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Effectiveness of Positive Deviance Approach in Promoting Appropriate Breastfeeding Practice in Jimma, Southwest Ethiopia: A Cluster Randomized Controlled Trial

By: Yibeltal Siraneh (MPH, PhD Candidate)

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Name of the candidate: Yibeltal Siraneh, Signature_____date:_____

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1. Promoter (First)

Name: Dr.Zewdie Birhanu; Signature_____Date_____

Department of Health, Behavior and Society, Faculty of Public Health

Jimma University, Jimma, Ethiopia

2. Promoter (Second)

Name: Prof.Mirkuzie Woldie; Signature  Date_____

Fenot Project, Department of Population and Public Health, University of British Columbia, Addis Ababa, Ethiopia; and Department of Health Policy and Management, Faculty of Public Health, Jimma University, Jimma, Ethiopia.

External Examiner

Name: _Dr.Eshetu Girma_____Signature_____approved___Date___27/6/2022__

Internal Examiner

Name: _____Signature_____Date_____

Abstract

***Background**: Breast feeding (BF) is one of the most important postpartum care to the newborn to survive which should be initiated within an hour of birth and continue exclusively in the first six months. However, suboptimal BF contributes to a significant number of infant deaths in developing countries. Positive Deviance Approach (PDA) was not tested and studied so far, whether it improves the poor practices of Exclusive Breast feeding (EBF) and Timely Initiation of Breastfeeding (TIBF) in Jimma town. Along with, understanding the end-user satisfaction and its drivers was essential to determine whether this approach will be viable in the long run. In a certain intervention, measuring implementation outcomes (the effects of deliberate actions) to explain the process and desired outcomes is paramount. In this regard, to what extent the participants' perceive/rate these outcomes were not known. Moreover, these psychometric outcome measures lack conceptual clarity, reliability and validity to the context.Very importantly; this behavioral intervention was not evaluated for its usefulness.*

As a result, we designed a study with the following objectives; (1) determine the effectiveness of PDA in increasing the proportion of EBF practice, (2) determine the effectiveness of PDA in increasing the proportion of TIBF, survival probability of timely initiation and its pooled predictors, (3) determine the level of end-user satisfaction with PDA intervention and identify multi-level predictors to explain variability, (4) measure implementation outcomes, determine valid and reliable scales and analyzing their correlation and variation, and (5) evaluate the cost-effectiveness of PDA in promoting EBF.

***Methods**: A cluster-randomized controlled trial was employed in Jimma town from February 01 to September 30, 2018. Six randomly selected clusters(Kebeles) were randomized into two arms. Then 260 pregnant women who met the eligibility criteria were enrolled either into the intervention or control arm depending on where they lived. Women in the intervention group received informational counseling and social support in addition to the usual service to promote EBF, from women-identified and trained as positive deviants in their community, while those in the control groups received the usual community-based services from urban health extension professionals. Data on primary and secondary outcome variables were collected at three points, and statistical difference was estimated using Chi-X^2 or Fisher exact test. The net effect of the intervention was determined. The magnitude of the intervention effect was estimated using the relative risk (RR). General Linear Model (GLM) for repeated measures, while log-binomial regression-Generalized Estimating Equations (GEE) for a point measure considering binary outcomes were used. The baseline, midline and end-line data were analyzed to see the effect on EBF, while only the midline data were used for TIBF. The survival data were summarized using estimates of survival functions with the Log-Rank test and compared by Kaplan-Meier (KM) curves. The predictors of time to initiate BF were estimated by Cox-regression model and interpreted using adjusting hazard ratio.*

The data for the end-users' satisfaction with and Implementation Outcomes (IOs) of PDA were collected between September 01-25, 2020, and from August 28, 2020 to September 30, 2020 respectively. The study participants for the satisfaction study were mothers and their relevant others (n=260 end-users) who are living in the intervention clusters, while intervention implementation participants/stakeholders (n=384) were for the IOs. End-users were invited to assess individual and community-level factors and their satisfaction. The validity and reliability of the satisfaction measurement scales was checked. The satisfaction mean scores were standardized using Percentages Scale Mean Score (PSMS) formulae. Two-level mixed-effects linear regression models were performed to fit individual, community, and mixed-level variables.

As a follow-up study, implementation participants were assessed for their perception toward implementation outcomes of PDA. The developed tool was validated. The determined mean scores indicates to what extent each scales were rated. Pearson's correlation, independent sample t-test or One Way ANOVA was used to see the relationship among these outcomes and mean variabilities against selected background characteristics. The explained variation of scales was checked using coefficient of determination (r^2).

A cost-effectiveness analysis was done considering the two trial arms such as intervention (n=130) and control (n=130). The design for this study was a mixed of alongside a cluster randomized controlled trial (cRCT) with decision models built on common causes of childhood morbidity and mortality, and maternal Health Related Quality of Life (HRQoL) for the first 59 and 6 months respectively. Checklist was used to collect input/cost data for both control (routine care cost) and intervention costs. Infant outcomes were analyzed from the literature and our trial report, while maternal HRQoL measured using an adapted EuroQol (EQ-5D) tool. Those costs and outcomes were compared between the arms. The main outcome measures were the intervention cost, Disability Adjusted Life Years (DALYs) for infants and maternal Quality Adjusted Life Years (QALYs). Data were analyzed using Excel-spread sheet 2013, and SPSS 21.0. Independent samples t-test and One Way ANOVA were used to compare the mean scores, and mixed-effects linear regression model was fitted to determine the effect size. In analyzing data for all of these studies, assumptions were checked as appropriate. For every statistical tests, 95% CI with a P-value of < 0.05 was used.

***Results**: While analyzing the data to evaluate the effectiveness of PDA on EBF and TIBF practices, EBF was significantly different between the groups at mid and end points, while no difference at baseline. A higher proportion of mothers in the intervention group reported EBF compared to the control group at mid and end-line. The rate of EBF increased by 18.5% (P=0.01) in the intervention group while 0.2% in the counterparts; with a net effect of +18.2%. The probability of practicing EBF was significantly higher for the intervention group compared to the control group. At baseline, the relative risk of avoiding EBF was similar among the two groups. However, at follow-up, mothers in the intervention group were 2 times more likely to practice EBF compared to those in the control group. Similarly, TIBF was significantly different between the groups at midline but not at baseline. A higher proportion (60.47%) of mothers in the intervention group initiated timely BF compared to the control group (27.1%) at midline, with a net effect of +27.3%. Unlike the baseline, mothers in the intervention group were almost 2 times more likely to initiate BF timely (RR:1.64, 95% CI:1.268-2.121; P:0.000) compared to the counterparts. The life table showed that half of the BF initiation occurred in the first hour of birth in the intervention group while takes longer time in the control group. The timely initiation survival probability was 65% in the intervention group whereas 40% in the control group. The median time to initiate BF was 1 and 2 hours in the intervention and control group respectively. Cox-Regression revealed that parity, sex preference, mode of delivery, the health status of mother, support of relevant others, knowledge, and attitude of EBF were pooled predictors of TIBF (p<0.05).*

Findings from the analysis of end-users' satisfaction showed that the overall level of end-users' satisfaction (PSMS) with PDA as an intervention to improve EBF was 50.9% with a maximum score of 99% and a minimum of 8%. Of the emerged satisfaction measuring scales, the standardized mean score for the user empowerment scale was the highest (53.7%). Five scales were emerged with 84.2% of the total variability explained in users' satisfaction. The mixed-effect model revealed that age, occupation, experience of breastfeeding(BF), knowledge,

attitude, self-efficacy, main source of BF information, previous home visit/support received from HEPs, participation in any social activities, and perceived community support for BF were independent two-level predictors of satisfaction.

Whereas, the findings from the assessment of IOs of PDA revealed that the total variability explained by the emerged scales was 72.1%. Valid and reliable 52 items were developed to measure these outcomes. The maximum mean score was for 'appropriateness scale' 27.81 (6.5SD), while the minimum was for 'implementation cost scale' 11.37 (5.2SD). The overall mean score was 164.18(26.8SD). Majority (66.7%) of outcomes of PDA were highly rated. Implementation fidelity, penetration, organizational readiness, and sustainability scores were positively and significantly correlated with acceptability of the approach. Furthermore, significant mean differences were observed between sexes, educational status, roles of the participants and level of engagement. Of all the explained variations among the measurement scales, the maximum variation explained was observed between acceptability and implementation fidelity (36%).

Finally, the cost-effectiveness analysis revealed that the mean PDA intervention cost per person (infant-mother pair) was $5.9 more than the usual care estimated for 6 to 59 months. The mean incremental DALYs and QALY of the intervention were 0.40 and 0.18 respectively. The Incremental Cost-effectiveness Ratio (ICER) for infants and mothers were $14.75/DALY averted and $32.8/QALY gained respectively. Each extra DALY averted for infants and QALY gained for mothers by the PDA as an intervention to promote EBF relative to the control group costed (or will cost) $14.75 and $32.8 USD respectively.

***Conclusion**: PDA is an effective intervention strategy to promote EBF and TIBF. It was also effective in shorting the time to initiate BF, median time, and the survival probability among the intervention group. More than half of the end-users were satisfied with PDA, and the variabilities were predicted by multi-level factors. This study also identified nine valid, reliable and well explained IO measures that help to understand the intervention reality. Majority of outcome measures were highly rated by intervention participants which suggest as it is a promising approach to promote EBF by PDs. However, addressing the perception of participants about feasibility, adaptability and cost issues need great attention before and during implementation. Objectively, this approach is feasible and cost-effective. Therefore, we recommend the use of PDA to promote EBF as an added strategy to the existing maternal and child urban health program.*

***Keywords:** Effectiveness, positive deviance approach, exclusive and timely initiation of breastfeeding, survival probabilities, user satisfaction, multi-level predictors, implementation outcome measurement scales, cost-effectiveness, cluster randomized trial, follow-up study, Ethiopia*

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Abbreviations

ANC=Ante Natal Care
AOR=Adjusted Odds Ratio,
BCC=Behaivior Change Communication
BF=Breast Feading
C/S=Cesarean Section
CFA=Confirmatory Factor Analysis
CHWs=Community Health Workers
CI=Confidence Interval
cRCT= Cluster Randomized Controlled trial
EBF=Exclusive Breast Feeding
EBF=Exclusive Breastfeeding
EFA=Exploratory Factor Analysis
FA=Factor Analysis
FGD=Focus Group Discussion
FMoH=Federal Ministry of health-Ethiopia
GA=Gestational age
GEE =Generalized Estimating Equation
GLM=General Linear Model
HDA=Health Development Army
HEPs=Health Extension Professionals
HEWs=Health Extension Workers
HP=Health post
HPs=Health Professionals
IDI=In-deep Interview
IRB= Institutional Review board
KM=Kilo meters
KMC=Kangaroo mother care
MDG=Millennium Development Goals
MLM= Multi-Level Modeling
MOH=Ministry Of Health
MPH=Masters of Public Health
NMR=Neonatal Mortality Rate
PCA= Principal Component Analysis
PD=Positive Deviance
PDA=Positive Deviance Approach
PDI=Positive Deviance Inquiry
PDs= Positive Deviants
PHC=Primary Health Care
PNC=Post-Natal Care
PSMS (%SMS)=Percentages of Scale Mean Score
RCT=Randomized Controlled trial
SD=Standard Deviation
SDG=Sustainable Development Goals
SEM=Structural Equation Modeling
SPSS=Statistical Package for Social Sciences
SVD/VD=Spontaneous Vaginal Delivery
TVE= Total Variability Explained
U5MR=Under 5 Years of Child Mortality Rate
UHEPs=Urban Health Extension Professionals
UNICEF=The United Nations International Children's Emergency Fund
USD=United States Dollar
WDA=Women Development Army
WHDA=Women Health Development Army
WHO=World Health Organization

Chapter One

1. Introduction

1.1. Background

Breast feeding (BF) is one of the most important postpartum care to the newborn to survive if practiced appropriately. Exclusive Breast Feeding (EBF) is the situation where the infant has received only breast milk except for supplements, vaccines or medicines in the first six months. EBF is one of the most important BF pratices to the newborn that could be initiated at health facility or home bases to thrive and survive (1,2). Essential newborn care emphasized on initiation of early and exclusive breast feeding as primary focus of newborn care. During those caring practices, in addition to the general care, supporting the mother to initiate timely BF and sustain EBF, observing while breastfeed and assess attachment and suckling, help to improve position and attachment were some of the care to be provided in the first week and beyond (3) to improve nutritional status.

Infants suffer from high rates of acute malnutrition, which is primarily attributed to poor breast feeding practices, poor health-seeking behavior and poor sanitation and hygiene due to many factors (4). In Ethiopia, poor breast feeding practice is reported especially in urban settings (5–11). Due to these and other factors, stunting was 38%, while severe stunting was observed in 18% of children aged under-five. In addition, wasting and underweight were 10% and 24% respectively (12). The fact that, significant proportions of children in Ethiopia were not fed according to the World Health Organization (WHO) recommended feeding practices (1,12). In order to address poor breastfeeding practices, the child survival and development strategy was designed which aims at accelerating and scale up of evidence-based high impact, safe and cost-effective interventions such as timely initiation and EBF (13). For this reason, components of essential newborn care were considered in the guideline in order to promote optimal breastfeeding practices (14).

Despite these interventions, global burden of neonatal deaths continued. From 2015 onward, for 15 years, with further implementation of proven health interventions, it is anticipated that the infectious causes of death will decline. However, most of these deaths happen during the first month of birth that can be prevented with EBF as an effective and feasible intervention (15). For this critical time, WHO recommended three packages for training and supporting Community Health Workers (CHWs) for caring the newborn at home (3,15).

To contribute for these efforts, a Positive Deviance Approach (PDA) led community-based intervention was conducted to measure its effectiveness on Timely Initiation of Breastfeeding (TIBF) and EBF. It is an approach to behavioral and social change based on the observation that in any community there are people whose uncommon but successful behaviors enable them to find better solutions to a problem than others, despite facing similar challenges (16). We have implemented an intervention using this approach to improve TIBF and EBF practice having the assumptions; (a) communities already have the solutions (they are the best experts to solve their problems), (b) communities are self-organized and have the human resources and social assets to solve an agreed-upon problem, (c) collective intelligence and know-how is not concentrated in the health leadership alone or in external experts but it is distributed throughout the community that can be applied to specific problem requiring behavior change, (d) sustainability as the cornerstone of the PDA (community to seek and discover sustainable solutions to the problems), and (e) it is easier to change behavior by practicing rather than knowing about it (16,17).

The most efficient way to improve health is to use locally available, sustainable, and effective approaches after rigorous testing (17). In this study, we have tested and discribed how the PDA works or not works given that its effectiveness always depends on contextual factors while applying such a generic approach for local problem solving. This means the concept of PDA is not one size fit for all rather it needs to start from the scratch to test its effectiveness anywhere. This approach requires discovering uncommon positive cases that fulfil criteria pre-set examples. Rare examples are costly to identify and to promote, while highly common examples fail to stimulate new thinking (18,19). In the process, following relevant ways of communication and psycho-social support (informational, emotional, instrumental and appraisal support) is needed to improve breast feeding practice. Health communication is an important part of community health interventions to bring behavior change if it is well defined, contextualized (co-created) and tailored. Of the known features of communication ways for social change (20), individual behavior change is a core to bring social influence where individuals who adopt a new health behavior advocate its adoption to other individuals. Then community dialogue and collective action in which members of a community take action through their network to solve a problem of EBF practice (21).

In line with such intervention, determining intermediate and implementation outcomes are strongly recommended (22–24). This is because of measuring such constructs is equally

important as of measuring effectiveness on the client, behavioral and health outcomes to understand why and how effective or ineffective. Although defining the outcome measure of a given intervention is controversial and subjective to the goal or objective of the intervention depicted at the design stage, service and client outcomes are defined as effects upon the target population (25). Whereas, implementation outcomes' are the key elements of the implementation process and are the effects of deliberate and purposive actions in implementing new approach, and used as indicators of the implementation success and key intermediate outcomes to explain the intervention effectiveness (24). These outcomes are themselves interrelated in dynamic and complex ways to unlock the black-box (26). Thus, measuring different level of outcomes and cost-effectiveness of PDA are important perspectives to understand in this study (24,27–29).

1.2. Statement of the problem

1.2.1. Exclusive breastfeeding practice

Breast feeding (BF) is one of the most important postpartum care to the newborn to thrive and survive (1,2). Appropriate breastfeeding is critical for optimal growth (30), brain development and cognition (30). Poor feeding in infanthood is associated with negative health outcomes on cognitive development, morbidity in latter life and overall economic productivity (31). Infants suffer from high rates of acute malnutrition, which is primarily attributed to poor breast and other feeding practices (4). EBF for the first 6 months after birth was associated with greater weight-for-height score (32). WHO recommends EBF for the first 6 months of life, with continued BF together with proper complementary feeding for up to 2 years of age (33). However, evidences showed that there are substantial EBF gaps reported for which new interventions are needed.

Breast milk provides all infants nutritional and fluid needs in the first six months and is a perfect combination of different nutrients. It is the best and cost effective intervention to reduce infant morbidity and mortality from infectious diseases that disproportionally affect children under five in developing countries. Mothers, therefore, are encouraged to feed breast milk only for the first six months (3). Breastfed babies got fewer infections; i.e., less diarrhea and vomiting, chest and ear infections since breast milk makes a baby's immune system work best (34). Hence, early supplementation such as pre-lacteal feeding is discouraged for several reasons: it exposes infants to pathogens and increases their risk of infection, decreases infant's intake of breast milk and suckling, and supplementary food is often nutritionally inferior at this age.

Suboptimal breastfeeding contributes 45% of neonatal infectious deaths, 30% of diarrheal deaths

and 18% of acute respiratory deaths among under five children in developing countries (6). In Ethiopia suboptimal breastfeeding contributes to 70,000 infant deaths per year, i.e., 24% of the total infant death annually (35). Worldwide optimal breastfeeding has the potential to prevent 1.4 million under-five deaths (36). However, globaly large proportion (45% in 2015) of the deaths in children under age five years occurs in the first month of life. This will continue due to infectious causes unless EBF practice promoted. Sub-Saharan Africa's share of global child deaths is expected to increase from 49.6% to 59.8% by 2030 (35,37,38). Identifying the major factors that contribute to neonatal deaths to design and implement intervention strategy is imperative.

Despite the existence of different interventions, the global burden of neonatal deaths is still unaccetably high. From 2015 onward, for 15 years, with further implementation of proven health interventions, it is anticipated that the infectious causes of death will decline more quickly. However, because of the high number of births, Sub-Saharan Africa's share of global child deaths is expected to increase from 49.6% to 59.8% by 2030 (35,37,38). Most of these deaths happen during the first month after birth, which could be due to preventable conditions through practicing EBF (15). The first day is considered as the most dangerous time period for the mother to breastfeed and to the newborn to survive (15). In this critical time, caring for newborn through home visits (3,15) is recommended. In addition to the general care and counseling, supporting the mother to initiate timely and sustained EBF is also expected care to be provided by the health extension professionals (HEPs). A total of five visits such as two during pregnancy, on the day of birth, at third and seventh day are strongly recommended (3). Additional visits are also proposed for low birth weight babies. However, its implementation is questionable in urban settings of Ethiopia (38).

Reduction of high neonatal mortality is an urgent priority in many countries of the world. For example, Nepal has high rates of home delivery and poor community-based services. The country, however, had success in reduction of under-five mortality due to the implementation of community-based child health programme provided by focal community health volenteers following the Lancet recommendation as outreach and family-community care. Studies suggest that home visits can reduce newborn deaths in high mortality settings by 30% (39) and above. Although there were some community based programs in place in Ethiopia still 59/1000 children under the age of one die. High proportion (90%) of child deaths in Ethiopia are due to pneumonia, diarrhea, malaria, neonatal problems, malnutrition and HIV/AIDS, and often a

combination of these conditions (40). Even if planned to reduce neonatal mortality ratio from 28 to 11 per 1,000 live births by 2020, it was increased to 30 per 1000 live births (41). Though guiding principles to implement the strategy was set, the achievement so far indicates that adequate preparation is not made to properly implement the interventions and to learn best practices (42). Hence, promoting EBF by applying a new approach could be one of the means of mitigating these challenges if found to be effective.

In Ethiopia, poor BF practice is reported disproportionately high in urban settings. Due to these poor feeding practices, stunting, wasting and underweight were reported significantly(12). The fact that significant proportions of children were not fed according to the WHO recommended practices (1,12). To address this, the child survival and development strategy was designed nationally. This aims at accelerating and scale-up of evidence-based high-impact, safe and cost-effective interventions which is EBF for the first six months (13). For this reason, as a component of essential newborn care, a guideline was adopted to promote BF practices at the community level (14). However, still suboptimal BF contributes 24% of the total infant death annually(35). Community health programs expected to address such basic health issues since the period of the primary health care movement. Following this, the Health Extension Program (HEP) has been implementing at urban settings since 2009 with essential health promotive and disease preventive packages (43).

The premise of HEP is to improve access and quality of primary health care for communities through the transfer of health knowledge and skills to households. Accordingly, the main strategy is building the capacity of families to be "model households. As per the 2013 revised health extension implementation guideline of the ministry, the expected model family training hours is 60. The definition of model family is a family that implemented all (100%) health extension packages concerning its family with the support and close supervision of health extension worker(43). The expected changes to be a model household include visible changes in behavior. Even if the plan of the HEP is to qualify all households as model households within three years of the program, eight years after the program implementation, the achievement was low (39). Failure to achieve these targets will adversely affect progress towards achieving Sustainable Development Goals (SDG) and the health sector transformation plan of the country (43). In Ethiopia, approximately 4 million out of 16 million households (26%) had completed the model household training. However, only 4.3% of households were certified as model household

which is very low as compared to the total coverage(43). Besides, only 56.8% of the HEPs have a work plan and the involvement of other stakeholders in its preparation is low (44).

Therefore, identifying strategic approach and implementing in context is demanding in Ethiopia. Accordingly, of the identified and prioritized 34 interventions in the Ethiopian Child Survival Strategy, 17 are to improve neonatal survival(35). However, most deaths took place during the first month of birth due to conditions that can be prevented with effective interventions such as EBF. The first day is considered as the most challenging time for the mother to breast feed and for the newborn to survive(15). Thus, community-based packages should be delivered at home (15,35) appropriately. However, in Ethiopia, deaths were continued-still 59/1000 children died under the age of one, of which 90% deaths were preventable by practicing EBF (40), and poor performance of HEPs was reported (40,45). Nationally, 59% of infants exclusively BF till six months, which declined from 71% in the first month and the median duration of EBF was 3.1 months. Although BF rates are improving (from 49% in 2005 to 59% in 2019), the practice is sub-optimal to decrease infant deaths (41). This evidenced by the neonatal mortality ratio which went from bad to worse (41). Though guiding principles to implement the strategy were set, the achievement so far remains poor and indicates inadequate preparation. Hence, promoting the practice of EBF by implementing a new approach could be one of the strategies of primary health care and rigorously testing as we did in this study. An approach that is tested practically is needed to promote EBF practice (42). Positive deviance approach is one of the potential paradigms which is focusing on the idea that solutions to problems already exist within the community, often practiced by positive deviants (16). However, due to measurment and intervention challenges, there are research gaps on how can we design the most effective and efficient mechanisms to provide community based strategy that can explain how different aspects of implementation influence the outcomes.

In Jimma town, 16,000 mothers completed the model household training package–placing it below average nationally. Training packages are 16 modules related with health promotion and prevention aspects of different community health problems. Each module has content, objectives, and mode of delivery to be given for 60 hours. The household with a trained woman called ‘a model household’-a family that implemented all health services extension packages concerning its family with the support and close supervision of health extension professionals. The expected changes to be a model household include visible changes in behavior. Evidence showed that

model families were not actively participating in the implementation of the packages(45,46). Low (4.3%) practice of home visit by HEPs or HDA leaders, poor social support, negative subjective norms about EBF and its challenges at weaning period, career or job-related challenges to practice EBF, increasing intention toward industrial products(45,47), and gap on predisposing, enabling and re-enforcing factors of EBF were the common challenges(48). In the study area, low proportion of EBF (33.2%) (7) was reported compared to the national (59%) and rural settings (67%) (6,41). As far as the investigators knowledge, there is no evidence on the effectiviness of PDA in promoting EBF in Ethiopia as well as in other parts of the globe. Therefore, since there was no evidence related, we implemented a trial using PDA which aimed to determine its effectiveness in increasing the proportion of EBF practice.

1.2.2. Timely initiation of BF practice

Timely Initiation of Breast Feeding (TIBF) is providing breast milk to the newborn within an hour of birth,which can be also extended to 24 hours of birth (49,50). However, to be said timely and beneficial, it should be initiated within the 1st hour after birth. This ensures that the infant receives the colostrum or 'first milk' which is rich in protective factors such as antibodies (51). The time to initiate breast feeding practice is the time at which the baby was first breastfed after delivery although it varies among practitioners(50). Conventionally, every mother should be supported to initiate BF within an hour after delivery. This support should be practical to enable them not only to initiate but also to establish BF, sustain, and be able to manage common BF difficulties(52). However, there are limited social support interventions to promote timely initiation of BF particularly in urban settings.

TIBF after birth is an inseparable part of the safe delivery process (52,53) and empirically acknowledged as beneficial practice and cost-effective intervention that can reduce 55-87% of neonatal morbidity and mortality related with infections (54–56). Evidence shows that initiating BF within an hour after birth reduces the probability of dying within 28 days of age by 29% as compared with those who initiated within 2-23 hours of birth (57,58). TIBF can also prevent 22% of all neonatal deaths (59), and a recent Lancet series revealed as it can reduce up to 44% considering different contexts (60). In addition, timely initiation of BF increases the bond with the mother, stimulate milk and oxytocin production, promote durable breast feeding practice, reduce risk of obesity in later life and for the health of the mother such as reduce post-partum bleeding, breast engorgement, and associated pain, and risk of breast cancer (61,62).

The neonatal period is the most vulnerable time for a child's survival. Children face the highest risk of dying in their first month of life at an average global rate of 18 deaths per 1,000 live births in 2018. Though remarkable progress made, still approximately 5.4 million under-five children die globally each year. Of these, close to half (2.5 million) deaths occur on neonates. The other inequality is that majority of these deaths occur in low-and middle-income countries(63). Ethiopia has made remarkable progress in reducing under-five child mortality (35). However, the mortality reduction was not uniform across the different childhood age groups, where neonatal mortality is decreasing at a slower rate accounting for 41% of under-five deaths(12,34). In contrary, neonatal mortality rate is standard indicator for evaluation of health status of a country. Identifying the major factors that contribute to these deaths and designing a new intervention strategy to promote timely initiation is needed.

Although some factors related with child mortality were identified and targeted as shown (64) below in **Fig.1**, the neonatal mortality is still the grand challenge problem that could be averted by TIBF and EBF. This means those factors contributing for malnutrition could be avoided through those practices.

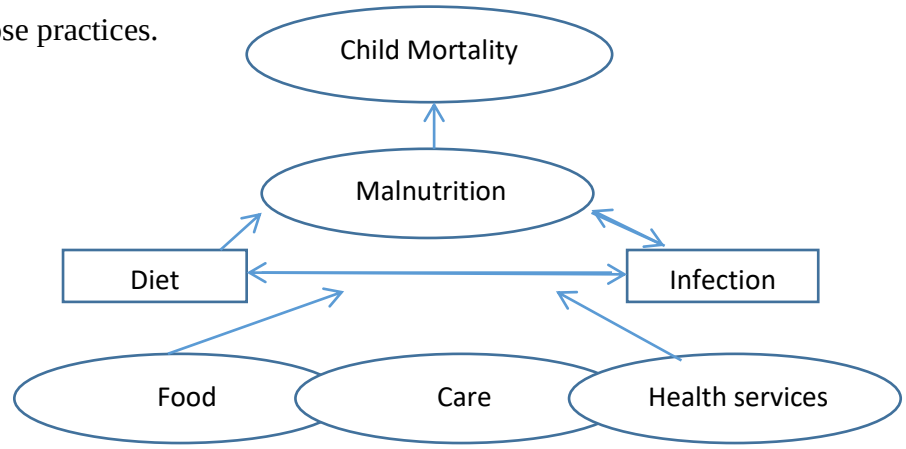

Figure 1. UNICEF conceptual framework of child health and survival, 1992.

Despite the importance, many mothers fail to initiate BF immediately after birth irrespective of the countries they live in. Each year, globally (50%) and in Sub-Saharan Africa (52.8%) of neonates don't get breast milk within an hour of birth, the figure ranges from 17% in Guinea to 95% in Malawi (65–67). Analysis of demographic health surveys from 46 countries showed more than half of the countries reported initiation of BF within the first hour of birth for less than 50% of newborns, and no country reported a proportion more than 80% (68,69). In contrary to these findings, the Lancet reported that 49% of 68 low and middle income countries (LMICs) for which data were available reported more than 50% of newborns started BF within an hour. Just

one country (Kyrgyz Republic) reported the highest-80%. Surprisingly, 50% of LMICs had no data on TIBF practices even if it is much better as compared to high income countries (HIC) (6/27 countries had data-with the highest rate reported in Italy-94% and the lowest in Saudi Arabia-23%)(61). The National Health Service publication reported that the TIBF rate is not known in the UK but merely 75% of neonates initiated BF without specifying the exact starting time, while 54% in the USA that increased from 29% through hospital-based initiatives(70,71). In Ethiopia, worse to note, the proportion of TIBF increased from 51% in 2000 to 69% in 2005 and then decreased to 52% in 2011 while again rose to 73% in 2016. The median duration of BF decreased from 25.2 months in 2000 to 23.9 months in 2016(6). Studies reported that TIBF practice of 58.3% in Addis Ababa, 78.8% in Motta Town, 62.6% in Debre Birhan Town, and 73.1% in Denbecha District (72–75). The reasons for this fluctuating pattern nationally and difference across cities and settings were not clear.

Several factors influence breastfeeding practice including mothers' socio-demographic, obstetric characteristics, factors related to critical practices, and events around the time of birth (76). Factors that are often associated with TIBF were maternal age, education, place of residence, household income, Place of birth, maternal occupation, cultural beliefs and/or traditional feeding practices, counseling services provided during antenatal and postnatal visits, parity, mode of delivery, pregnancy and BF intention, the number of children have at birth, information regarding BF practice, attitude and skill of practicing BF (72,74,77–85). Amazingly, in Bangladesh a 10 years survey showed that one of the factors for not timely initiating BF was giving birth at a health facility compared to home delivery. This means mothers who gave birth at the facility were less likely to practice timely initiation than those who gave birth at home (86). Although these factors may differ according to regions and states- cultural beliefs and traditional feeding practices may prevent mothers from initiating breastfeeding immediately post-birth. In Ethiopia, for example, mothers discard colostrum because of the negative perception they have as it may harm the newborn (87). Furthermore, in north-eastern Ethiopia, late initiation of BF was associated with pre-lacteal feeding practices such as raw butter feeding since they perceive as it is better than colostrum (88). These known and other unknown factors may contribute for the current practice in Ethiopia.

Following the WHO recommendation (50–52), to practice TIBF as a simple and important intervention, many efforts have been made by national and international organizations to support

and encourage mothers (89). However, as we summarized above, still the global, continental, sub-Saharan African and Ethiopian proportion of TIBF is not satisfactory. For example, the baseline of our study conducted in Jimma revealed that 34.6% and 28.5% of mothers timely initiated BF for the previous last child in the intervention and control group respectively. Many evidence including several systematic reviews revealed that sound intervention which promotes TIBF with sustained exclusiveness is needed (90–92). To fill these strategic and evidence gaps, we have implemented a trial at community-level. However, the data related with this concern were not analyzed so far. Hence, this study determined the effectiveness of PDA in increasing the proportion of timely initiation, and predictors of time to initiate BF practices.

1.2.3. Service outcome (end-users satisfaction)

In Ethiopia, poor BF is reported especially in urban settings (6,7,41,93). Due to many reasons and contextual factors, timely initiation and EBF is challenging (8,93–97). The challenges could be attributed to mother's age, occupation (maternal employment and maternal leave), marital status, sex preference, wealth status, mode and place of delivery, limited social and community/family support, mis-use and mis-understanding the benefits of industrial products, gaps in pre-disposing, enabling and re-enforcing factors of EBF (8,93–98). To promote EBF as it is a proven intervention, there are considerable challenges of selecting an approach that fulfils the need and expectation of mothers (1,16,22,99).

PDA focuses on changing behaviors of those who directly (caregivers) or indirectly (relevant others) influence child nutritional status by improving feeding practices (100–102). The main nutritional intervention after birth is breastfeeding practices. These are affected by various factors such as healthcare related, sociodemographic, psychosocial, cultural, community, and policy related. Late initiation and shorter duration of EBF has been reported as one of the main reasons for malnutrition in infants (103). Hence, an approach that applied to solve such problems needs to fulfill the expectation, feeling and preferences of mothers to satisfy in the process and sustain the practice. The PD Hearth approach was used as a behavioral change intervention which targeted families of children with malnutrition to introduce locally-discovered positive practices. The premise was as an individuals who share the same poor socioeconomic characteristics as their community members but manage to find ways to overcome barriers without external interventions (104). In 1976, Wishik described an approach that identified deviant behaviors, which are affordable, acceptable, and sustainable, practiced by the caretakers

of well-nourished children from poor families and suggested transferring such positive practices to other community members (105). The term 'Positive Deviance (PD)' was first used by Zeitlin in 1990 (106). Hearth programs were originally modified versions of the Nutrition Demonstration Foyer (NDF) program that originally evolved from Mothercraft Centers in Haiti, where volunteer mothers prepared and fed meals to malnourished children in outdoor kitchens. In the 1990s, the concept of PD was combined with Hearth sessions—called PD Hearth programs—and were implemented in Haiti, Bangladesh, and Vietnam (107,108).

Ethiopian mothers' knowledge and beliefs towards breastfeeding are not well known. However, few studies have pointed out current barriers in promoting such practices. Colostrum was often discarded as it was considered to cause abdominal problems, and ritual pre-lacteal feeding was often reported (109–111). Mothers recognized colostrum and breast milk as different substances (111). Though maternal knowledge about the nutritional value of human milk and breastfeeding duration was good, the majority of mothers preferred not to breastfeed during illness of mother or child or when busy at work place (109). Majority of mothers began complementary feeding at the child's age of 4-6 months, mainly because the mothers believed that amount of breast milk would not be adequate for the infant-age (110). Having such potentially harmful beliefs which could lead to poor health outcomes, mothers should be well-addressed through culturally tailored and context-specific behavior change communication strategies that fit for their need and context.

To address such gaps, lactating mothers are always in need of psychosocial support from someone available around. Learning mechanism can affected by source credibility, fact presentation and actual support provided (112) that may determine their satisfaction. In the helping process, engaging relevant others is a central to work on interpersonal communication that has more likely to affect adoption of the new behavior. In such approach, positive deviants are central to influence the behavior. To guide how to frame the message, relevant assumption (112) should be considered. Explicitly demonstrated behavior and positive re-enforcement enhance the impact of message, and audience involvement matter to understand and to act. When audiences think of or understand the consequences of their action with regard to BF practice, they would change their behavior if the psychosocial support was consistent with their interest (113). Behaviorists recommended that interpersonal communication is the most powerful to influences an intended behavior even if it is an expensive approach. In addition, practicing TIBF

and EBF are not an easy to be practiced with other modalities rather close follow up, coaching, social and psychological support play crucial role (113). Social support is perception that one is cared for and loved or has a confident or intimate friend. The degree to which a person's basic social needs are gratified through interaction with others-may be seen as the emotional and instrumental support that is obtained from one's social network. Overall it appears that all the definitions imply some form of positive interaction provided to someone in need of support (114). There are different types of social support such as (a) emotional support-includes provision of care, love, and empathy built on relationship of trust, (b) instrumental support-includes providing tangible aids or support practically, (c) informational support: involves providing information or advice or suggestions to another in a time of need, especially problems solving situations. The richest source of this form of support is often from trained personnel with lived experiences. However, informational support can also be provided by friends and family after taking training, and (d) appraisal support: often included as part of informational support which facilitates self-evaluation through constructive feedback. Involve the communication of key information that is relevant in self-evaluation situations(114). Studies have shown social support has many positive effects on health and well-being, including: fewer complications during pregnancy, increasing compliance with prescribed medications or recommended practices, increased levels of self- esteem, facilitates coping and adaptation to change behavior, and overall, increased life satisfaction(21). These supports can be integrated and provided through home-visit to improve the clients or service outcome.

Measuring different types of outcomes is recommended in implementation research. However, defining the outcome measure of a given intervention is controversial and subjective to the goal or objective of the intervention depicted at the design stage. Generally, an outcome is defined as effects upon the target population which is measured among the end-users of the service (25). To understand the variety of these effects, most of the intervention may have primary, secondary, or sometimes tertiary outcome measures (25,115). Those outcomes could be implementation outcomes, service/client outcomes, or behavioral/clinical outcomes (22,24). The conceptual distinction among these three types of outcomes is also another source of disagreement among scholars. Of which, service outcome is an intermediate outcome which could be effectiveness, efficiency, safety, client-centeredness from an interventionist perspective, while satisfaction from the end-users perspective (24).

Evidence of systematic review reported that among intervention studies included in the review, in 57.1% of the studies, clinical or behavioral outcomes were measured (116), while client and/or service outcomes were not assessed. This means in a given interventional study, intermediate service outcomes were less measured as compared to the ultimate outcomes (116).Thus, there are key questions in evaluating implementation research such as how to conceptualize and measure an intermediate outcome (user satisfaction) (22,25). Measuring the intermediate outcome is equally important in understanding the effect of the intervention on the ultimate outcome (22). In many implementation types of research, the challenge is not only selecting a certain approach but also measuring its short-term and long-term outcomes at the same time (22,24,25,116).

In this study, an outcome is conceptualized and measured as an intermediate result of the service provided as perceived by the end-users (24). End-user satisfaction is the general service outcome measure of a given intervention including the process and intermediate results. Intermediate outcome is measured by psychomotor domain after the actual encounter of the overall services, while implementation outcomes are measured by the cognitive and affective domain of the respondent from general understanding, perception, and encounter of each segment of the service (24,117). According to WHO and Enola Proctor's implementation framework, measuring intermediate outcome can address both the concern of program responsiveness and client responsiveness, while measuring implementation outcome focus only on the program responsiveness, fidelity, and future fate (22,24,117). As an intermediate outcome, user satisfaction represents a complex mixture of perceived need, individually determined expectations, and experience of service which could be health or non-health-related matters (24,118).

Thise outcome may be measured at any stage (pre-implementation, throughout implementation, post-implementation) according to the nature of the intervention and outcome of interest (24). Selection of outcomes may be differentially relevant to various stakeholders (22). However, to ensure the transferability of intermediate outcomes across a range of settings, stakeholders' priority should be represented in the measurement process (24,25,119). The literature suggests that user satisfaction can be captured at different times after the implementation (24,117,118). But some studies fail to specify a timeframe or are inconsistent in the choice of a time point (24,26,99). So far, client outcome was not measured, characterized/described, and the variability was not predicted in the earlier trial. Hence, understanding the end-user's level of satisfaction

and its drivers is essential to determine whether this approach will be viable in the long run. Therefore, we aimed to determine the level of end-users satisfaction with PDA implemented to promote EBF, and identified multi-level predictors to explain variation in satisfaction.

1.2.4. Implementation outcomes of PDA

Behavior change is primary target in low-income countries like Ethiopia where expenditure on health and its interventions are low. The key question in such behavior change intervention is how to predict and modify the adoption and maintenance of behaviors (102,120). A change in behavior of mothers is needed to address BF practice (121,122). Thus, the PDA can be one of the options to implement; quickly identifying the positive deviants, efficiently gathering and organizing the positive deviant knowledge, motivating others to adopt the approach, sustaining the change and scaling such interventions (106). As reported from Vietnam, this approach was implemented to improve problem of young child malnutrition. About 64% of children weighed in the pilot villages were malnourished at the beginning, while decreased by 21% at the end. It was effective but the implementation process was not clearly reported. Instead of simply telling participants what to do differently, they designed the program to help them act their way into a new ways of thinking (123).

Positive deviance in health and development means that some people exhibit good outcomes against the odds. Within the international health community, the PD approach has been most commonly applied to the study of child nutrition. Over the past three to four decades, programmers have integrated PD-informed programs into a number of large-scale multifaceted interventions(19). Save the children's community empowerment and nutrition program in Viet Nam(124) is one example of these. The PDA guides formative research through the positive deviance inquiry (PDI), mobilizes communities through active participation, reflection, and planning, and changes behavior through the transfer of skills by encouraging target audiences to model PD practices. Previously, the objective of the PDI has been to identify the specific practices that in spite of harsh conditions to have better outcomes. These practices may be well-known behaviors in the community (125) (i.e., exclusive breastfeeding) or local adaptations of key behaviors. Hence, clearly describing the implementation outcomes and mechanisms while using the PD approach are needed. This may help to learn how PDA could be seen by the participants in relation to EBF practices. In that study, the implementation process was described to understand the effect on the desired health as three sequential determinants: risk factors,

enablers, and behaviors. In the previous studies, risk factors were considered as the most commonly underlying determinants which are often socioeconomic conditions that are not easily or quickly modifiable. While enablers are determinants of behavior, such as knowledge, skills, confidence, norms, or availability of time or necessary commodities, and behaviors are practices associated with better health and survival.

In our review, no study tested the contribution of PD to promote EBF, for programmatic outcomes. We are unaware of any evaluations conducted to understand the implementation process and expected outcomes. Thus, the perceived quantitative attributable benefit of the PD-related activities remains unknown. An evaluation (124) of a given study pointed out that the PD inquiry was complete in theory, but its implementation was imperfect in applying household selection criteria, duration, and data gathering methods. Moreover, delivery of health messages informed by the PDIs was low unlike to the time spent for demonstration in that study. However, the encouraging behavioral outcomes resulted due to applying the PDA to child growth have prompted applications of PD to other contexts, including newborn care and infant feeding in Pakistan(18), young child nutrition in Viet Nam (124), and birth outcomes in Egypt (126). The potential to apply PD to areas of child nutrition encouraged us to review the method to better understand what the PD approach is, what it does, and how it works. If PDA is to be used successfully in other heath and non-health settings, the community should strengthen the conceptual pillars of the approach, particularly by looking at not only outcomes, but also at behaviors and what influence to clarify the role of this approach through understanding the implementation process.

Two approaches to program design are possible. One can provide direct opportunities to develop self-efficacy, a key determinant of behavior, or the other can identify specific determinants and tailor an intervention. The former approach rests on the observation that at least three conditions promote self-efficacy: persuasion that one can perform a behavior, vicarious experience of success, and positive feedback for performance. Acting one-self into a new way of thinking may be easier than thinking one-self into a new way of acting. The second program design approach calls for a detailed understanding of enablers to design an effective intervention. This could be accomplished through more in-depth PDIs that compare doers and non-doers among the same high-risk group perhaps using “counseling procedures” (47). In general, the use of PDA remains promising but may differ in context.

Our purpose is to explore if positive deviance can be a relevant concept to promote TIBF and EBF practice. Health promotion focusses on enabling individuals and communities to increase control over and to improve their health, whereas positive deviance focusses on stimulating the whole community to perform better. Positive deviance is used to develop interventions based on the successful behaviors and strategies of some individuals who benefited out of it. To expand these best practices, appropriate means of communication is recommended (124). For thus, inter-personal communication and social support is the impactful ways of communication to bring behavior change. Attempts have been made to define positive deviance in relation to health. However, there is no universal definition of positive deviance, which includes a description of the positive deviance approach and the positive deviance methodology. The concept of positive deviance is relatively new. Earlier, deviance was used to describe negative behaviors, attributes, or conditions with negative connotations. Within sociology, there was a debate about the term positive deviance. Some sociologists argued that the full scope of deviance, including positive and negative deviance, should be taken into account, while others argued that positive deviance was relevant to change behavior by diluting and replacing negative one. The first time that positive deviance was used to tackle a problem was in relation to child malnutrition. Positive deviance is also used successfully to tackle other health related problems, such as problems related to health care management, hospital infections, and reproductive health(124). Salutogenesis (a medical approach focusing on factors that support human health and well-being, rather than on factors that cause disease-pathogenesis), an approach used to promote health, focusses on the conditions leading to wellbeing and on factors associated with successful coping. Antonovsky, the founder of salutogenesis, emphasized the importance of looking at the deviance cases. In contrast to most sociologists, Antonovsky did not see deviants as negative, rather those individuals at risk of health problem (127). The main weakness of the positive deviance literature is that researchers have been unclear about their methodologies, findings and implementation outcomes, which is an important point that needs to be studied while applying it so that to be a standard approach in health promotion. Positive deviance has not been elaborately used to tackle health related problems, since it is a relatively new concept. However, the successes of positive deviance cannot be neglected in promoting child feeding using locally available and unique foods in low socio-economic settings. Therefore, positive deviance seems a relevant concept for

health promotion at community level to apply in context to test its effectiveness and measuring the implementation outcomes.

When we look back to the evidences, the positive deviance/Hearth Nutrition Program reported as the complementary feeding practices of Hearth-mothers were significantly better than non-Hearth mothers (47). However, there is no data on the effect of the positive deviance/Hearth program on TIBF, EBF and childhood health outcomes and the implementation process was not evaluated. In Viet Nam study, the existing knowledge, attitudes, and practices related to child feeding were documented (47). However, there is no data on how some mothers were able to combine working and breastfeeding/complementary feeding practices. Problems with low breastfeeding rates are not restricted to only developing countries. In the United States alone, 13 billion dollar per year could be saved on medical care and treatment if 90 percent of all women would exclusively breastfeed in the first six months. Especially black mothers and lower educated mothers have low breastfeeding rates. In order to understand why some women are breastfeeding than others, the PDI could investigate. Although this approach was implemented in different countries such as Viet Nam, Bangladesh, Haiti, united states of America and India (128). The implementation of the approach differed between the different countries, since there were no specific guidelines on how to use the approach. In order to develop the guide for replication, understanding implementation outcomes is very important and the enfluence of social relationships, working and living environment, neighborhood and social networks are reflected in measuring these outcomes (129).

Implementation outcomes are the effects of deliberate and purposive actions while implementing new interventions. These outcome measures are essential for monitoring and evaluating whether the intervention is successful (99,130) and they are the central meaning of what implementation science is (24,99). It helps to identify the health system challenges and solutions, and is particularly useful in low-income countries where the reachability of interventions are under-reported (131). These outcomes are crucial in implementation research and practice which are indicators of the implementation processes and preconditions to achieve the desired outcomes (24). Hence, reliable and valid measures of these outcomes are important to understand the mechanisms of success or failure of the implementation efforts.

However, currently available implementation outcome measures are not clear, not context-based and less qualified to our interest (27). This raises questions in building common knowledge in

guiding implementation efforts. The available measures were not tested for validity, reliability and their correlation/variability. Due to this they are not clearly distinguishable including measuring items that seems similar to examine different constructs (24,132). So that, what these generic measures are assessing is not exactly clear. In fact, some measures of implementation outcomes have been assessed for scale validity and reliability even if not generalizable for specific approach, context, or behavior (27,133). These measures are somehow conceptually distinguishable though it has been difficult to differenciate empirically and to what extent intervention participants rate/perceive them (24,27).

In our study, we want to be clear with outcome measures of PDA intervention used to promote EBF practice in the community. The available outcome measures are like 'empty cup' such as acceptability, appropriateness, feasibility, fidelity, penetration, sustainability, organizational readiness, adaptability and implementation cost. The reason why we select those measures are (a) they seems conceptually distinct but they are complex empirically (24,133), (b) they are mostly used in formative studies as the main indicators of implementation success but not studied (24,134), (c) evidence shows those outcomes are highly correlated to each other but we fail to justify contextually, (d) our preliminary intervention needs to address definitional and measurment ambiguities and to understand whether the means justifies the end outcomes of such intervention, (e) to contribute for the development of valid, reliable and qualified outcome measures in implementation science(133), and (f) to understand how and to what extent intervention participants (implementors and end-users) perceive them. This will also answer the questions of measurment perispectives of those outcomes as we can assess them flexibly. These measures have no the same meaning for many researchers rather conceptualized and measured contextually. Even there is no agreed up on type of measurement to develop for different intervention participants. Hence, developing, operationalizing, measuring, and validating to understand the constructs is important(27,99,133).

Applying a new approach and measuring its implementation outcomes is very relevant. This is because of assessing intermediate constructs is equally important as of measuring effectiveness to explain the means. These outcomes' are the key elements of the implementation process and they are proxy indicators of the service/client outcome, while distal indicators to the desired outcome(24,27,99,133). Those constructs can be measured at any implementation stage (pre, throughout, post-implementation) (24). Studies are inconsistent when to measure such outcomes.

However, we have not yet identified empirical studies that explain which outcomes are best suited for different types of studies at different stages of implementation (24,133). These outcomes are themselves interrelated in dynamic and complex ways (26,135). Although we implemented a new strategy (PDA), we have no evidence on how to design the most acceptable and sustainable mechanisms in developing feasible and effective EBF promoting strategy.

There are key questions in evaluating implementation research such as how to conceptualize and measure success or failure of implementation processes and their impact on ultimate outcome. Implementation outcomes need to be developed, identified, assessed, distinct from intended behavioral outcomes. The reason why it is important to distinct these outcomes is to understand how services/approaches are successful and the reasons are equally important in understanding its effect (22). In implementation researches, the challenge is not only applying a certain approach but also measuring its implementation outcomes at the same time.These outcomes may be differentially salient to various stakeholders depending on their perceiption (24) (22). To ensure applicability of implementation outcomes across a range of settings and to maximize their external validity, all stakeholders should be represented.

This is because of an established evidence for a ‘‘proven’’ approach elsewhere does not ensure successful implementation in another context. Implementation also requires addressing a number of important contextual factors, such as provider attitudes, end-user behavior, and the service system/approach. These outcomes have potential to capture the provider and users’ attitude (acceptability) and behaviors (adoption, uptake) as well as contextual factors (system penetration, appropriateness, implementation cost) (24,29). In this regard, we believe that successful implementation be considered in light of many factors, including implementation outcome measures. Implementation success should be reflected by the implementation outcomes. Therefore, reliable and valid measures of implementation outcomes will enable empirical testing of the success of the efforts. In most current initiatives including our intervention, the success is assumed and evaluated at behavioral or health outcome level. However, beyond an exclusive focus on such outcomes only, understanding the process of implementation with contextual factors is paramount to have comprehensive understanding on how the approach works or not.

Theoretically, scholars defined acceptability, appropriateness, feasibility, fidelity, adaptability, organizational readiiness, penetration, sustainability and implementation costs as follows: Acceptability is the perception among intervention participants that a given intervention or

approach is agreeable, while appropriateness is the perceived fit, relevance, or compatibility of the intervention at a given setting for the provider, or end-users; and/or its fitness to address specific problem. It is conceptually similar to acceptability and it seems overlapping (22,24). Feasibility is the extent to which a new intervention can be successfully implemented within a given setting(24), while implementation fidelity is to confirm weather delivered as intended (28). Adaptation is the process of implementers or users bringing changes to the original design of an intervention. Adaptive interventions are those for which adaptation is allowed or even encouraged(119). Organizational readiness is a shared psychological state in which members feel committed to implement an intervention through receiptive means (136). Penetration is the integration of a practice within a service setting and its subsystems(28). We found infrequent use of this term in the implementation researches rather known in terms of institutionalization. Sustainability is the extent to which a new intervention is maintained within a setting (28). Implementation cost is the cost impact of an implementation effort that can be perceived, actual or opportunity cost (24).

All the aforementioned constructs evaluate the fitness of something. Some measures are personal which means two people can view the same approach in different ways based on their needs, preferences, or expectations, some others are somehow technical or social. These constructs seem overlap; however, they can be measured operationally to fit with the purpose. For example, a PDA could be judged both as unacceptable and inappropriate if PDs see it as contrary to the existing social norms related with the thing under promotion. In the same way, a PDA could be judged both as inappropriate, when considered as ineffective in meeting mothers' needs, and infeasible if PDs sees it as difficult to implement at community setting with the existing resources, social networks and values. Therefore, perceptions of PDA could be measured with different conditions under observation. An implementation framework shows that (137) acceptability and appropriateness are highly variable than other constructs. This is because of willingness to try new things (trialability), while appropriateness is consistency with mothers' needs (relevance). Similarly, feasibility is also varying based on the cost or time (resource availability) or ease of implementation or use (complexity). From this understanding, we assumed as all those outcome measures are correlated (29,137).

In this study, PDA was implemented as a new strategy to mitigate the gaps in EBF practice in Jimma. However, we were not clear about measurements and correlation of implementation

outcomes.The successful implementation depends on these outcome measures as perceived/rated by the study participants. There is no evidence to what extent they perceive/rate those outcomes as far as EBF is concerned. In addition, currently available psychometric outcome measures lack conceptual clarity, unknown reliability and validity to the context. Hence, assessing outcome measures helps to understand the mechanism how intervention participants perceived and engaged in promoting EBF practice at community-level using a PDA. Therefore, we assessed implementation outcomes, determined valid and reliable measurement scales and analyzed their correlation and variation.

1.2.5. Cost-effectiveness of PDA

Primary health care (PHC) is an essential health care connecting the community and the formal health system, as a first level of contact with individuals, the family and community, bringing health care as close as possible to where people live and work. The Primary Health Care (PHC) addresses the main health problems in the community, providing promotive, preventative, curative, and rehabilitative services through igniting social change at grassroots level. Hence, promoting practice of BF could be one of the strategies to improve uptake of PHC at family and community level (42,64) using a new approach. As part of this effort, in Ethiopia, HEP is designed targeting households at community setting on the principle of PHC to improve families' health. Since 2009 the Government of Ethiopia has been implementing the HEP with an innovative approach. The main objectives of HEP are to improve equity and access to essential health interventions at the community-level by ensuring ownership and participation of the community, increasing health awareness and skills among community members, and promoting life styles which are conducive to good health. By doing so, it leads to the adoption of positive behaviors and the creation of a healthy environment (38,138). It is under-implementation in three settings of varying socioeconomic, cultural, and environmental conditions. These are the agrarian, pastoralist, and urban HEP. The urban HEP was started in 2009 at the national level to address the health crisis and the HIV/AIDS epidemic in urban areas (39). This HEP ensures health equity by creating demand for essential health services through the provision of health information at a household level and access to services through referrals to health facilities. It is currently implemented in more than 400 small and big cities/towns. More than 4000 nurses were trained and deployed to small and big cities or towns across the country (44). The specific services provided in an urban community are meant to be specifically targeted

to that community. The general service delivery system of urban HEP is at household, school, and youth centers, however, the implementation at grass root level is not systematic and poorly implemented (44). The urban HEP also supported by HDA which are comprised of up to 30 households residing in the same neighborhood. The HDA is further divided in to smaller groups of five members commonly referred to us “one- to- five networks” (139).

The global emphasis on the provision of PHC and community ownership of health care delivery following the Alma-Ata declaration in 1978 has gained a renewed recognition in this era (43) and that seems to guide the overall activities of urban HEP. The recruitment of Ethiopia’s urban HEPs, however, lacks resemblance to most global practices in that, unlike Community Health Workers (CHWs,) who belong to the community, the HEPs are government salaried, mid-level health professionals often come from elsewhere in the city (39). Their job is to interact with community members on matters of health such as child care, maternal health, HIV, malaria, sanitation, etc. The process involves recruiting community members for training on the 16 packages under UHEP, and each trainee is again expected to informally train five members of communities under her. Then the HEPs oversee this community interaction to eventually achieve change in the health seeking behavior of the larger community. Each HEP is required to train female community members. The intention then is when each of the trainees under every HEP in turn further trains five community members. There will have been achieved a fair coverage of the community in focus to raise the health and sanitation awareness as well as to reduce health inequities through improved access to health care informations and services(43).

Health service utilization studies in Ethiopia revealed that awareness and perception, literacy, family size, educational status, perceived illness, family income, media exposure, perception of distance to health facilities, perceived transport, and treatment costs are some of the predicting factors(140). A study conducted in Amhara regional state, Ethiopia reported as health extension workers conducted frequent visits to 52.7% of the households, and 78.5% mothers visited health posts. Mothers from model households (3 years after graduation) were more likely to visit health post compared to mothers from non-model households. Mothers who understood the HEP packages were more likely to visit health facilities. Even though community members had good relationships with health extension professionals during home visits, the health extension professionals did not involve the community in the planning of the program. Generally, those

reviewed literatures shows age, occupation income, home visits by HEWs, and frequency of home visits, have an impact on the utilization of health services(141).

Positive deviance is rarely used to improve the quality of PHC and it is limitedly elaborated in the literature. In Indonesia, a positive deviance study was carried out to discover factors that enabled nurse-patient communication in a family planning context. A better nurse-patient communication was needed to improve the quality of counselling in family planning programs in developing countries (142). To improve the quality, access, and utilization of rural primary health care in Ethiopia, a mixed methods positive deviance study was carried out. In that study, Primary Health Care Units (PHCUs) with higher performances were selected in order to discover factors that might explain the differences among rural PHCUs. The results revealed that three key themes that distinguished the high performing PHCUs from the others. These key themes were managerial problem solving capacity, relationship with the district health office, and community engagement. These themes should be used in an intervention in order to improve primary health care quality (46). According to researchers' recommendation, there is still a lot unknown about positive deviance which need further investigation in different context for different behavior so that to understand its cost-effectiveness. Therefore, in order to stimulate and to spread the use of PDA as an added program, it is important that researchers share their positive deviance experiences with clear procedures and including the cost and effect. Our study will fill this gap by determining whether PDA can be an effective approach against its implementation cost to promote BF in supporting the urban HEP (108).

To improve the infant and maternal health outcome through practicing BF need a long-term and cost-effective strategy. Different packages were recommended by WHO/UNICEF to train the CHWs regarding the newborn care (3,15). This would enable to support the mother to initiate timely and sustain EBF but its feasibility within a short period-frequent visit might be questioned. Due to this, its implementation is not as planned in urban settings of Ethiopia (38,43). In addition, there is no evidence that reported the cost-effectiveness of the government led strategy or any other donor driven added interventions to promote BF. Besides, in Ethiopia poor BF practices, child morbidity and mortality due to infections diseases were reported significantly (6) and maternal health related quality of life was also compromised due to BF difficulties (143).

Besides those challenges, if breastfeeding is well practiced, the short and long term health outcomes of the infant and the mother turned out to be good such as decreased morbidity and mortality, and improved health related quality of life (144–146). Despite BF is a satisfying experience for the mothers, they are facing modifiable difficulties, in which most of them experiencing with common challenges such as the routine needs of the infant, physically and emotionally tiresome tasks to feed and care the infant (147). To this end, BF is not an easy task that may result in depressive symptoms, withdrawl from work, affect marital relationship and the general living conditions in early postpartum period (148).

To improve the infant and mothers' health outcome efficiently, we need a cost-effective strategy. Different packages were recommended by WHO/UNICEF to train the community health workers (CHWs) regarding the newborn care through five home visits (3,15). Besides, in Ethiopia poor feeding practices, morbidity and moratlity due to infections diseases, and malnutrition (stunting, wasting and underweight) were reported significantly(12). To address this so far, the child survival and development strategy was designed nationally aiming to accelerate evidence-based high-impact interventions, but it is not economically evaluated (13). In addition, the urban health extension program (commenced since 2009) is not implemented as planned (43). This gap could be filled by rigorously studying cost-effective of a given strategy to recommend for a task shifting or to be an added strategy.

Beyond measuring and analyzing the health outcome of EBF on infants (immunity development, body growth, morbidity, mortality…etc) against the cost of the intervention, quantifying the maternal health outcome in terms of Health-related Quality of Life (HRQoL) is relevant. This helped us to understand the multifaceted effects of the intervention approach with a given cost in this study. According to WHO, Quality of Life (QOL) is defined as individuals' perception about their position in life in the context of the culture and values in which they live, and in relation to their goals, expectations, standards and concerns (149). In different studies, QOL has been used as a standard measure of health outcomes at individual or population level such as surveys (150) community-based interventions (151), factors influencing health studies (152), randomized clinical trials (153), and treatment optimization (154). In those studies generic or specific measures of QOL are applied (155). One of the generic measures is the World Health Organization quality of life scale (WHOQOL) and European Quality of Life (EuroQol:EQ-5D) measures were developed for different health interventions and/or disease measures across

different demographic characteristics (156–158). Compared to specific measures (159), generic measures are flexible and adaptable to the context to measure relevant changes aimed to be detected in the study. This means, generic measures may have less validity/reliability, but higher generalizability. The limitations of the specific measure of QOL including participants' cognitive skill, environmental and emotional state, and uncertainty of some scales restricted us not to use in developing country (159). Instead, we have preferred and adapted the generic scale- EuroQol: EQ-5D (157,158) and the infant outcome was modeled.

The infants' health outcome could be estimated using a certain model, while women's perception of their health-related quality of life is an essential measure of the quality and effectiveness of maternal and child health interventions (160). Based on the trial findings, we recommended that the PDA could be used to promote EBF as a strategy to improve EBF in urban settings.

However, the health resources are limited; the policy-makers mostly want to select the strategy that was confirmed as the lowest cost per health outcome such as decreasing infant morbidty and mortality (DALYs), and improving maternal quality-adjusted life-years (QALY). Cost-effectiveness (CE) is the ratio of the incremental cost to incremental effectiveness of one strategy compared to another measured in DALYs/QALYs. To assess whether the programme was cost-effective and affordable from the health system perispective, a costing study in both arms accompanied with the effect are needed. Prior to this study, no such effectiveness related with cost information available and not evaluated in the study area for this approach. In addition, behavioral interventions are mostely not evaluated for their usefulness including our PDA intervention. Therefore, this study aimed to determine the cost-effectiveness of the PDA in improving the infants' (DALYs) and maternal health outcome (QALYs) through promoting EBF practice as an added intervention to the existing program.

1.3. Significance of the study

Undernutrition begins at conception onwards, and failure to address undernutrition at an early stage negatively affects latter life by increasing the risk of childhood morbidity, mortality, poor academic performance, increased susceptibility to non-communicable diseases, and less economic productivity(161). Globally, 161.5 million (24.5%) children under five year of age were estimated to be stunted, 98.9 million (15.0%) were underweight and 50.8 million (8%) were wasted (162), as significant proportions were contributed by developing countries (162) which need practical solution. Most randomized controlled trials have presented primary outcomes of

interest, but what and how such interventions were implemented, modified, and accepted remains unexamined or described in a limited way (163,164). Lack of understanding in the implementation process of community nutrition programs that are based on behavior change communication strategies is likely to hinder effective program development, implementation, and scaling up to other similar settings. In response to these questions, a PDA-led effectiveness, process and outcome evaluation has been proposed and conducted to open the "black box" of the intervention process (163–165). In the town as well as in the study arms, there was no addition similar intervention underwent regarding promoting BF practices.

Ethiopia has implemented the urban HEP at the grass root level since 2009. The aim of the program is to increase public access to basic health services through household modeling approach. This program can be supplemented by a new and strategic approach such as PDA if found to be feasible and effective. To support this effort, we had implemented a PDA to promote TIBF and EBF to test effectiviness at community level, particularly at urban setting. In the study area, this type of implementation study is relevant to addition to HEP through home visit informational counseling and social support. Moreover, the insights gained will help to supplement the urban HEP packages delivery process. Mothers (selected as positive deviants) were benefited from this intervention directly by acquiring additional knowledge, and transferable skill, study subjects-mothers were also direct beneficiaries, and community members will benefit latter on through spill-over effect of information remaining in the community.

Therefore, determining the effect of using positive deviants in promoting EBF is paramount. Through this approach, there was community support made to the mothers regarding her child care including how and when to feed and sharing emotions and lived experiences. This is practically relevant because of solving the problem of BF by, from and to the community. Ultimately, it will be important for FMOH and its implementing partners to consider an added or alternative strategy to improve coverage of home visits and its impact on improving child health-EBF.

The findings of this interventional study will be used as a baseline information for scentific community and for further investigation in different context and behaviors. Furthermore, the study was come up with relevant recommendation for scale up to initiate timely and sustained EBF practice. This study is the first that measured multiples of intervention outcomes such as behavioral, services, client and implementation outcomes, and cost-effectiveness of the PDA for

possible programmatic recommendation. Such studies are very important to unlock what happened during the implementation process that can explain the observed outcome. Methodologically, the PDA was examined for procedural and scientific replicablity, as well as validation of constructs that measure implementation outcomes.

1.4. Conceptual framework of the study (brief notes)

The conceptual framework was developed to visualize the dimesnions and main variables of this interventional study and to brief the intervention process and expected outcomes. It shows the conceptual relationship between multiple independent and dependent variables. It was developed by integrating the concept of implementation research and the concept of a cluster randomized trial study. The predisposing (ideation factors), enabling and reinforcing factors were considered as the main moderators of the intervention process and its outcomes. Socio-demographic factors such as age, educational status, ethnicity, religion, marital status, occupational status, monthly income were considered. Whereas, obstetric related factors such as parity, mode of delivery and place of delivery were also studied. The remaining dimensions such as chain of outcome measures with respectcive relevant variables were depicted. We assumed that whenever there is intervention, there are different types of outcomes such as implementation outcome, client and services outcomes, behavioral outcomes and health outcomes. These outcomes are interrelated with each other, bidirectionally or unidirectionally considering the 'intervention variable' as a base (initial point).The PDA is an intervention strategy (counseling and social support by PDs to promote TIBF and EBF) which affect the mothers and their relevant others' Predisposing, Enabling and Reinforcing (PER) factors. Then the change in these factors can moderate the first three outcomes, except health outcomes. The socio-demographic, obstetric and other related factors affect the PER and all of the chain of outcomes. The intervention approach/strategy and implementation outcomes are interrelated to each other. This means the change in intervention approach affect the implementation outcomes, while the perceiption on those outcomes will affect the operability of such approach. Similarily, participants' perception towards the implementation outcomes is interdependent with client/service outcomes. However, the client/services outcomes influence the behavioral outcome, and the behavioral outcomes improve the health outcomes. The health outcomes were measured in terms of improving under-five child DALYs averted (reduced morbidity and mortality due to diarrhea and pneumonia) and maternal

QALYs gained (improved maternal HRQoL). In general, it indicates how the intervention was conceptualized and delivered to bring the intended outcomes. (**Fig. 2**)

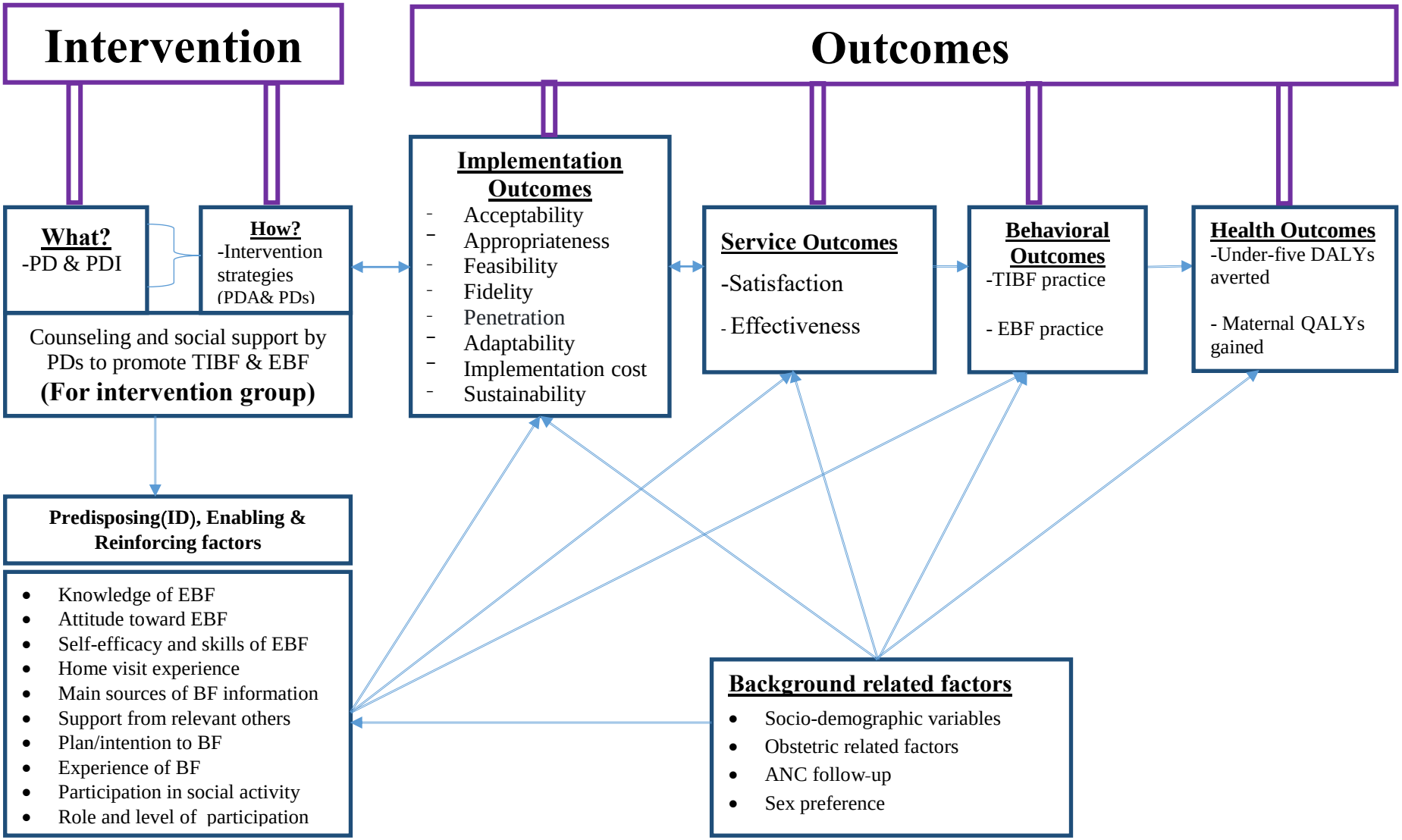

Figure 2. A conceptual framework developed to evaluate the effectiveness of PDA on TIBF, EBF and other outcomes, 2018-2020.

1.5. Organization of the dissertation

This dissertation consists of six chapters including the introduction chapter (**Chapter one**) which provide general information about TIBF and EBF practices and multiple health outcomes, the efforts made so far, challenges and reasons for not exercising such beneficial practices. Similarly, it includes the statement of the problems from the global to local context under five sub-headings considering the dissertation main objectives. Under each sub-headings, the problem (evidence gaps), magnitude of the problem and rationale of the study with crude research questions were addressed. It also address a comprehensive literature review on current situation analysis of EBF and TIBF in developed and developing countries, research findings and Positive Deviance health programs, and process evaluation studies, including cases of program impact studies for nutrition programs in other settings/coutries. In this chapter, significance and conceptual framework of the study were also included. **Chapter two**: deals with the research questions, hypothesis and objectives (general and specific objectives). **Chapter three:** describes the methods and participants of the study that includes summary, study design and settings, and population, randomization procedure, intervention activities, sampling technique, data collection methods and timelines, data management and approaches of statistical analysis, ethical considerations and plan for dissemination of the findings.

Chapter four: (**Paper**[1-5]) presents findings on the effectiveness of PDA intervention in improving EBF among mothers with infants at 0 to 6 (59 months) months of age. While the other study presents the findings on the effectiveness of the same approach on TIBF with different endpoints. These chapters also include the background characteristics, descriptive statistics/results, effect on the secondary outcomes and indicators of BF in addition to reporting the effect on the primary outcome variables. The latter also presents the survival probabilities of TIBF (using survival curve), the median time, and the predictors of time to initiate BF. It also presents the level of end-users satisfaction with the PDA and multi-level predictors among the intervention subjects (mothers and their relevant others). Whereas, the findings of the assessment of implementation outcomes and the measurement scales reported. Finally, the cost and effect results of the intervention, and incremental cost-effectiveness ratios (ICER) considering maternal and child health outcomes with respective sensitivity analysis were presented. Comparison of maternal health related quality of life mean and composite mean scores were also presented. Moreover, **Chapter five**: deals about the summary discussions, conclusions, and prospects based

on the results were discussed. Then detailed discussion for each objective; explanataion, implication, limitation and strengths were also presented in this section. **Chapter six**: concludes by summarizing the main findings of the overall study and program implications. It also offers recommendations for future community-based nutrition interventions targeting infants under-six months of age for different stakeholders for program improvement, methodological replicability and future practice.

Chapter Two

2. Research Questions, Hypothesis and Objectives

2.1. Research questions

The following questions were addressed by this study;

1. How effective is PDA in improving EBF practice? (Is PDA effective in improving EBF practice?)
2. How effective is PDA in improving TIBF ? (Is PDA effective in shortening the probabilities of the time-to-initiate BF?)
3. Are the end-users who enrolled to the intervention group, to improve EBF, satisfied with PDA?
4. To what extent or level implementation outcomes of PDA intervention are rated by the intervention participants in improving EBF practice?
5. Is the use of PDA as an intervention to improve EBF practice cost-effective?

2.2. Research hypothesis

1. Mothers who received home based informational counseling and other social supports through PDA are more likely to practice EBF than the control groups (or compared to children of the control group, the proportion of EBF in children of the intervention group will be significantly increased over the 6-month follow-up).
2. Mothers who received home based informational counseling and other social support through PDA are early initiaters of BF than the control groups (or PDA is effective in improving (shortening) the time to initiate BF or TIBF).
3. The end-users (mothers and respective relevant others) who enrolled into the intervention group will be satisfied with PDA as an intervention to improve EBF practice.
4. Implementation outcomes of PDA, as an intervention to improve EBF practice, will be highly rated by the intervention participants/stakeholders.
5. The use of PDA as an intervention to promote EBF practice is cost-effective (or PDA is less costly and highly effective to be added on the existing routine service to improve EBF practice).

2.3. Research objectives

2.3.1. General objective

- To assess the effectiveness, client outcome (users' satisfaction), implementation outcomes, and cost-effectiveness of PDA in promoting timely initiation and exclusive breastfeeding practice for infants aged 0-6 months.

2.3.2. Specific objectives

1. To determine the effectiveness of PDA in promoting EBF practice
2. To determine the effectiveness of PDA in increasing the proportion of mothers who practice TIBF (and in shortening survival probabilities of the time-to-initiate BF)
3. To assess the end-users satisfaction with PDA among the intervention group
4. To measure the implementation outcomes of PDA in promoting EBF among intervention participants/stakeholders
5. To determine cost-effectiveness of PDA as an intervention to promote EBF practice

Chapter Three

3. Methods and Participants

This chapter describes the overall study methods and participants of the effectiveness, measurement of multiple outcomes and cost-effectiveness of a PDA intervention to improve TIBF and EBF practice as an added strategy to the existing community-based routine care. The following components are summarized under each sub-heading, and discussed in detail for each study objectives. These are study setting/area and period, study design/approach, source and study population, eligibility criteria, sample size, sampling procedure, randomization and enrollment, study variables and measurement, intervention approach and activities, data collection methods/tools and timeline, data quality assurance, internal validity and generalizability, data analysis, ethical considerations and plan for dissemination of the findings.

3.1. Study area and period

This community-based trial and implementation study was conducted in Jimma town. It is one of the town administrations of Oromia regional state and located to the southwest part of the country. As part of this study, the trial related data for objective one, two and five were collected between February 01 and September 30, 2018, while the follow-up studies (objective three and four) were conducted between August 28, 2020 and September 30, 2020 among the end-users and implementation participants of the trial. The town has 17 kebeles (the smallest administrative units in Ethiopia) with an estimated total population of 192,000 based on the 2007 National Population and Housing Census of Ethiopia projected population for 2017/18. Among the women, 46674 were in reproductive age group (15-49yrs). In the town there were two functional government hospitals (one referral teaching hospital-Jimma University medical center and one primary hospital), four health centers and 17 working sites for HEPs (shared office with the kebele administration). There are 59 urban health extension professionals (HEPs) working in all of these sites. The total household in the town is 43,955. There were a total of 59 HEPs assigned and working for community-based health services during the study period in all kebeles of the town. The ratio of HEPs to households and population are 1:745 and 1:3254 respectively, which is less than the expected national standard of 1:500 and 1:1500 respectively. In both arms of this trial study (6 clusters), there were a total of 16 HEPs. In the intervention clusters, there were 8 HEPs with health worker to population and household ratio was also less than the standard. Prior to this study, the second quarter report of the town health office (MCH unit) during October–

December 2017 showed that the number of pregnant mothers at their third trimester of gestational age was 1260 (45).

3.2. Study design/approach

To address the five objectives of this study, experimental study (a cluster RCT design) and follow-up community-based cross-sectional designs were used. The details of these designs were described underneath.

To evaluate the effectiveness of PDA in promoting TIBF and EBF, experimental design with a cluster randomized controlled single-blind, parallel-group, two-arm trial with a 1:1 allocation ratio was employed. This design was feasible to implement in the community setting, where units of randomization were clusters. Since it was behavioral intervention (informational counseling and social support) considering clusters could minimize information cross-contamination. The data collectors were blinded. In line with this, a participatory action design/approach was used to implement the intervention. Participatory design is research on design and clarifying the process. 'Research *for* design' refers to research about design processes, how they are carried out and what are their results; 'research *by* design' refers to making an artifact where the thinking is embodied in the artifact, and 'research *through* design**'** refers to research into materials and forms for exploring possibilities. Although participatory design includes all three types of research, in this study; 'research for design' was followed. This means a Participatory Action Research (PAR) was integrated with RCT design to implement the intervention activities for the intervention group (99).

Moreover, follow-up cross-sectional study designs were used to assess the end-users' satisfaction and implementation outcome measures of the PDA as an intervention to promote EBF. This can be also called a post-implementation follow-up study. The design integration was done because of one of the implementation study design is a cluster RCT at the community setting. In community setting, a cluster RCT study has many draw-backs that could be minimized by integrating with participatory approach (99,130). The trial was conducted to determine the change in the primary and secondary outcome. However, to assess the newly approached intervention, implementation study could identify how the intervention works or not in a given context in addition to the effectiveness studies (99,130).

In addition, a mixed design of alongside a cluster RCT was conducted with Markov decision model to evaluate the cost-effectiveness of PDA as an added strategy to the existing routine care.

Decision tree modeling was also used to show the infant and maternal health outcome estimates for 59 and 6 months respectively. The data for maternal HRQoL was collected directly from mothers, while for infant related morbidity and mortality caused by common childhood diseases (diarhea and pneumonia) analyzed from EDHS-2016 (6) and the respective DALYs estimated using Global Burden of Disease(GBD-2019) specific weights(166). Then the two arms were compared in this particular economic evaluation study.

3.3. Source and study population

For the trial that used to determine the first two effectiveness and cost-effectiveness evaluations, all women in their third trimester of pregnancy, living in Jimma town was the source population. The study populations were eligible pregnant women in their third trimester (36 weeks of gestational age), living in selected clusters of Jimma town. While for the cost-effectiveness evaluation, the respective mother-infant pairs were considered for the outcome modeling in both arms.

The source and study population for the end-users satisfaction and implementation outcome studies were those individuals who are living in the intervention clusters of the trial arm and stakeholders who participated during the implementation of the intervention. The client outcome (end-users' satisfaction) assessment was conducted among intervention groups (mothers and their relevant others) of the trial. Among the six total numbers of clusters (kebeles), three clusters were randomized for the intervention arm. The number of mothers in the intervention clusters was 130. During the trial, name of kebele and village, personal contacts/phone number, and house number of each study participant were documented and available to use for these follow-up data collection. All mothers who enrolled into and received the intervention, and one relevant other who was nominated by the respective mother were included in the satisfaction study.

However, the study populations for the assessment of implementation outcomes were all the implementation participants including stakeholders. These were HEPs, health extension supervisors, Community Health Workers (CHWs), Women Health Development Army (WHDA) leaders/volunteers, model mothers certified by HEP, all positive deviants and all mothers who received the intervention with one relevant other who supported her in practicing EBF. Those all are participated in the implementation activities with different role and levels. CHWs are community volunteers who are trained on basic health promotion and/or specific intervention to facilitate new interventions, mass drug administration, sanitation campaign, immunization

campaign, and any other community level health related activities with a close supervision from HEP and plan and work together with HEP. The implementers and/or facilitators received basic training on PDA, steps of deviance inquiry, how to set selection criteria to identify deviants, selection of deviant mothers, basic skills of facilitation to promote EBF using this approach at community setting.

3.4. Eligibility criteria

Pregnant women who were in the third trimester of pregnancy (36 weeks of gestational age), living in the selected cluster, and who gave birth in the last 5 yrs, and who had no known medical/physical problem that prevents BF practice, capable of giving informed consent and willing to be home visited by PDs/supervisors/data collectors and no plan of moving away for at least a year were included in both trial arms. Thirty-six, 37, and 38-40 weeks of gestational age were the selected times for enrollment, baseline data collection, and for the first home visit of the intervention group respectively. We preferred to include women who gave birth in the last 5 years to have the baseline information about BF practice, and related variables before the intervention. This is because of illogicality to start the intervention after delivery since exclusive BF practice is breached mostly within 1-3 days of post-delivery. After enrollment at 36 weeks, the death of a mother and/or baby at birth, or stillbirth, pre-term birth before baseline data collection, clinical complications related to hospitalization for more than a week, anatomical malformation that prevents BF, and lost the first visit at 38-40 weeks were excluded, and replaced with other eligible subjects.

3.5. Sample size determination

In summary, the sample size for the effect and cost-effectiveness evaluation (trial) was calculated using Designing Clinical and translational Research software Version (UCSF-DCR-4) in comparing proportion with a dichotomous outcome considering necessary parameters and values. This yielded a total sample of 260 (130 for each group) after adding 10% expected non-response rate. Based on this, the sample size for the satisfaction study was determined considering the number of end-users in the intervention group (n=130 mothers) of a cluster RCT study and one relevant other (n=130) which was 260. However, the sample size for the implementation outcome study was 384 considering all implementation participants/stakeholders who were participated during the intervention period starting from the inception training till close-up of the project. The details are elaborated as follows;

For the trial (evaluation studies), the sample size was calculated in comparing proportion with a dichotomous outcome. We estimated the sample size using the Chi-squared statistic based on the following assumptions: 95% confidence level, 80% power, number of subjects in the intervention to control group ratio 1:1, the proportion of mothers in intervention and control group practicing EBF=33.3% (P_0 =proportion of EBF in control groups) with AOR of 2.1 (7). P_1 was the proportion of outcome in the intervention group, which changes in the practice of EBF from the assumed baseline; it is expected to increase the level of EBF practice by a minimum of 15% detectable differences. Hence, P_1=48.3%. This yields a sample of 118 in each group. By adding 10% expected non-response rate on each sample size and multiplied by 2 arms, the total sample size became 260. Therefore, the number of mothers in the intervention and control group was 130 each.

Whereas, the sample size for the end-user satisfaction (follow-up) study was estimated considering the number of end-users in the intervention group (n=130 mothers) of a cluster RCT study and one relevant other (n=130) to make the sample size double (2x) to minimize sampling error since we considered clusters in the study. Therefore, the final sample size for this study was 260.

Moreover, the sample size for the implementation outcome measures was estimated considering all active participants/stakeholders who involved during implementation. Those were 8 HEPs, 10 CHWs, 45 WHDA leaders, 45 model mothers, 3 health services extension program supervisors, and 13 positive deviants who were participated in the inception training, review meeting and workshops and in the subsequent implementation and intervention process, and 130 mothers who received the intervention with their one relevant other. Therefore, the total sample size was the submission of 8+10+45+45+3+13+130+130=384 intervention participants. Hence, the final sample size was 384. These all eligible study participants were invited to participate in this study.

3.6. Sampling technique, randomization and enrollment

For the effectiveness and cost-effectiveness studies, simple random sampling technique-lottery method and randomization were employed. Out of 17 clusters (kebeles) found in Jimma town, 12 non-adjacent clusters were selected considering the remaining as buffer zones. Then 50% of these (6 clusters) were randomly selected using a lottery method. Clusters were the unit of randomization for the trial, while mothers within the respective clusters were units of analysis.

The six clusters were randomly allocated to the intervention and control arms using a simple randomization technique. First, each cluster was represented using numbers 1-6, and then a random number generator using SPSS version 21 was applied to get half the number of the total. Then, a lottery method was applied to decide the intervention and control group. Based on this, the first three clusters (Ginjo-Gudiru, Awetu-mendera, Mendera-Kochi) were randomized as intervention sites, and the remaining (Hermata-Mentina, Mentina, and Bosa-Kito) as control site. A statistician, who was blinded to study groups and not participated in this study, randomized the clusters and allocated into two arms. Study participants were not concealed since they certainly knew their group, whereas the data collectors were masked. They were not informed of the allocation, not being residents in any of the clusters and not part of the trial implementers.

Ahead of randomization, all pregnant women in the selected clusters were identified from family folder-logbook found with HEPs, followed by rapid community survey with their assistance. However, recruitment was started after clusters had been randomized. A total of 310 third trimester pregnant women who lived in the six clusters were identified. The group sample was allocated proportional to each cluster's number of 3rd trimester pregnant women. Then recruitment and enrollment continued till the proportionally allocated sample size was attained in each cluster of the respective arms keeping the eligibility criteria. Forty-five women were excluded for not meeting the criteria, and five refused to participate. The remaining eligible 260 mothers were enrolled to either the intervention or control group depending on where they lived. The detail part of this section was reported using CONSORT-2010 trial flow chart in **Figure-3.**

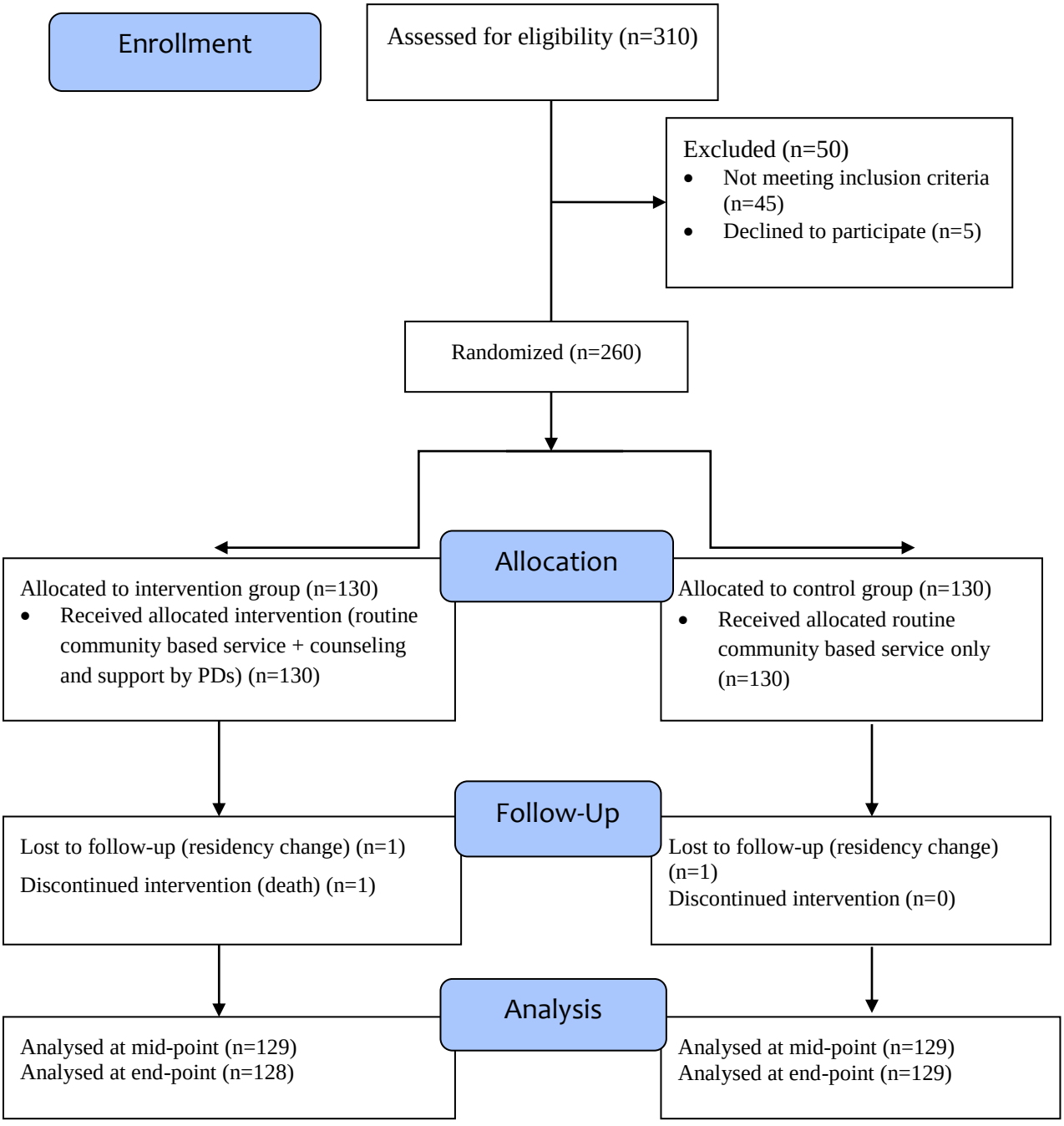

Figure 3. Trial flow chart using CONSORT 2010, interventional study, Jimma town, 2018.

However, for the satisfaction and implementation outcome studies, all eligible individuals were invited to participate in the respective study. Each participants was traced using their address to reach them at their home and/or working sites. In addition to the trial flow report, the proportional allocation and sample size for each cluster were reported in **Table 3.1.**

Table 3. 1. Sampling procedure and follow-up report till middline period of the interventional study, Jimma Town, 2018.

Group and name of clusters		Source population	Allocated and enrolled sample	Continued follow-up till the midline point*
Intervention group	Ginjo-Gudiru	51	42	129
	Awetu-mendera	52	43	
	Mendera-Kochi	55	45	
	Sub-total	**158**	**130**	
Control group	Hermata-Mentina	48	41	129
	Mentina	47	40	
	Bosa-Kito	57	49	
	Sub-total	**152**	**130**	
Grand Total		**310**	**260**	**258**

3.7. Study variables and measurements

For the first two effectiveness evaluation studies, the primary outcome variables of the intervention were EBF (and change in rates of BF indicators) and TIBF (time to initiate BF), while secondary outcome variables were ideation factors/predisposing variables (knowledge on EBF, attitude toward EBF and self-efficacy to practice EBF). The explanatory variable (intervention variable) was counseling and social support by PDs, whereas the baseline characteristics were socio-demographic and obstetric related variables, enabling and reinforcing variables related with practicing EBF, previous support related variables, and BF related variables.

While, end-users' satisfaction with the PDA was the outcome variable for the assessment of client outcome study. In this particular study, the independent variables were individual and community-level variables. Individual-level variables were socio-demographic characteristics of respondent, BF related factors and post-implementation predisposing factors, while community-level variables were area of residency/cluster, existence of perceived functional Health Development Army (HDA) network, participation in any social activity, receiving support/visit from a HEP, previous main source of BF information, the village/zone where the assigned PD is living, educational status of the assigned PDs, and perceived community support for BF.

Whereas, the variables for the implementation outcome study were socio-demographic characteristics of this particular study participants, participation in the intervention (role in the implementation, level of participation during implementation, self-confidence to run the program, and value to the approach, perceived level of understanding related with PDA and perceived context of support), and newly developed nine implementation outcome measures or constructs.

Moreover, the study variables for the cost-effectiveness study were socio-demographic characteristics of mothers, baseline/routine service cost, implementation/incremental cost, morbidity and mortality of infants (DALYs averted), and HRQoL of mothers (QALYs gained), proportion of EBF among intervention and control arms (in terms of relative risk), incremental effect in health outcomes (DALYs and QALYs), and incremental cost-effectiveness ratio (ICER). The details of each variable, measurements and operational issues, related with each study objectives, were reported under the following sub-headings.

3.7.1. Study variables for the effectiveness of PDA on EBF

The primary outcome variables were EBF practice and change in rates of BF indicators, while secondary outcome variables were knowledge on EBF, attitude toward EBF, and self-efficacy to practice EBF. The explanatory variable (intervention variable) was counseling and social support by PDs, whereas the baseline characteristics were socio-demographic variables (age, educational status, ethnicity, religion, marital status, occupational status, monthly income), obstetric and previous support related variables (parity, mode of delivery, sex preference, received home visit from HEPs, received home visit from model mothers, receiving support from relevant others), and BF related variables (place of delivery, source of information about EBF, previous experience of BF-for the last child, plan/intention to breast-feed for the upcoming baby). Operational definition/measurements and definition of terms for the main variables/terms were described as follows;

- *Positive deviance health approach (PDA):* is an approach/strategy to solve community health problems that focuses on positive deviance within the community, rather than focusing on the community's needs or outside solutions/resouces. The approach uses solutions that already exist in the community to bring about sustainable behavioral and social change.

- *Positive deviance (PD):* is the the concept that in every community or organization, there are individuals who have found uncommon practices/behaviors that enable them to achieve better solutions to problems than their neighbors who face the same challenges and barriers.
- *Positive deviance Inquiry (PDI):* it is the stage in the PD process where the problem and challenges of BF assessed, positive deviants are identified within the community members and their successful behaviors and solutions are listed to initiate the intervention. In this process, the secret of successful behavior should be the main focus to identify, not only uniqueness of that practice.
- *Positive deviant (PD):* an individual or group who demonstrates special or uncommon behaviors and strategies that enable the person or group to overcome a problem without special resources. A person is defined as a PD only in the context of a specific problem. In this study, positive deviants (PDs) are mothers who practiced EBF for the first 6 months who were selected using specific criteria developed in the process of PDI (reported below) and used as change agents for the intervention with lived experience. Those mothers who had previous experience of EBF (if multi-para, for the last child) regardless of any challenges faced and have good knowledge, positive attitudes toward EBF, and good skills of BF practice, and attended all the training given by HEPs, and implemented all health extension packages and recognized as an opinion leader of her village, and used all recommended ANC services per visit, made institutional delivery and used PNC services for the last child.
- *Positive deviant (PD) behavior:* it is an uncommon practice by a positive deviant that allows them to be more successful than their neighbors who have access to exactly the same resources.
- *Breastfeeding (BF)* is one of the most important postpartum care to the newborn to survive if practiced appropriately that was measured using different indicators as primary outcomes in addition to the main indicators such as EBF and TIBF practices.
- *Exclusive BF* refers to feeding infants less than six months of age only breast milk, no added foods or liquids, except for medicines, syrups, or vitamins. The exclusive BF rate was calculated as the number of infants less than six months of age who were exclusively BF divided by the total number of infants under six months in the group multiplied by 100%.
- *Timely initiation of BF* refers to BF within an hour of birth. It is viewed as one of the most important indicator of BF to be measured independent of EBF. This means the concept of

timely initiation and EBF practice are mutually exclusive. In this case, TIBF was calculated as the number of newborns who were BF within an hour of birth divided by the number of newborns in the group multiplied by 100%.

- *Appropraite BF* refers to practicing those TIBF and EBF keeping the recommended time of initiation, duration, frequency and timely initiation of complementary feeding at 6 month, and avoiding non-recommended feeding practices.
- *Predominant BF* means that breastmilk is the predominant source of nourishment but the infant also receives water, water-based drinks, fruit juice, or oral rehydration solutions. It was calculated as the number of infants less than six months of age who were predominantly BF divided by the number of infants under six months of age in the group multiplied by 100%.
- *Complementary feeding* is the process of giving an infant food in addition to breast milk when breast milk becomes insufficient to satisfy the infant's nutritional requirements. It was calculated as the number of infants six months and older that started complementary feeding divided by the number of infants six months and older in the group multiplied by 100%.
- *Pre-lacteal feeding* was defined as feeding an infant something other than breast milk in the first three days of life. It was calculated as the number of infants less than 6 months of age who received something other than breast milk in the first three days of life divided by the number of infants under six months in the group multiplied by 100%.
- *Partial BF or mixed feeding*: the infant is given some breast feeds and some artificial feeds, either milk or cereal, or other food or water.
- *Bottle-feeding*: the infant is feeding from a bottle, regardless of its contents, including expressed breast milk.
- *Never BF Rate* is the proportion of infants who never even begin to BF during/for the study period.
- *Expressed breast milk* was defined as breast milk that was squeezed out and stored so that the infant could be fed at a later time. It is an optional practice to maintain EBF when the mother gets busy due to work.
- *Mean duration of lactational amenorrhea* referred to the average number of months without menstrual bleeding for a mother who BF exclusively.
- *Mean duration of BF* was measured as the average minutes that a baby BF without interruption.

- *Frequency of BF* referred to the number of times that an infant was BF per day. It is considered as less frequent if < 8 times or frequent if 8-12 times per day because the young infant's stomach capacity is limited, and frequent suckling is necessary to meet the child's nutritional needs.
- *Knowledge of EBF* was measured using 17 items that assessed knowledge of BF with Yes=1 (correct) or No=0 (incorrect) response. Mothers who scored greater than or equal to the mean score were considered to have "good knowledge" and those who scored below the mean score were considered to have "poor knowledge."
- *Attitude toward exclusive BF* was measured using 12 items with five-point Likert scale agreement responses (1-strongly disagree to 5-strongly agree), and the mean value was used to categorize the respondents as having a"favorable" attitude or "unfavorable" attitude toward EBF.
- *Self-efficacy w*as measured using 11 items with five-point Likert scale agreement responses (1-strongly disagree to 5-strongly agree), and the mean value was used to categorize the respondents as having "good self-efficacy" or "poor self-efficacy".

3.7.2. Study variables for the effectiveness of PDA on TIBF

The outcome variable was the time to initiate BF practice (status: timely initiated or not), whereas the explanatory variables were counseling and social support by PDs (intervention variable), socio-demographic related variables (age, educational status, ethnicity, religion, marital status, occupational status, monthly income), obstetric and BF related factors (parity, mode of delivery, sex preference, health status of newborn, health status of mother, previous experience of BF, intention to BF), support and service-related factors (receiving support from relevant others, ANC follow up for the current pregnancy, place of delivery, main source of info about EBF in the last 3 months), and predisposing factors (knowledge, attitude, self-efficacy of EBF). The measure of knowledge, attitude, and self-efficacy of EBF practice were categorized using the mean score. The remaining explanatory variables were measured by nominal responses. However, the time-to-initiate BF for those who practiced was measured in minutes (for those who initiated <=1 hour), in hours (for those who initiated 1-24 hours), and in days (for those who initiated after 24 hours). Then the minutes and days were converted into hours before analysis. Finally, hours were dichotomized into <=1 or >1hour to determine the proportion of mothers who initiated timely (<=1 hour) BF.

3.7.3. Study variables for the end-users' satisfaction study

The dependent variable was end-users' satisfaction with the PDA intervention (counseling and social support service by PDs). Independent variables were individual-level factors such as socio-demographic characteristics of respondent (age, sex, educational status, ethnicity, religion, marital status, occupational status, monthly income), BF related factors (previous experience of BF/support, intention to BF/support), and post-implementation predisposing factors (knowledge of EBF, attitude/subjective norm towards EBF, self-efficacy to BF). Community-level factors were area of residency/cluster, existence of perceived functional Health Development Army (HDA) network, participation in any social activity, receiving support/visit from a HEP, previous main source of BF information, the village/zone where the assigned PD is living, educational status of the assigned PDs, and perceived community support for BF.

The dependent variable (users' satisfaction) was defined as the feeling of the respondent about the informational and social support provided at home by PD. It is about the whole process of the intervention, the benefit received, and judged by the end-users after the actual encounter of the service. It is also a perceived need, individually determined expectations, and experience with PDA intervention. Satisfaction with various aspects of the intervention/service delivered, support, approach, and user participation was measured using a five-point Likert scale. The scale ranged from1 (strongly dissatisfied) to 5 (strongly satisfied). The total number of items was 30.

Knowledge of EBF was measured using 17 items that assessed participants' understanding about EBF with Yes=1 (correct) or No=0 (incorrect) responses. Attitude toward EBF was measured using 12 items with a five-point Likert agreement scale (1-strongly disagree to 5-strongly agree). Self-efficacy to BF/supporting the feeding mother was measured using 11 items with a five-point Likert agreement scale (1-strongly disagree to 5-strongly agree). Responses to negatively worded statements were reverse-scored before analysis. The remaining variables were measured using nominal responses, and the responses to some variables such as age and monthly income were categorized. Considering the positive influence on the outcome variable, nominal responses were represented by 0=failure, and 1=success.

3.7.4. Study variables for the implementation outcome study

The study variables were socio-demographic characteristics of the study participants (age, sex, educational status, ethnicity, religion, marital status, occupational status, monthly income), participation in the intervention (role in the implementation, level of participation during

implementation, self-confidence to run the program, and value to the approach, perceived level of understanding on PDA and perceived context of support), and implementation outcome measures(acceptability,appropriateness,feasibility, fidelity, adaptability, organizational/structural readiness, penetration, sustainability and implementation costs). The first two parts of variables were measured using nominal and ordered responses, and some variables such as age and monthly income in continuous manner. The remaining variables (outcome measures) are generic constructs conceptualized from literature (22,24,27,29,99,130,133) and identified to consider while measuring a certain implementation outcomes. In this study, crude numbers of items that were assumed to measure these constructs in context were developed for validation and to identify reliable measurement scales of the intervention outcome of the PDA. We employed a deductive approach to generate those items (167), whereby we used the definitions and conceptual framework described in the background section to ascertain whether items could adequately measure/capture the theoretical content/concept of the construct in relation to the PDA. In the process of item and construct validation analysis, items were determined whether represented the intended construct more than the other constructs through removing the cross-loading items. All outcome measures were measured using a five-point Likert agreement scale. The scale ranged from 1 (strongly disagree) to 5 (strongly agree). The total number of initially developed items was 78. Responses to negatively worded statements were reverse-scored before analysis. After identifying valid constructs, the scores of each respondent were summed up and the highest score indicates higher relevance of the factor in promoting the approach with the perception of the study participants. The relative weight of constructs were identified using PCA/factor analysis. The pre-assumed constructs were operationalized and measured as follows;

Acceptability is the perception among implementation stakeholders and end-users that a PDA is agreeable or appealing to them. It was assessed based on the study participants' experience with various dimensions of the intervention implemented, and users' survey which is more specific, referencing a particular set of intervention process. This construct was explored the direct study participants' perceptions that the PDA is beneficial to them and to others in terms of preferences, felt needs, compatibility, suitability, usefulness, practicability regarding the EBF situation. Ten (10) items were developed to capture their perceptions about the approach in addressing BF problem in context. Items were constructed using a 5-point Likert agreement scales ranging from 1-strongly disagree to 5-strongly agree. Responses were added up to form a composite score that

was interpreted as a higher value of the score indicated the acceptability of the PDA and relative importance of this factor. The higher acceptability of the PDA implying that it is a promising strategy in promoting EBF practice in in urban settings by positive deviants.

Appropriateness is the relevance, or compatibility of the PDA to the intervention participants, provider, or consumer; and/or perceived fit of the intervention to address EBF practice in the setting. It is a perception based on respondents' view as a PDA intervention may be perceived as appropriate but they might not accept it, and vice versa. This construct is important to capture some 'pushback' to implementation efforts, or is not consistent with PDs skill set, role, or job expectations. Hence, a variety of stakeholders would likely have perceptions about a new intervention's appropriateness to a particular service setting, objective, providers, and clients. Seven (7) items were developed and designed to capture their perceptions about the perceived fit of the approach in addressing BF problem. It was measured using a 5-point Likert agreement scales ranging from (1) strongly disagree to (5) strongly agree. Responses were summed-up to get a composite score that was interpreted as a higher value of the score indicated the appropriateness of the PDA. High composite scores implied as a higher importance of this factor. The higher score implied that it is an appropriate strategy in promoting EBF practice in in urban settings by positive deviants.

Feasibility is as the extent to which a PDA (new intervention) can be successfully used or carried out within urban community setting to promote EBF that could be measured by the actual and perceived experience of implementation stakeholders. Typically, the concept of feasibility is a potential to explain the PDA intervention's success or failure, as reflected by recruitment, retention, or participation rates. Study participants could perceive that the PDA may be appropriate for their setting—in that it is compatible with the setting's mission or service mandate, but may not be feasible due to resource or training requirements. Eight (8) items were developed and designed to capture their perceptions about the extent to which level it was carried-out using the available resources. It was measured using a 5-point Likert agreement scales ranging from (1) strongly disagree to (5) strongly agree. Composite score was analyzed to interpret as a higher value of the score shows appropriateness of the approach and relative importance of this factor. The higher score implies that it is a feasible strategy in promoting EBF practice by positive deviants.

Fidelity is to confirm weather implementation delivered as per the plan and quality of implementation that used to ensure internal validity. Implementation stakeholders could have perception weather the intervention maintains its intended effects. It has a direct relation with outcome of an intervention as a mediating variable between the context and intervention effectiveness. They can have their own judgement weather the PDA intervention was implemented as it was prescribed in the original protocol by comparing the original evidence with the actually implemented activities in terms of six dimension such as adherence to the program protocol, dose or amount of program delivered, quality of program delivery, program component differentiation, exposure to the intervention, and participant responsiveness or involvement. This perceived fidelity (individuals' perceptions about the degree to which an intervention is delivered as intended) of implementation was measured through self-report/ratings, using 10 items on a five-point Likert agreement scale ranging from 1-strngly disagree to 5-strongly agree, by individuals delivering the services or receiving them, and comparing with what achieved as compared to the shared plan at the beginning. Items designed based on the major PDA intervention components and activities. Composite score was analyzed and interpreted as higher score indicates the intervention was conducted as intended in a valid way.

Adoption/adaptability is the degree of uptake or actual use of a program at different level. It is the intention, initial decision, or action of the end-users to try or employ the EBF practice promoted by PDs as facilitated by many other stakeholders. Adaptation is the process of implementers or users adopt the practice and the way how to promoted as designed or making fit with them without compromising its intent. Depending on the nature of the modifications brought, adaptation could either be potentially positive or could carry the risk of threatening the theoretical basis of the intervention, resulting in a negative effect on expected outcomes. Adaptive interventions are those for which adaptation is allowed or even encouraged as we promoted in this PDA intervention. In this study, adaptations can be deliberate or accidental that was measured in response to the 5 developed items. It was measured using a five-point Likert agreement scales ranging from 1-strongly disagree to 5-strongly agree. Respondents expected to consider whether there was no any modification made, need or no need of modification, additions of new components, deletions/ignoring of an intervention component and minor or major modifications to an existing intervention component from their implementation

experiences. Composite was created with higher scores indicating high degree of adoptions or uptake of the PDA interventions for promoting EBF by the PDs.

Organizational readiness is reflected in terms of features such as culture, climate, structures, policies, routines, and resources can create a receptive context for the new intervention or approach. However, receptive context does not translate directly into organizational readiness, rather the content and approach of intervention matters as of the context of implementation. Project stakeholders might work in a very receptive organizational context, but they might do not value all proposed changes or new approach equally. It is shared psychological state in which stakeholders feel committed to implement the intervention and confident in their collective abilities to do so and how much they value the effort and how favorably they appraise factors of implementation capability. Hence, this construct was measured through stakeholders' perceived readiness to the task demands, resource availability, and situational factors, readiness for change, commitment to sustain the change and change efficacy. Seven (7) items were designed using the 5-point Likert agreement scale to measure this component. Responses were composited with a high value indicating high perceptions of organizational/community readiness. When organizational readiness is high, stakeholders and the community are more likely to promote EBF using PDs, exert maximum effort, show more cooperative behavior and feel confident that they can do.

Penetration is defined as the integration of PDA intervention activities within a setting and its subsystems. The concept of intervention penetration to the users (the number of eligible persons who use a service, the number of providers who deliver a given service and the number of facilitators of the implementation as compared to the expected ones) was measured to assess feeling of intervention participants on the degree of reachability of the intervention. The project reported as 130 mothers got the intervention and 13 trained PDs did what expected from them as per the protocol. However, the intervention stakeholders' could perceive different that was assessed using 7 developed items on a five-point Likert agreement scale ranging from (1) strongly disagree to (5) strongly agree. The created composite score interpreted that higher value indicates as highly reached/penetrated intervention was conducted using the PDA in addressing EBF practice.

Sustainability is the extent to which a newly implemented PDA intervention is integrated or institutionalized within a service setting's ongoing, and stable operations to transit from

temporary to permanent support, from periodic to routine practice and attaining long-term viability. Implementation stakeholders might perceive sustainability as different from penetration, in that higher penetration may contribute to long-term sustainability. This study measured the stakeholders' perception about how likely the PDA intervention in promoting EBF will be continued functional in the community. A total of 8 items designed on five-point Likert scales ranging from 1-strongly disagree to 5-strongly agree. Intervention participants were asked their opinion to rate on across range of factors that were related with the sustainability of this program. High composite scores were interpreted as a higher importance of this factor. This means; stakeholders who have higher perceptions toward the viability and ability to implement the PDA to promote EBF that will sustain in the future.

Implementation cost is the cost impact of an implementation effort that incurred in addition to the usual baseline cost. Implementation costs vary according to interventions' complexity, way of delivery, interests, settings and overheads. The direct and indirect expense/cost of implementing an intervention was measured and analyzed in another cost-effectiveness study. However, in this study, the perception of stakeholders' about the measurable, non-measurable and opportunity cost of the approach/intervention was assessed using 8 items with a five-point Likert scale ranging from 1-strongly disagree to 5-strongly agree. The responses to the positively stated items were reverse scored before the analysis. The higher composite score indicates that the implementation of PDA in addressing the problem of EBF practice is perceived as costly.

3.7.5. Study variables for the cost-effectiveness study

The study variables were socio-demographic characteristics of mothers, baseline cost, implementation/incremental cost (intervention cost), morbidity and mortality of infants (DALYs averted), and HRQoL of mothers (QALYs gained), proportion of EBF among intervention and control arms (in terms of RR), incremental effect, difference-in-difference of the effect, and incremental cost-effectiveness ratio (ICER).

Implementation cost is defined as the cost impact of an implementation effort. Implementation costs vary according to the interventions nature such as complexity, implementation strategy used, overheads and the setting. The cost of implementing an intervention can be measured using the direct and indirect expense/cost of the particular intervention for each implementation strategy used, and the location of service delivery including the cost of delivering existing usual

services and program cost. These cost estimations are combined with intervention outcomes and used to determine cost-effectiveness.

Incremental cost-effectiveness ratios (ICER) were calculated from the total cost of intervention and total cost of the usual services provided to both arms and incremental cost effectiveness ratio was used to determine the cost-effectiveness of the PDA. ICER is the incremental cost of a program divided by the incremental effectiveness compared to the next most alternative effective intervention. ICER is the cost that on average needs to be sustained to obtain "one Life Year gained or one quality of life year gained". For maternal health outcome related measurement, ICER was calculated by dividing the cost difference by the difference in HRQoL gained estimated from the composite score. Standard formula (168) for incremental cost effectiveness ratio was used to calculate and determine whether the approach is cost-effective. Unit costs were defined and estimated based on the international standards released during the period of intervention using USD.

HRQoL is defined as mothers' perception about their position in life in the context of the culture and values in which they live, and in relation to their goals, expectations, standards and concerns about their health and general wellbeing. It has been used as a standard measure of maternal health outcome at individual level. Many women usually have little information about the long-lasting physical and mental health problems that may result as a consequence of pregnancy, childbirth, and puerperium; therefore, they are not ready when they face such problems. As a result, their health related quality-of-life will be compromised for a long period. The mothers' HRQoL also affects the health and well-being of the child, with long-term psychosocial and health consequences. Health outcome (Effect) of EBF on infants was measured using standard estimator (DALYs-morbidity and mortality through modeling strategy). However, the maternal HRQOL was measured using adapted EQ-5D with 5 response scales (169) and compared between intervention and control arm: (1) mobility for work and social activity; (2) self-care and infant care; (3) daily home activities; (4) pain and discomfort; and (5) anxiety or depression. The response for the adapted measurement scales were ranging from 1 to 5 (1=extreme problem, 2=some problem, 3=not sure/uncertain, 4=not as such a problem (negligible), 5=never/not a problem). Using the overall mean score, QALYs of mothers was re-scaled from 1= a fully functional quality of life to 0=dysfunctional life. The QALYs of the participants experienced over the 6-month period was estimated from the HRQoL composite score. EQ-5D was used as a

generic instrument to measure HRQoL across all kinds of health problems including maternal health states in relation with the support to practice EBF. A higher HRQoL composite score (mean score) indicates a good HRQoL (QALYS gained by the mother) during the first six months of post-delivery.

Timeliness and activity profile for the input variables

The interventional study had three phases: the design phase (discussion with stakeholders [HEPs, WHDA leaders, community health focal persons about PDA] about the concepts of the approach, developing training materials/ intervention packages and communication materials), set-up phase (recruitment and enrollment of eligible mothers, positive deviance inquiry in context, identification and selection of PDs, training PDs) and the intervention phase (delivering each services/activities per protocol, supervision, review meeting with PDs, workshop with stakeholders, facilitation and feedback communication). There were two modules containing EBF messages and social support means that were delivered with 6 visits (1^{st} visit at 38^{th} week of GA, 2^{nd} visit at the 1^{st} day of delivery or return from health facility, 3^{rd} visit at the end of 1^{st} month, 4^{th} visit at the end of 2^{nd} month, 5^{th} visit at the end of 3^{rd} month, and 6^{th} visit at the end of 4^{th} month). Simultaneously, research activities (training, pre-test, supervision, data collection, data entry, analysis and dissemination of preliminary findings) were also performed at baseline (37^{th} week of gestational age), midline (3^{rd} month of post-delivery) and endline (6^{th} month of post-delivery). The data for this study were considered costs of the baseline (common routine interventions provided in both arms), programmatic (1^{st} and 2^{nd} phase) activities and intervention activities conducted from February 01 to September 30, 2018. The training provided to PDs (change agents) had two parts; the theoretical aspects with lectures about BF, counseling/support and communication; while the practical session includes listening, learning, counseling, confidence and supporting skills with simulation, work in smaller groups with discussion and role-plays, which took four days.

Unit cost (cost estimates) as input variables

Resource utilization (cost expense) data of the PDA guided intervention was collected/estimated from the trial protocol implemented as per the agreement signed with the funding institution. However, the time value for the PDs and end-users (mothers) was estimated using the minimum wage rate referred from a national study conducted in Ethiopia (170). Some of the routine data including the time allocated to each activity and implemented accordingly was extracted from

the project record. We used a provider and funder perspective to calculate costs for the intervention and programmatic adjustment activities. Baseline and research costs were excluded from the CEA, while merely reported to show the cost of the research and the basic salary expended by the government to run the usual care by UHEPs. We collected direct financial costs (expense/activity) and economic costs, which includes opportunity costs for the provider/PDs and end-users/mothers.

As part of the baseline cost, HEPs receive basic monthly salary from the government who have 3 years of pre-service training equivalent with a diploma nurse (171). The costing items were categorized into 3 such as baseline cost, intervention cost, and research cost. The basic salary information for HEPs was obtained from the human resource department of Jimma town health office. Accordingly, average per month payment for each HEP was 229.4USD (average of the level IX=4609ETB/minimum to XIII=8017ETB/maximum basic salary) (45). As part of the intervention cost, 25USD was paid for 4 HEPs and 2 MPH holders for recruitment and enrollment activities, while 62.5USD was paid for 8 participants of the training which comprised of UHEPs for recruitment, 2 MPH holders for enrollment, and 2 experts for supervision purposes. For the whole period of intervention 165USD was paid for communication/air time, 175USD for logistic cost including material/protocol printing, and 6.6USD per inquiry of a single positive deviant through the process called positive deviance inquiry. The refreshment/incentive cost per PD was 30USD/6visit for 10 mothers. This means the PD were paid 0.5USD per a single visit for a single mother. To supervise the home visit, 94.2USD was paid per supervisor for five round supervisions conducted by 3 experts. Workshops and trainings were conducted to discuss with key stakeholders including urban health extension program supervisors, HEPs, research team and community health leaders, and to capacitate PDs with expense of 17.53 USD per session conducted for 9 times. As part of indirect cost of the intervention, the overall visiting and consultation time-monetary value for 13 PD was 234.0USD. This was estimated as a single PD should conduct 60 visits with 45minutes for each visit, with a minimum daily wage rate of 1.6 USD (170). From the end-user's perspective, the consultation time value per a single mother was 0.914USD considering the same wage rate. This means a single mother took 45 minutes for each consultation with total of six round visits. This is because of the loss of productivity due to such intervention was estimated by converting the total counseling minutes into full day equivalent. Productivity loss was estimated using the average

daily wages (poor persons' general consumer price index-deflated real wages) for unskilled urban labour in Ethiopia (170). The referred study used the data on prevailing wages collected by Central Statistical Agency of Ethiopia (2015). We converted the average wages for urban settings in Ethiopia in 2015 (43.6ETB) to USD.

Although the research cost was not included into the analysis, a total of 4678.45USD was expended to each arm for the training, logistics including refreshment, guideline development, pre-test, data collection, supervision, data entry, materials printing, communication, review meeting, preliminary and main findings dissemination costs. No transport costs for home visits by PDs as travel was done on foot. There was no overheads and administration cost for office and project financial administration. Actual salary packages were used to estimate the cost of HEPs' time involved in any intervention activites. The base year for converting intervention costs into USD was 2018.The exchange rate of USD to Ethiopian Birr (ETB) in May 2018 was 1USD equivalent with 27.5176 ETB at the midline of the study.

Discount rate

A discount rate is the rate of return (interest rate) used to discount future cash flows back to their present value. It is the reduction of the value of future consumption and/or health in an economic evaluation at a pre-specified rate, on the basis that individuals and societies value the present consumption more than future consumption. Hence, a discount rate of 5% per the total cost/year was applied, and for the infant morbidity and mortality (DALYs), and maternal HRQoL (QALYs) discounted as suggested by the WHO 3% and 3.5% respectively (172) since there is no Ethiopian guideline for health economic evaluation. The effect of PDA as an intervention to increase proportion of EBF, whereby to improve health outcome of both parties (mother and baby), was reflected in the model by promoting the practice and health outcome. However, the intervention was not assumed to be 100% effective, because the EBF practice in the intervention arm is much lower than 100%, even if higher than from the control group. The discount rates of cost and infant-maternal outcome are user input in the default model. The analysis was conducted from both interventionist (cost of the direct intervention) and user's perspective (mortality, HRQoL and cost of time). Every cost was converted to 2018 US dollars ($) and discounted by the aforementioned rate. In addition to actual intervention costs, the societal perspectives such as costs for PDs' and mothers' time value were accounted.

Outcome variables estimates and model structure

In this study, there were two effects (health outcomes) estimated. These are infant health outcome (DALYs-morbidity and mortality) and maternal health outcome (HRQoL-QALYs). The infant health outcome was estimated using decision tree model (**Fig-4**) and Markov model (**Fig-5**) to explain the outcomes alongside with the trial(173) and secondary data analysis. Both the maternal and infant outcomes were presented using the decision tree to visualize the transitional probabilities as shown in the figure. The transitions for infants' outcome considered the benefit of EBF to estimate DALYs for 6 and 59 months, while maternal outcome was measured only for the period of intervention (till 6 months of post-partum). To estimate the DAYLs, the top childhood diseases (pneumonia and diarrhea) which cause significant number of morbidity and mortality (nationally-Ethiopia, regionally and globaly) were selected based on EDHS-2016, and global, regional, and national causes of child mortality estimates-2010 (174). Then the Relative Risk (RR) of avoiding EBF was taken from the other study of this trial which was used as a baseline indicator for these infant health outcomes(93). The relative risk was estimated from a sample of 260 mothers (130 in each arm). Of all mothers included in each arm, 50.8% and 31% in the intervention and control arms were exclusively breastfed in the first 6 months of post-partum respectively. However, at the baseline, there was no significant difference in the proportion of practicing EBF between the two arms (32.3% vs. 30.8%).

In the model, the probability distribution of health states of the infant who were EBF or not analyzed from EDHS-2016 data set (175) which shows the probability of the infant who EBF or not how transit across the four health states depicted at **Fig-5** and **Table 3.2**. Weighed analysis was also done during calculating the respective proportions from the data set. The model revealed the number of life years with disability and life loss averted using DALYs. These outcomes were discounted using the aforementioned discounting rates and continuity correction was applied. Half-cycle correction was applied to estimate DALYs with total of 10 cycles for 5 years. This makes uncertain the episodes of death occurrence within each cycle to become continueos. Utility for pneumonia and diarrhea in the transition model were adjusted using the DALY weights. DALYs weights for moderate diarrhea (W=0.188) and pneumonia (W=0.051) were taken from the global health data-2019 estimates (166). For each health state the probabilistic and deterministic distributions were considered to estimate the respective utilities.

In the process, we developed a cohort simulation Markov model in Microsoft Excel on the cost-effectiveness of the PDA as a strategy to increase practice of EBF among mothers in the intervention arm compared to their counterparts to improve infants' health outcome such as decreasing morbidity and mortality (DALYs) and improving maternal HRQoL (QALYs). In the model, the transitions from diseases to back healthy state and to death were estimated using the general probabilities (considering the same for those transits) regardless of EBF practice due to the absence of relevant evidence. The EDHS data set didn't have related raw data to analyze such probabilities as we did for other states reported in the first 3 rows of **Table 3.2**. Health states of mother (quality of life) and infant (disease progression, death and DALYs) were modeled as primary outcomes which need mixed analytical models as we showed in the two figures and a table below. The model compared if the PDA intervention used or not used (in its absence) could improve infant-maternal health outcomes.

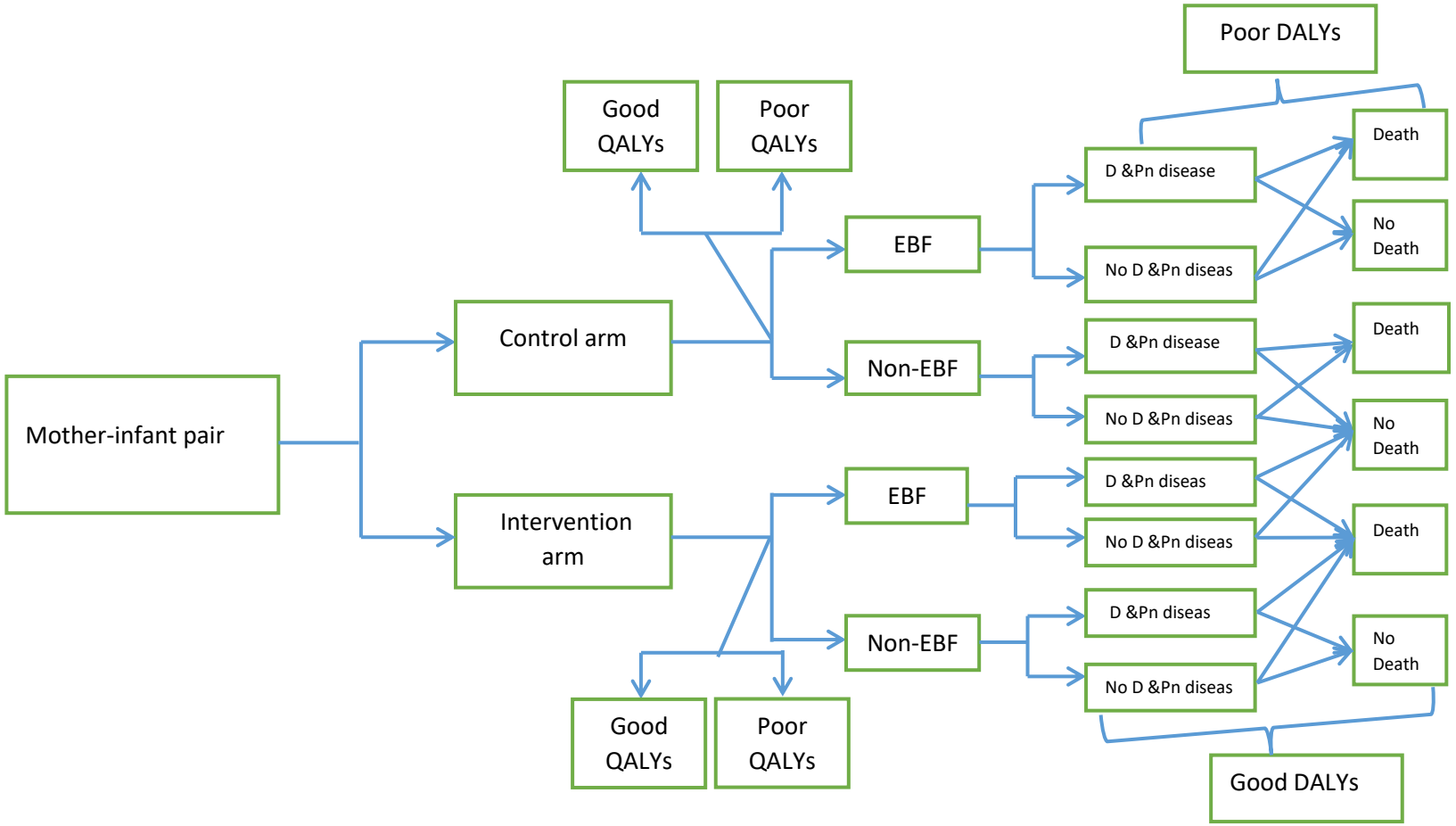

Figure 4. Decision tree modeling for the infant outcome (DALYs), and maternal health outcome (QALYs) with PDA alongside a cluster RCT, Jimma, 2018. (D=Diarrhea, Pn=Pneumonia, EBF=Exclusive Breastfeeding).

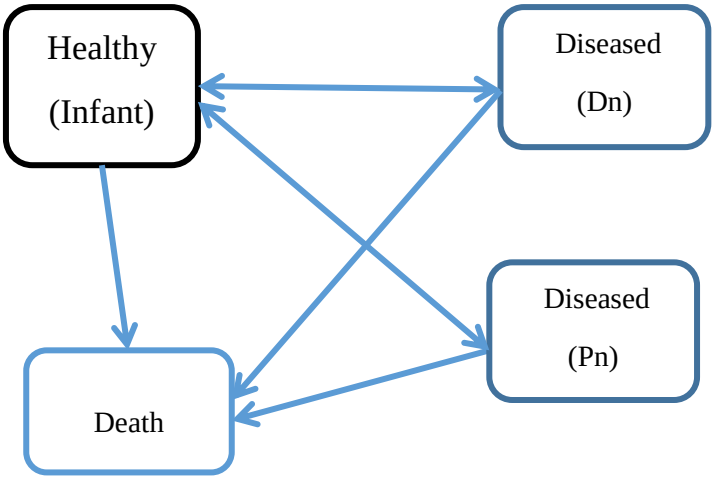

Figure 5. Markov model to show the transitional probabilities as reported at **Table 3.2** using percentage points for modeling DALYs and to explain the decision tree **(Fig-4)** among infants who EBF or not, trial study, 2018. (Dn=Diarrhea, and Pn=Pneumonia)

Table 3. 2. Transitional probabilities between health states of infant, trial study, Jimma, 2018.

Transitional probabilities		**Exclusive BF**		**Non-exclusive BF**	
		<6 months	**6-59 months**	**<6 months**	**6-59 months**
*Staying healthy (%)		89.3	70.0	61.4	65.7
*Healthy to diarrhea (%)		5.8	23.6	20.1	19.8
*Healthy to pneumonia (%)		6.2	15.0	22.6	14.5
@Diarrhea to healthy (%)	99.7	The same probabilities were used to transit back to healthy and to death states across EBF categories.			
@Diarrhea to death (%)	0.3				
@Pneumonia to healthy (%)	99.5				
@Pneumonia to death (%)	0.5				
#Estimate of EBF practice with PDA intervention to control group (in RR)	2.29				

*analyzed from EDHS-2016 (175), @ taken from Global, regional, and national causes of child mortality-2010 (174), and # taken from the earlier trial-2018 (93).

3.8. Intervention approach and activities

The PDA was used to guide the intervention through a participatory design. In the study area, there are mothers whose uncommon but successful behaviors enable them to find better solutions while feeding breast milk only for the first 6 months. Participatory approach was followed to iteratively construct the emerging design and elicits the qualitative results as co-interpreted by the researchers and the participants who used or implemented the design. The method of a participatory design ensured whether the participants' interpretations are taken

into account in the intervention. Participants' co-interpretation of the research was not to confirm but also considered as an essential part of the process. These aspects were productively and ethically examined through partnerships including the tacit, invisible aspects of mothers' activity. The researcher and PDs cooperatively designed artifacts, workflow, and work environments; and argued iteratively so that they developed and refined their understanding of the activities. This design helped the researchers to understand the tacit and implicit knowledge rather than explicit, holistic rather than bounded and systematized; it is what mothers know without being able to articulate. The mothers' knowledge is too layered to be fully articulated but have experience. They better communicate through actions than words. We understood these through the positive deviance inquiry as knowledge is a condition of a certain context. This means the PD approach helped to get the lived experience from mothers and to use them for the intervention practically although mothers might fail to articulate in words. This participatory design helped the researchers to find a common "language" with implementors, and to capture diverse information on how to implement the intervention.

In the process, future users or implementers of the solutions were involved in the design of those solutions through shared knowledge that would improve the design. The design process facilitated user participation throughout emphasizing mutual learning (problem setting and solving) and co-construction of the new solution in its real context.

The project team, HEPs, and invited volunteer women identified the positive deviants and practices using series of six steps: defining the problem of EBF (problem clearly stated), exploring the presence of PD individuals (confirmed their presence and selected using 5 criteria), discovering uncommon practices/behaviors (clearly described and discovered), designing the program (designed with a clear objectives, activities and outcome), planning for monitering and evaluation (developed framework and agreed), and planning for scale-up (how to scale-up and sustain discussed). These steps were detailed as follows;

The following six steps were employeed to design the PDA;

1. Defining the problem: we worked together with HEPs, model mothers and invited volunteer women from the community in defining the problem or why mothers do not exclusively breast feed in context.
    a. The project team communicated HEPs to call HDA leaders, model mothers and invited volunteer women purposively to discuss real problems with EBF.

b. The main agenda for the discussion was "What are the problems of newborn/infant caring practice in the community and why?". With focus on BF and EBF.
c. The principal investigator was the facillitator of this qualitative investigation so that to ensure whether it is part of the pre-planned intervention or not. Mothers had the following worries in relation to EBF practices;
    - Feeling tense and overwhelmed while they think EBF
    - Difficulty of combining work and BF
    - Feeling very tired while they think the recommended duration of EBF and the needed effort.
    - Difficulty in positioning the baby
    - Worry of not having enough milk and the baby may not get satisfied
    - Worry about the baby weight gain
    - Fear of sleeping disorder to feed breast during night
    - Baby is in difficulty during sucking
    - Worry about sore nipple and breast infection
    - Worry about breast engorgement, leakage of milk and associated loss of beauty
    - Caring with BF difficulty for 6 months
    - Weaning difficulty to switch BF-difficulty to wean to start supplementary feeding.

From the qualitative study, we understood that a mother who gave birth was affected by many factors not to practice EBF such as predisposing, enabling, and re-enforcing factors. These factors are salient aspects of mothers' psychological context. Predisposing factors were her knowledge of EBF, attitude toward exclusiveness, self-efficacy, and skill of breast feeding. Some examples of enabling factors were feeling helpless if no experienced mothers around, and if available become enablers. Re-enforcing factors could be positive or negatives ones. Examples of negative reinforcing factors were worrying about her baby body size and health; if become thin and thin, mothers think about formula feeding to be fat like others baby. Positive re-enforcing factors such as if her baby becomes fat and healthy with only BF encouraged to continue. Mothers may also refer to other nearby mothers' practices regarding breast feeding. If mothers in her network are not breast feed or practice mixed feeding and if their baby looks healthy, she may think of what is going on such babies, and then she may try to give additional foods similar to what others did. On the other way, other intimate peers may push to give some additional so that to have strong enough and fattened baby. If the mother not accept this, during coffee ceremony or in any other event simply family members or relatives gave water or sweetened fluids without the mother's permission. This all affects mothers' psychology that may

needs informational counseling and sharing lived experiences with emotional and appraisal components of social support including her relevant others in the family.

2. Determining the presence of PD individuals: Once we defined the real existing problem regarding practice of EBF. Health extension professionals helped the project team to identify positive deviants from the community.
    a. We tried to search whether some positive deviants exist and had lived experience to overcome the identified community problem during the group discussion together with the volunteer women and health extension professionals. After confirming their presence, we developed a list of criteria to select PDs from the community by shortlisting, completing checklist/criteria, and interviewing from the final lists. There were two main questions we asked; (1) Are there mothers who practice EBF regardless of any challenges faced in the community? Yes, of course, some mothers were managed to feed exclusively without access to any special resources despite they face many challenges-this helped to identify candidates for positive deviation, (2) what were these PD mothers doing that others were not and how? The answers for this question were used to supplement the first selection criteria (listed in the next paragraph) during the interview.
    b. The process of the positive deviance approach was started by training HEPs and HDA leaders on the overall objective of the intervention and identifying deviant cases from the community. Then we assessed each of the candidates using the following objective and subjective set of criteria. Thirteen (13) PDs were selected out of 39 final short-listed who came directly from the community and screened using the following criteria;
        1. Previous experience of EBF and timely initiated with best practices (if multi-para, for the last child) regardless of any challenges and,
        2. Have good knowledge, positive attitude toward EBF, and good skills of BF-verified through interview and demonstration (using rating scale) and,
        3. Willingness/motivation to take part in the intervention with good communication skill demonstrated during interview and
        4. Attended all the training given by HEPs and implemented all health extension packages and recognized as an opinion leader of her village and
        5. Uptake of all recommended ANC visits, institutional delivery, and PNC services for her last pregnancy/delivery.

3. Discovering uncommon practices or behaviors:
    a. At this step, the team tried to discover best practices that are uncommon, scientifically sound (initiation, frequency, position, attachments, and time of starting BF as per the WHO protocol), and positive attitudes to overcome identified major problems to do EBF.
    b. At the second step, we identified individuals that have a positive attitude toward EBF and had lived experience to solve EBF problems using listed criteria.
    c. The team members set out behaviors and attitudes that allow the positive deviants to be successful in caring for their baby to feed breast milk exclusively. Scientifically sound and socially acceptable practices were investigated by the project team, HEPs, and HDA leaders. Those discovered best practices were included in the intervention package to be used by PDs.
    d. Discover uncommon practices or behaviors: the project team, in discussion with positive deviants, determined the behaviors that allowed them to successfully breast feed alone for the first six months.

    In this step, qualitative research methods were used to identify the successful behaviors and practices, using (i) focus group discussion with WHDA leaders; (ii) key informant interviews with HEPs and in-depth interviews with mothers from the community (iii) observational visits to homes of 5 lactating mothers; and (v) observational visits to health posts. The study focused on identifying the intentional and unintentional behaviors and practices of mothers and the strategies that enable them to achieve better EBF with timely initiation practice for their baby. PD mothers practiced EBF for six months irrespective of their job status and avoided giving any other thing except supplements and medicines. For example, if working mothers reported as she expressed breast milk and kept the containers at home when working far away, could be uncommon practice. Some working mothers may also come home and BF their infants or take them to the daycare center to look after them intermittently.

    Hence, a mother who overcomes identified challenges to feed breast milk exclusively was considered as had uncommon practice. The causes/challenges identified were peer pressure to mix food, intention toward industrial products, work after maternity leave, knowledge gap, unfavorable attitude, skill gap, a cosmetic issue, and limited support from partner/relevant others. Those mothers might practice EBF with own solution, seeking advice from professionals, or by receiving support from husband or relevant others.

Medically, PD mothers may comply with the recommended visits to the health institutions and also independently contact health care providers whenever they need advice. Thus, they seem to have a close relationship with the health care providers and are more receptive to inputs from health professionals, in comparison to the others. Furthermore, these mothers proactively seek information, from multiple sources, related to feeding and child care and put the information to use. The caring practices among the PD families may be based on the decisions of the mother or mother jointly with the father/other family members, irrespective of the mother's employment status. The PD's husband/partner was also actively involved in the actual child care responsibilities, especially help in positioning, breast attachment, and providing expressed breast milk while she was away. Therefore, we asked them how they overcome the challenges of EBF practice at urban setting concerning the above medical and social issues, and their explanation and our observation result shows deviation.

4. Program design:
    a. After we identified successful practices, the community health workers including HEPs and PDs decided what strategies they would like to follow.
    b. And design activities to help others access and practice these uncommon and other beneficial behaviors. Our intervention was designed to supplement the counseling and social support process.
    c. Community members selected strategies to adopt among those practiced by positive deviants. These strategies were added to those already chosen by the project team strategies to adopt for the intervention.
5. Monitoring and evaluation
    a. The project was monitored by community health workers and the project team. Also, its process was evaluated through a review meeting. Activities were monitored that used to see whether implemented as planned or not to take corrective action a soon as possible.
    b. In line with this, to evaluate the progress of the intervention, data were collected three times at the beginning, midline, and final stage.
6. Scaling up
    a. If it was found to be effective, scale up was considered as part of sustainability plan, after the intervention.

b. We expect that the community observing the success and engaging in a PD project, might adopt the practice that remains vital to the acceptance of new behaviors.
c. After the completion of the project, the changes and improvements resulted from this project were evaluated and the improvements achieved could be taken examplery to recommend scale up in the other remaining kebeles, zonal, regional and national level by selecting similar settings.

Since the whole process conducted with the community, strengths, weakness, opportunities and challenges identified that helped us to re-shape the intervention plan. During testing and for future scale-up of this type of intervention, the primary beneficiaries were newborn/infants, mothers & future generation as a whole to be healthy and productive.

For the intervention group, comprehensive and personalized counseling and social support intervention packages provided for mothers allocated to the intervention group at their home by trained positive deviants to promote EBF practice using their preferred local languages (Afan Oromo and Amharic). PDs provided face-to-face informational counseling and psychosocial support. Thirteen (13) trained positive deviants were assigned to visit 10 mothers each, 6 times on the predetermined schedule. Positive deviants were community volunteers but we certified them in recognition of their active role and incentivized with minimum acceptable refreshment cost that permitted by the Jimma Institute of Health-Institutional Review Board (JIH-IRB) which was 0.5USD/visit. This means 5USD per 10 home visits at each round (total rounds-6). The counseling and social support protocol assumed to take 45 minutes at each visit based on the following two main points; (**Table 3.3**)

1. **Informational counseling**: This constitutes individual counseling to share best-lived experiences and updated with training content adapted (176) on EBF and any relevant to the newborn care. They also recommended practicing Kangaroo Mother Care (KMC) if needed to maintain the infant's body temperature, and to stimulate BF. Low birth weight and pre-term neonate who were indicated by the birth attendant should be put on Kangaroo mother care. This means giving breast milk while placing the baby in between the two breasts because that initiates the newborn to suck strongly and survive. Summary of intervention activities, schedule, training modules to qualify PDs and main contents (**Table 3.3**), and co-created BF messages were reported as follows;

Table 3. 3. Summary of implementation activities conducted to improve EBF practice, Jimma Town, 2018.

S.No	Implementation activities	Responsible body	Place of field work	Strategy/Activities
1.	Enrolling eligible mothers	Project team and UHEPs	Facility based and community based-At health post/site and Home to home	Listing from family folder with identifiers and making rapid community survey
2.	Capacity building training for WHDA leaders and HEPs on PD approach	Project team	Facility based-At Health post/site	All HEPs and WHDA leaders were communicated formaly and training on how to proceed with PDA principles and the way forward for this intervention study
3.	Identifying positive deviants and training them	Project team, WHDA leaders and HEPs	Facility based-At selected Kebeles/Health posts	Through qualitative methods and together with HEPs, and WHDA leaders recruiting deviants and **qualified** by training on Module-I and II
4.	Personalized and comprehensive informational counseling and social support	Positive deviants (for both communication and supportive intervention)	Community based-home to home visit	Informational counseling and social support to mothers together with their family or relevant others on TIBF & EBF practice
S.No	**Module/content**	**Time of exposure/visit**		**Duty of PDs per visit**
1)	Module-I	1st Visit (38th wk of GA)		Refer below in module-I
2)	Module-I and II	2nd Visit (1st day of delivery or return from health facility)		Refer below in module-I and II
3)	Module-II	3rd visit (end of 1st month)		Refer below in module- II
4)	Module-II	4th visit (end of 2nd month)		Refer below in module- II
5)	Module-II	5th visit (end of 3rd month)		Refer below in module- II
6)	Module-II	6th visit (end of 4th month)		Refer below in module- II

Module one (informational support)

A. Developing an empathic relationship:

- Greeting the family, take seat, self-introduction and start a conversation about the general newborn care and EBF
- Building trust, safe, alliance with the mother and other family members.

B. Collaborating with the family as a partnership:

- The PDs brought skills and knowledge of EBF issues and the family brought their own experience and resources to discuss and reach a consensus.

C. Using guided discovery:

- A style of engagement to both gentle probe for the individual and family's BF beliefs, and to stimulate alternative ideas. Then appropriate use of "information "
- What are the beliefs and subjective norms that prevailed about EBF at the individual and community level?

- What looks like the general newborn caring practice? Such as personal hygiene, maternal feeding…etc
- What is an exclusive BF practice? Why and how practiced?
- What is the process of BF with time? When to initiate and why? Frequency of feeding, position, attachment and why KMC is indicated for feeding initiation?
- Importance of BF for maternal heath (prevent breast pain, cancer, and facilitate uterine contraction) in addition to the baby's health.

Module two (Emotional and appraisal support)

A. Putting knowledge into practice and behavioral activation:

- Recap major concepts discussed previously (verification of understanding)
- Checking whether the mother tried things out in between counseling sessions, putting what had been learned in the last visit
- The lived best experiences of PDs would be explained and shared
- Psychosocial support and verification of her understanding of EBF.
- How to express and feed breast milk when the mother busy/go to work?-PDs were trained on manual expression techniques and steps.
- What are the danger signs of the newborn in the process of general caring?

B. Working with key family members

- This helped to motivate and encourage mothers to take small steps and then build on these.
- Identifying the most relevant others for the mother and engaging them.

C. Problem-solving:

- Problems and barriers in putting new knowledge and skills into practice would be analyzed, communicated soon, and solved.
- Emotional and appraisal support

D. Analyzing challenges and giving feedback

- They analyzed what the mother challenged and give feedback

2. **Psychosocial support and verification** of their understanding concerning the continuum of infant care including EBF. This includes a plan on how to care newborn/infant, experience with best caring practices used and expectations, beliefs, and myths related to newborn/infant care including EBF. The first thing was to develop an empathic relationship such as trusting, safe, alliance with the mother and other family members. Collaborating with the family in an equal partnership such as the PDs might bring skills and knowledge of EBF issues and the family brought their own experience and resources. As a style of engagement, gently probing the individual and family's BF beliefs, attitude and to stimulate alternative ideas was done. Hence, deviants used "information" effectively to make culturally appropriate illustrations so that to facilitate communication with mothers and families. Putting knowledge into practice and

behavioral activation means the mother tried things out in between counseling sessions, putting what had been learned into practice. PDs worked with key family members to motivate and encourage mothers to take small steps and then build on these. They tried to solve problems and barriers in putting and analyzing new knowledge and skills into practice and communicated soon. Then every month the PI collected feedback about each visiting session from PDs if they challenged with some technical and medical issues of BF. The information gathering checklist contains confirmation of the presence of the positive deviant per schedule (both mother and deviant put sign), discussion points raised, any difficulty on technical and medical issues of BF, the way forward, the next time of visit and challenges faced. This intervention was in addition to the already existing routine community-based services. The details of the type and activities of psychosocial support (intervention packages) were presented as follows;

1. **Informational support** involves advice and suggestions on;
    - Encouraged delivery at the nearby health facility
    - Counseled the importance of initiating breastfeeding within 1 hr of delivery and feeding colostrum first
    - Discouraged use of traditional pre-lacteal foods and post-lacteal foods
    - Encouraged the mother to increase their usual food intake to support lactation
    - Emphasized frequent and on-demand breastfeeding,
    - Encouraged the mothers to continue EBF for 6 months
    - Discussed beliefs and subjective norms that prevailed about EBF at the individual and community level
    - Defined the meaning of exclusive BF practice, why and how to practice
    - Conceptualized the process of BF with time including when to initiate and why, frequency of feeding, position, attachment and relevance of Kangaroo mother care for the timely initiation.
    - Ensured the importance of BF for maternal heath (prevent breast pain, cancer, and facilitate uterine contraction) in addition to the baby's health.
    - Lactation amenorrhea method and other family planning options Personal cleanliness and domestic hygiene, hand washing.
    - The lived best experiences of PDs were explained and shared

2. **Emotional support** involves providing empathy, love and care, built on relationships of trust including but not limited to;
    - Greeting the family, take seat, self-introduction and start a conversation about the general newborn care and EBF
    - Building trust, safe, alliance with the mother and other family members.
    - Discuss personal difficulties with breastfeeding
    - Showed expressions of caring, encouragement, attentive listening, reflection, reassurance, and avoiding critics.
    - This support would promote the experience of feeling accepted, cared for, admired, empathized, respected, and valued.
3. **Instrumental support** consists of providing tangible aid such as;
    - Observed the positioning, the latching, and the feeding of the new-born with hands-on guidance as necessary
    - Solved any breastfeeding problems, Helped breast milk expression and storage
4. **Appraisal support** facilitates self-evaluation through constructive feedback;
    - Provided constructive/ appropriate feedback
    - Praised the mother for correct actions
    - Encouraged to persist in problem-solving
    - Reassured that their efforts will result in positive outcomes
    - Helped to motivate and encourage mothers to take small steps and then build on these.
    - Identifying the most relevant others for the mother and engaging them.
    - They analyzed what the mother challenged and give feedback

Co-created messages with PDs (Basic concept and benefit of EBF)

I. Concept of EBF and its benefit

- Exclusive BF practice means that an infant should receive only breast milk from his/ her mother or a wet nurse, or expressed breast milk and no other liquids, or solids, except drops or syrups consisting of vitamins, minerals supplements, or medicines for the first six months.
- Breast milk provides all infants nutritional and fluid needs in the first six months and is a perfect combination of proteins, fats, carbohydrates, and fluids and it is the best and cost-effective intervention to reduce infant morbidities and mortalities.

- Therefore, exclusively BF for the first six months and continuation of BF up to 24 months or beyond with complementary feeding have paramount importance on your baby's health and growth.
- If you didn't use this cost-effective intervention you may sacrify a lot when your infant ends with illness and malnutrition.
- Your infant will get white blood cells through your breast milk which can make the baby's immune strong rather than never get it from any other formula or cow milk feeding.
- To practice EBF, you have to initiate BF within one hour of life or immediately after birth.
- This has two important things: your baby will get colostrum-Amharic (Inger) that has very good nutritional values.

II. Milk production mechanism and feeding techniques

- On the other hand, your baby will learn sucking and your breast will be stimulated more to produce more milk to the next sucking.
- Put the baby to the breast frequently (8-12 or more/day) and take yourself more fluids and sips because the milk production depends upon how much the baby sucks/stimulates it and how much you take food/fluid.
- When you put the baby to your breast make sure that you hold it in the correct position and attachment (supported by PDs).
- Hold your breast gently with your hand around the middle without pressing with your fingers to facilitate more flow of milk toward the nipple.
- Make sure that the baby's mouth is well sucked the breast nipple and the lips should be bulged out.
- If your baby is low birth weight and indicated by the birth attendant to put on Kangaor mother care, try to give your breast while the baby is in between the two breasts because that initiates the newborn to suck strongly.

III. Practical support, milk expression technique and assurance

- After sharing the lived best experiences of PDs and explaining their experiences to the project team, they were oriented to transmits/transfer their skill with positive side [demonstrations were conducted during training].
- Psychosocial support and verification of mothers' understanding of EBF practice were also managed by positive deviants as per the protocol.

- When the mother became busy or go to work rather than giving any other sorts of foods, expressing breast milk using POP-expresser or manual expressing techniques then putting with cup till the mother gets back (it can be stored for about 6 hrs), was recommended.
- If the milk expressed was not too much try to come back as soon as possible or try to compensate the feeding while you are with your baby.
- If you do all the recommended things and feed breast milk only for the first 6 months, your baby will be healthy and the body can defend against diseases easily.

IV. Negative subjective norms, and maternal benefits of EBF

- You may hear information as practicing EBF till 6 months will affect the infant's appetite to switch breast milk at the weaning period to start new complementary food easily.
- This depends on the technique that the mothers apply to transit their baby to complementary feeding.
- If the baby gets frequent, small, variety of foods in different style and at different mood, sure he/she will adapt.
- Rather than following others' what told to you, always it is best to check by yourself and you will be one of the mothers who can talk about this recommended practice and how did you tackle it for the sake of your baby's ultimate health. By the way, when you practice EBF, you are also on the safe side.
- You may not suffer a lot from breast engorgement and associated pain; you are at low risk of breast cancer, and unwanted pregnancy.
- Therefore, you will be healthy and your baby will be healthy so you will lead a healthy family life that is the meaning of quality of life.

V. Re-assurance on BF technique, benefit and impact

- Once again, please don't forget to take enough amounts of fluid and food for you that determine the milk production.
- Don't press your breast with your two fingers during feeding that will hinder the flow of milk toward the nipple.
- Then accumulated milk may engorge your breast and you may suffer due to pain, even it may become one of the risk factors for cancer.

- If the whole nipple part is not immersed into the infant's mouth until it bulged out, the intensity of sucking will be affected and duration becomes short so that your baby didn't get adequate nutrient.
- This leads to malnourished conditions and normal growth will be affected in the short and long-term.
- If KMC was indicated for low birth weight, don't forget to give your breast while the baby is in between of your two breasts because that initiates the newborn to suck strongly.
- In addition, it would be nice if you know the danger signs of newborn such as poor feeding, deadly fever, diarrhea/vomiting, and often a combination of these may occur due to interruption of BF with other foods/fluids.
- As some of the mothers might tell you, when you become busy, expressing breast milk not affect nipple sharpness and milk production because I have tried it.
- If you don't do all the recommended things and do not feed breast milk only for the first 6 months, your baby will be unhealthy and may contract diseases easily.
- In terms of cost, you will expend much more to treat yourself as well as your baby but all are preventable via practicing only breastfeeding in the first 6 months.

However, mothers enrolled into the control group received the usual routine prenatal and post-partum services which are provided by HEPs. This was done as per the urban HEP guideline through home-to-home visits. Otherwise, nothing was done for this arm except for data acquisitions activities. These implemented interventions were the base for conducting the first two effectiveness studies, and the last cost-effectiveness study, while it was an opportunity to conduct the end-users satisfaction and implementation outcome measurement studies.

3.8.1. Implementation activities

The integrated approach and strategies were designed through the active participation of different stakeholders including the end-users and their relevant others.The main implementation activities were enrolling eligible mothers, capacity building training for HDA leaders and HEPs on PD approach, identifying the presence of deviated behaviors (in favoring EBF practice), selecting positive deviants and training them, and supervising while they provide personalized and comprehensive educational couseling and social supports by PDs. These home-based counseling and supporting activities were implemented for 7 months with 6 visits. It was implemented in 3 clusters only. The intervention was also considered the participation of their relevant others. The

counseling contents of EBF were adapted from WHO "Breastfeeding Counselling guideline" (176) and used to train PDs. They were trained with different modalities including classroom sessions for providing theoretical aspects of breastfeeding, counseling and communication; practical sessions on counseling skills (listening and learning skills, confidence and support skills) and simulation. Lectures, demonstrations/simulation, and work in smaller groups with discussion and role-plays were training methods used. Then the main messages were co-created in consultation with them. At each visit, the psychosocial support (emotional and appraisal) and verification of their understanding was the pillar to make sure about the plan of care, experience sharing and expectations, beliefs, and myths related to EBF. As part of supervision activity, follow-up checklist was developed. The information gathering checklist contains confirmation of the presence of the positive deviant per schedule (both the deviant and mother put sign), discussion points raised, any difficulty on technical and medical issues of BF, the way forward, the next time of visit and challenges faced. This intervention was in addition to the already existing routine community-based BF counseling services expected to be provided by urban HEPs.In summary, the main implementation activities were;

- Enrolling eligible mothers
    - This was conducted by the project team and urban HEPs
    - Facility and community based survey were conducted
    - The main activity was listing participants from family folder (Health extension registry book) with identifiers and making rapid community survey not to miss those non-registered.
- Capacity building training for HDA leaders, HEPs, model, HEPs suppervisors….etc on PD approach
    - This was conducted by the project team
    - It was arranged at urban HEPs working sites/Kebeles.
    - All HEPs and HDA leaders were communicated formaly and training on how to proceed with PDA principles and the way forward for this intervention study.
- Identifying the presence of deviated behaviors (in favoring EBF practice), selecting positive deviants and training them
    - This was conducted by the project team, WHDA leaders and HEPs.
    - It was facility-based and arranged at urban HEPs working sites/Kebeles.

- Through qualitative methods and together with HEPs and WHDA leaders, PDs were recruited/screened from the community and qualified by training.
- The training modules were focusing on informational support (Module one) and emotional and appraisal support (Module two).

- Actual provision of personalized and comprehensive informational counseling and social support with active supportive supervision.

3.9. Data collection tool, procedure and timeline

Summary of tool development and data collection timelines were discussed for each objective as follows;

For the evaluation of the effect of PDA on EBF, interviewer-administered structured questionnaire was adapted in English. The tool had three parts such as the baseline characteristics of the mothers, ideation factors, and outcome measurements (EBF). The second and third parts of the tool were adapted from reliable and validated sources (177,178) and WHO standards (179) respectively. To ensure face validity, the adapted tool with some modification was pre-tested on 5% (n=13) of the sample out of the study clusters. Based on the comments and feedback collected, relevant modifications were made.

While for the evaluation of the effect on TIBF, the baseline and midline data were collected using an adapted interviewer-administered structured questionnaire. The tool had three parts such as socio-demographic, obstetric and support-related variables, predisposing factors of EBF at midline point and outcome variable such BF practice, timely initiation, and the time to initiate for the first time. The second part of the tool was adapted from reliable and validated sources (177,178). The third part of the tool was adopted from WHO standards(179).

Moreover, for the satisfaction study, interviewer administered and structured questionnaire was used to collect the data. The tool for the predisposing factors was adapted from reliable and validated sources (119,177,178,180). However, socio-demographic and BF-related variables, community-level factors, and end-users satisfaction measuring items were developed. Initially, 35 items were developed to measure satisfaction, while 5 items were dropped during face validation.

Whereas, for the implementation outcome study, data were collected using a structured questionnaire developed for addressing the socio-demographic variables, intervention related variables, and implementation outcome measures. The face and construct validity were checked

for the outcome measures. Using the collected data, the construct validity and item's reliability test was checked for these measures. Construct validity was tested using Exploratory Factor Analysis (EFA) to indicate valid scale constructs with a total variability explained. Principal Component Analysis (PCA) method was used. Then reliability test (inter-item consistency) was checked using Cronbach alpha values for each measurement scales.

While for the cost-effectiveness (CE) study, an adapted (181,182), interviewer-administered, and structured questionnaire was used to collect the HRQoL data. The tool had three parts such as cost and infant health outcome (effect) estimation checklist, socio-demographic characteristics of mothers, and HRQoL assessment using EQ-5D scale. The HRQol measurment items were pre-tested by taking 5% of the total sample size. Cost and effect measuring items were developed to collect direct intervention, indirect intervention and baseline (routine service costs for control) expenses while effect measuring/estimating standards were adopted (166,183) to model the outcome. There were items used to measure each cost of usual service such as HEP's salary in arms, intervention costs, program costs and research costs. The last part of the tool was about HRQoL comprised of five dimensions with five-point response scale. This part of the tool had a total of 35 items, after some modifications, following the pre-test. The transition probabilities (health states for outcome estimates) among EBF and non-EBF child were analyzed from the global burden of disease-2010, and EDHS-2016 data set.

In summary, enrollers, data collectors, counselors/PDs and supervisors are different individuals. The enrollment period, data collection frequency and content, and follow-up were the same in both groups except the newly added intervention provided to one group. The data collection timelines and vising time were summarized in **Table 3.4**.

Table 3. 4. Summary of data collection timeline, visiting time to the intervention group and stage of the trial verses study objectives, Jimma Town, 2018.

Visiting time (total visit=6)	Data collection time	Intervention	Stage	Study objective
	Baseline data:(37 weeks of gestation)*		Before intervention	Evaluation of effect and CE on EBF (Baseline to end-line data), While, evaluation of effect on TIBF (baseline to
38-40 weeks of gestation		Counseling and social support by PDs	Intervention	
1st day of delivery				
1st month of post-partum				
2nd month of post-partum				
3rd month of post-partum	Midline data			
4th month of post-partum				

	Endline data: 6th Month of post-partum		After intervention	midline data)
	23- 24 months of post-partum period		Post-intervention implementation	Satisfaction and implementation outcome studies

*Mothers reported on BF practice in the first 6 months, for the last child who born in the last five years.

In addition to the above summary, the details of the data collection tool development and validation were explained using the following five sub-sections;

3.9.1. Tool for the effectiveness of PDA on EBF and TIBF

Interviewer administered structured questionnaire was adapted in English, and translated into two local languages-Afan Oromo and Amharic, then back translated by independent language expert to check consistency. The tool which was used to assess the change at three-points in time had three parts. Part-I of the questionnaire assessed the baseline characteristics of the mothers such as socio-demographics, obstetric history, previous experience of receiving home visits and social support, main source of information about EBF, and intention to BF for the current baby. Part-II assessed ideation factors of EBF such as knowledge (definition, advantage to baby, advantage to mother, colostrum, effective feeding, breast milk expression, initiation, duration and frequency of feeding, problems with BF, practical aspects of BF and exclusiveness), attitude (affective, behavioral and subjective norms related with EBF), and self-efficacy (confidence and capability to practice EBF, technique of BF, and effective BF). Face validity was conducted including for the self-efficacy measuring items since it was adapted with some modification. This part of the tool was adapted from reliable and validated sources(177,178). The final (part-III) consisted of items measuring EBF practice based on WHO standards (179), which measured BF practice, timely initiation, and the time to initiate for the first time. The questionnaire was pre-tested on 5% (n=13) of the sample out of the study clusters. Based on the comments and feedback collected, relevant modifications were made.

Six data collectors (one for each cluster), who had a college degree in a health-related field and relevant experience, were recruited to conduct the interviews. Two public health experts (MPH) were recruited to supervise the data collection process. Data collectors and supervisors received training for three days. Data were collected at three points in time–from both the intervention and control groups. Supervisors' and principal investigator provided oversight for the data collection and fieldwork and checked samples of completed questionnaires. The same data collectors who were blinded (not informed to which cluster/group assigned) collected the baseline, midline, and

end-line data to minimize interviewer bias. Each study participant had a unique identification number and contact details to trace at each point of data collection. We used the baseline and midline data only. This is due to the BF initiation can happen to the maximum of third month, while the trial ended at 6^{th} month because of the time at which the primary outcome (EBF) could be measured. At baseline, BF-related practices and obstetric histories were collected from mothers about her last child who was born in the last five years.

3.9.2. Tool for the end-users' satisfaction study

Interviewer administered, and structured questionnaire was used to collect the data. The tool for the predisposing factors was adapted from reliable and validated sources in English (119,177,178,180) and then translated into local languages (Amharic and Afan Oromo). However, socio-demographic and BF-related variables, community-level factors, and end-users satisfaction measuring items were developed. Initially, 35 items were developed to measure satisfaction.

Then, members of the face validation panel were chosen considering the objective of this study and professional mix. To ensure face validity, the draft questionnaire was reviewed by expert panel including 3 MPH students, 2 Ph.D. students, and 2 academic staff with MPH. They were given the initial questionnaire with 35 items to review. In this stage, we asked them to comment on items' understandability, logical order, duplication of items with the same meaning, readability, relevance, simplicity, language clarity such as wording and sentence structures. Then based on their comments, relevant modification was made, and five items were dropped. The final modified tool was translated into Amharic and Afan Oromo by language experts, and then back-translated into English by a third party who had research experience to ensure meaning equivalence.

Next, four health science graduates in the nursing and public health profession were recruited for data collection and supervision. Three data collectors and one supervisor were trained on the procedure of data collection, the content of the pre-tested tool and ethical considerations. The trained professionals collected the data under close supervision. Each interview was conducted at the study subject's homes based on their willingness to participate. A noise-free area for the interview was selected based on the context of each mother's home setting. The interviewing time was estimated to take 25 to 30 minutes.

3.9.3. Tool for the implementation outcome study

Data were collected using a structured questionnaire developed for addressing the socio-demographic and other intervention related variables, and implementation outcome measures. Initially the questionnaires were prepared in English. To ensure face validity, the draft questionnaire was reviewed by expert panel including 3 MPH students, 2 Ph.D. students, and 2 academic staff with MPH. They were given 78 items developed for measuring implementation outcomes to review and comment on items' understandability, logical order, duplication of items with the same meaning, readability, relevance, simplicity, language clarity such as wording and sentence structures. Based on their comments, relevant modification was made, and 8 items were dropped. The final modified tool was translated into Amharic and Afan Oromo by language experts, and then back-translated into English by a third party who had experience to ensure meaning equivalence. Then, based on the comments from the pretest (conducted on 5% (n=19) of the total sample size) relevant modifications were made. Next, four health science graduates in the nursing and public health profession were recruited for data collection and supervision. Three data collectors and one supervisor were trained on the procedure of data collection, the content of the pre-tested tool and ethical considerations. Trained interviewers have collected the data from each intervention participant through self-administered or interviewer-administered ways considering the participant's ability to read and write. The data collection was conducted at the study participant's homes or office. A noise-free area for the interview was selected considering each context. The interviewing time was estimated to take 30 to 45 minutes. Data were checked for completeness after each day of data collection by supervisors.

Using the collected data, the construct validity and item's reliability test was checked for the implementation outcome measures. Construct validity was tested using Exploratory Factor Analysis (EFA) to indicate valid scale constructs with a total variability explained. Principal Component Analysis (PCA) method was used. Then reliability test (inter-item consistency) was checked using Cronbach alpha values for each measurement scales.

3.9.4. Tool for the cost-effectiveness study

An adapted (181,182), interviewer-administered, and structured questionnaire was used to collect the HRQoL data after translating into Amharic and Afan Oromo (local languages). The tool had three parts such as cost and infant health outcome (effect) estimation checklist, socio-demographic characteristics of mothers, and HRQoL assessment EQ-5D scale. The HRQol measurment items were pre-tested by taking 5% of the total sample size.

Cost and effect measuring items were developed to collect direct intervention, indirect intervention and baseline (routine service costs for control) expenses while effect measuring/estimating standards were adopted(166,183) to model the outcome. There were items used to measure each cost of usual service such as HEP's salary and allowances in arms, intervention costs, program costs and research costs. Checklist was used to capture proportion of EBF in both arms and relative risk of avoiding EBF to be used for outcome modeling. The last part of the tool was about HRQoL comprised of five dimensions with five-point response scale. This part of the tool had a total of 35 items, after some modifications, following the pre-test. Since the generic items were modified to BF related problems and difficulties, and some others were added, reliability test was done. Hence, using the data of this study, the reliability coefficient (Cronbach's alpha) was α=0.952 for mobility and social activity (items=8), α=0.913 for self-care and infant care (items=8), α=0.883 for daily home activities (items=5), α=0.841 for pain and discomfort (items=6), and α=0.956 for anxiety or depression(items=8).The total variability explained in HRQoL of mothers by the five domains was 71.6%.

Four data collectors and one supervisor were trained. One data collector with MPH was used to collect/abstract cost related data, while four nurse professionals collected the remaining socio-demographic and maternal HRQoL data from mothers enrolled into the trial arms.

3.10. Data quality assurance, internal validity and generalizability

For the evaluation of the effect of PDA on EBF, Six data collectors (one for each cluster), who had a college degree in a health-related field and relevant experience, were recruited to conduct the interviews. Two public health experts (MPH) were recruited to supervise the data collection process. Data collectors and supervisors received training for three days. Data were collected at three points in time–from both the intervention and control groups. Supervisors' and principal investigator provided oversight for the data collection and fieldwork and checked samples of completed questionnaires. The same data collectors who were blinded (not informed to which cluster assigned) collected the baseline, midline, and end-line data to minimize interviewer bias.

To evaluate the effect of PDA on TIBF, the data collected by the above experts at the first two points (baseline and midline) were used. The data used for this study were collected at 37 weeks of gestation as a baseline, and at the 3rd month of post-partum as a midline while the intervention and follow up continued. The visiting (counseling and social support) times conducted before the midline survey were the 1st visit at 38-40 weeks of gestational age, the 2nd visit at the first day of

delivery, the 3rd visit at 1st month of postpartum, and the 4th visit at 2nd month of post-partum. We used the baseline and midline data only for this particular study. This is due to the BF initiation can happen to the maximum of third month, while the trial ended at 6th month because of the time at which the primary outcome (EBF) measured.

While, for the satisfaction and implementation outcome study, four health science graduates in the nursing and public health professions were recruited for data collection and supervision. Three data collectors and one supervisor were trained and collected the data under close supervision. Each interview was conducted at the study subject's home. A noise-free area for the interview was selected based on the context of each mother's home setting. Using the collected data, the construct validity and item's reliability test was checked for the implementation outcome measures. Face validity, construct validity and reliability test were checked as appropriate.

Whereas, the data for the cost-effectiveness study were collected by four trained data collectors and one supervisor. One data collector with MPH was used to collect/abstract cost related data, one expert analyzed national and global data set, while four nurse professionals collected the remaining socio-demographic and maternal HRQoL data from mothers enrolled into the trial arm.

For all of the studies, back and forth translations from English to two local languages (Afan Oromo and Amharic) were done. Also pre-tests were conducted as appropriate. Supervision was the main activities during the data collection process. Confounders were controlled through appropriate analysis while undertaking the desired analysis. Field supervisors were deployed or assigned to monitor the intervention process and main data collection times. The statistical testing power adequacy, use of randomization and random sampling technique ensure the generalizability (external validity) of the findings and could be applied to the target population. Also representative sample size determination was done considering the basic assumptions or population parameters. Considering such parameters, during calculating sample sizes for the effectiveness studies can ensure the validity of the findings.

3.11. Data management and analysis

The summary of the method of data analysis used in each study were reported in the following table, while the detail was reported under each sub-sections. (**Table 3.5**)

Table 3. 5. Method of data analysis used for respective study objectives, intervention study, Jimma town, 2018-2020.

Study objectives	Methods of data analysis
Evaluation of the effectiveness of PDA on EBF	-Descriptive statistics -Intention to treat analysis was followed -To compare the baseline characteristics and intervention effect, a $\chi 2$-test or Fisher exact test for dichotomous, and independent sample t-test for continuous measures -Difference-in-difference (DID) was calculated to determine the net effect of the intervention in percentage points -The magnitude of the intervention effect on the outcome (EBF) was estimated using the adjusted rate risk (relative risk). General Linear Model (GLM) considering repeated measures was used -Multivariate models were fitted by adjusting for confounders (Analysis of Covariance (ANCOVA) and Multiple Analysis of Covariance (MANCOVA)
Evaluation of the effectiveness of PDA on TIBF (the time to initiate and survival probabilities and pooled predictors)	-Descriptive statistics -Intention to treat analysis was followed -To compare the baseline characteristics and intervention effect, a $\chi 2$-test or Fisher exact test for dichotomous, and independent sample t-test for continuous measures -The magnitude of the intervention effect on the outcome variable was estimated using adjusted relative risk (RR) through log-binomial regression-GEE (Generalized Estimating Equations) custom method considering binary outcome- most robust method to estimate RR -Multivariableble model was fitted by controlling confounders -Survival analysis to estimate survival and hazard functions with a Log-Rank test -The estimation of survival distribution (life table) provided the median time -Bivariate and multi-variable Cox-proportional regression model (adjusted HR) to identify the pooled predictors
Measuring end-users satisfaction with PDA	-Descriptive statistics -Exploratory Factor Analysis (EFA)/Factor Analysis (FA) -Reliability test -Standardizing satisfaction measurement scale and mean score -Two-level mixed-effects linear regression model or Multi-Level Modeling (MLM) -ICC and other assumptions were checked
Measuring implementation outcomes of PDA	-Descriptive statistics -Exploratory Factor Analysis (EFA)/Factor Analysis (FA) -Reliability test -Pearson's correlation analysis -Independent sample t-test or OneWay ANOVA for comparison -The explained variation (interdependency) of scales was checked using coefficient of determination (r^2)

Cost-effectiveness of PDA	-cost data analysis -time value estimation -Cost and effect calculation, ICER -Probabilistic sensitivity analysis -Descriptive statistics for HRQoL data -PCA to determine the total variablity explained -Reliability test -Standardizing the maternal health outcome/HRQoL score -DALYs and QALYs estimation -Independent two samples t-test and analyses of variance (ANOVA-One Way) -Mixed-effects regression model -Difference-in-difference (DID) in cost and effect

3.11.1. Data analysis for the effectiveness of PDA on EBF

Data were entered into Epidata 3.1 and then exported to SPSS version 21.0 for analysis. Baseline characteristics were summarized using proportions for categorical variables, and means or medians for continuous variables. Descriptive statistics were presented as the mean ±SD or frequencies with percentage. All quantitative data were checked for normality using the Shapiro-Wilk test and/or histogram as appropraite. Responses to each variable were compared between the two groups across three points in time. To compare the baseline characteristics and intervention effect, a $\chi 2$-test or Fisher exact test for dichotomous, and independent sample t-test for continuous measures, were used to estimate the significant difference at 95% CI with P-values of< 0.05. The tests were used to check for significant differences in the primary and secondary outcome variables between the groups. Intention to treat analysis was used so that all enrolled mothers were included in the final analysis. In addition, difference-in-difference was calculated to determine the net effect of the intervention in percentage points. The magnitude of the intervention effect on the outcome (EBF) was estimated using the adjusted rate risk (relative risk). General Linear Model (GLM) considering repeated measures was applied, and the respective 95% confidence intervals with the p-value at a level of 5% significance were provided. The multivariate models were fitted by adjusting for occupational status, ever BF, menses return, and duration of suckling breast (in minutes) among the intervention and control groups since there were significant differences at baseline. Those factors/covariates were not controlled at baseline that might have effect on the outcome. This was controlled through Analysis of Covariance (ANCOVA) and Multiple Analysis of Covariance (MANCOVA), which

are GLM methods blending ANOVA and regression. These evaluates whether the means/proportion of a dependent variables were equal across levels of a categorical independent variable (intervention), while statistically controlling for the effects of other continuous and dichotomous variables that were not of primary interest.

3.11.2. Data analysis for the effectiveness of PDA on TIBF

Data were entered into Epidata 3.1, and exported to SPSS version 21.0. Socio-demographic, obstetric, and other baseline variables were described using proportions along with the timely initiation practice. Then the median time to initiate was compared between the groups.

The intervention effect on the time to initiate (TIBF practice) was analyzed using a $\chi 2$-test or Fisher exact test. The test was used to estimate the significant proportion differences between the groups; at 95% CI with P-values of< 0.05. Intention to treat analysis was followed to test the effect. The magnitude of the intervention effect on the outcome variable was estimated using adjusted relative risk (RR) through log-binomial regression-GEE (Generalized Estimating Equations) custom method considering binary outcome. The multi-variable model was fitted by controlling confounders which were significantly different at baseline between the two groups. Although General Linear Model (GLM) is commonly used ways of analysis for repeated measures, the most robust method to estimate RR is log-binomial regression which is found with GEE method. The respective 95% confidence intervals with the P-value >0.05 were used to declare significance, and RR was used to show the magnitude of the risk ratio.

The data for the time to initiate BF is an interval censored data, the beginning time was the onset of delivery and the maximum tolerable time to initiate BF is considered as the 3rd month of post-partum. Hence, there are some lost follow-up mothers or incomplete data within those months in addition to the issue of the time to event concern which needed survival analysis. The survival data summarized through estimates of survival and hazard functions. The initiation times obtained from the two groups were compared using Kaplan-Meier (KM) curves on the same graph. However, this didn't allow us to say whether there is a real or significant difference between the groups. Hence, to see the significant statistical difference, a Log-Rank test was performed. The estimation of survival distribution (life table) provided the median initiation time which indicates the time beyond which 50% of the mothers expected to initiate BF. The assumption for these non-parametric tests was checked by the model goodness of fit test.

A secondary analysis was conducted using survival analysis to identify independent predictors of the time to initiate BF practice. The predictors were estimated using the pooled data from both trial arms. Initially, candidate explanatory variables were identified using bivariate Cox-proportional Hazard regression) at 95% CI and P-value of <0.25, then those associated with the outcome were included in the final model (multi-variable Cox-regression model). Enter method was used in the final model, and the findings were interpreted using adjusted HR at 95% CI at a P-value of <0.05.

3.11.3. Data analysis for the end-users' satisfaction study

Data were entered into Epidata 3.1 and then exported to SPSS version 21.0 software for analysis. Socio-demographic characteristics of the participants were summarized using proportions for categorical variables, and means or medians for continuous variables.

The validity of the satisfaction measuring tool was checked using Exploratory Factor Analysis (EFA)/Factor Analysis (FA) to indicate the scale constructs. The purpose of doing EFA was to explore and validate constructs, reduce the data, and create satisfaction factor scores for regression modeling. All the assumptions of principal component analysis (PCA) were checked. The case to variable ratio was 8.5 to 1. Bartlett's Test of Sphericity was significant at $p<0.05$. Overall sampling adequacy was checked using Kaiser-Meyer-Olkin (KMO) which was >0.5. The correlation matrix showed more than 2 cells with a coefficient of 0.3 to 0.9. Varimax rotation was employed during factor extraction to minimize the cross-loading of items. Reliability of items (inter-item consistency) was checked using the reliability coefficient (Cronbach alpha values) >0.70.

The mean score was used to dichotomize responses to satisfaction with PDA, knowledge of EBF, attitude towards EBF, and self-efficacy to BF measuring scales. Those who scored greater than or equal to the mean score were considered as 'satisfied'; otherwise 'dissatisfied'. Respondents who scored greater than or equal to the mean score were considered to have a "good knowledge"; otherwise "poor knowledge." Likewise, the mean value was used to categorize the respondents having a "favorable" attitude or "unfavorable" attitude; and having a "good self-efficacy" or "poor self-efficacy". This was helpful to describe the proportion of satisfaction against the background characteristics and facilitate easy understanding among the readers (program managers and implementers). Using the mean score for categorization avoids miss-classification, and the data were normally distributed.

In addition to this, standardizing the satisfaction measurement scale for PDA was done. Standardized percentages of the mean scores were created, ranging from "0%" to "100%''. For each case, it was calculated using the formulae (184,185); ***Percentages of Scale Mean Score (%SMS)=[Actual score-Potential minimum]/[Potential maximum-potential minimum]*100%.*** The mean scores for all scales were reported as %SMS. A higher score indicates higher level of satisfaction with the service provided and approach.This facilitates comparison with others' findings.

Two-level mixed-effects linear regression analyses (linear mixed models) were performed. The data were at the individual (mothers and their relevant others) and community (cluster) levels. Individuals were nested in their respective clusters of the interventional study. The unit of analysis for the community-level variables was the cluster. There were three clusters in which 254 individuals were nested. Multi-Level Modeling (MLM) was used to estimate the correct standard errors to control bias not addressed by the classical linear regression which is employed to identify general predictors. To address this shortcoming, four models were fitted to identify two-level predictors of the end-users' satisfaction.

First, two-level analyses were done to identify the candidates at a p-value <0.25 using mixed-model simple linear regression analysis. Then, the final two-level mixed-effect multiple linear regression models were fitted to identify the independent predictors. Fixed (residuals) and random (intercept) effects were analyzed to assess the individual and cluster level variations respectively. Random effects model estimate to see the variability within the clusters and between the three clusters, while fixed effects models only estimate within-cluster variability. All assumptions were checked for the mixed-effects linear regression model.

During the analysis, four models were fitted, null model (empty model without factors), model-1 (containing only individual factors), model-2 (containing only cluster/community factors), and model-3 (both the individual and community-level factors). An empty model without any factors/covariates was fitted to see the variance of the outcome variable and to justify the likelihood of using consecutive models. The intra-cluster correlation (ICC) was calculated which is one of the basic assumptions to conduct a multi-level mixed-effect model. The variation between clusters on satisfaction score was >0.1 (recommended cut-off point), while the variance and ICC must be >0 to analyze cluster-level factors. In this study, ICC was 0.16 at the empty model. If no such observed variability among the three clusters, GLM or GEE at an advanced

level or the classical linear regression model could fit to identify the general factors without leveling, unlike this study. The variance at corresponding 95% CI was used to see the variation due to the effects of leveled factors for each model using ICC so that to identify the variance explained by the leveled factors. The higher the ICC, the more relevant were the community characteristics for understanding individual variation in satisfaction composite score.

In the subsequent models, β-estimates were used to see the measure of association and its magnitude. The variability on the estimate of beta (β)-values explained by successive models was calculated using percentage variance in the mean score. The Variance Change in Percentages' Mean Score (VCPMS) was used to show the change in cluster-level variance between the empty and consecutive models. Akaike information criterion (AIC) was used to see the fitness of each model with a lower value indicating more fitness. Adjusted R-square change was used to show explained variation by each model. As reported in the empty model, 16.1% of the variations in satisfaction scores could be attributed to community/cluster-level factors. The values of the log-likelihood results were presented. Multi-collinearity between covariates was assessed with individual correlation values less than ten(186). All statistical analyses were performed at the 95% confidence interval with a 5% level of significance, and only significant variables from the final model were retained for interpretation.

3.11.4. Data analysis for the implementation outcome study

The data were entered into Epidata 3.1 and analyzed using the statistical packages for social sciences (SPSS) software version 21.0. Descriptive statistical measures (socio-demographic characteristics of the participants) such as frequency, mean, proportion, and standard deviation were computed and presented.

To assess the validity of the conceptual measurements, we performed EFA on the same data. Factor analysis using PCA method was conducted to reduce the data/items and to test construct validity. The purpose of doing EFA was to explore and validate constructs and respective items, reduce the data, and create composite factor scores. All the assumptions of principal component analysis (PCA) were checked. All (70) items were fitted once to create components. The Eigen value was fixed as 9 (number of pre-assumed constructs). The case to variable ratio was 5.3 to 1. Bartlett's Test of Sphericity was significant at $p<0.05$. Overall sampling adequacy was checked using Kaiser-Meyer-Olkin (KMO) which was >0.5. The correlation matrix showed more than 2 cells with a coefficient of 0.3 to 0.9. Varimax rotation was employed during factor extraction to

minimize the cross-loading of items. Cross-loaded items(items created complex structure) on more than one component were removed. Reliability of items (inter-item consistency) was checked using the reliability coefficient (Cronbach alpha values) >0.70.

The measure of correlation and variations among the implementation outcome measuring scales were analyzed. The Pearson's correlation analysis was carried out to examine the relationship between the psychometrically measured implementation outcome variables as bivariate analysis. Similarly, an independent sample t-test was carried out to compare the mean score between the dichotomous variables (two groups). OneWay ANOVA was also used to see the significant differences between more than two groups of the selected background characteristics. All assumptions for each test were checked. Multi-collinearity between covariates was assessed with individual correlation values. The explained variation (interdependency) of scales was checked using coefficient of determination (r^2). All statistical analyses were performed at the 95% confidence interval with a 5% level of significance. Accordingly, correlated variables and compared and significantly different mean scores were interpreted.

3.11.5. Data analysis for the cost-effectiveness study

Statistical analysis

Cost data were entered and analyzed using the Excel-based cost of PDA Intervention tool designed for this purpose and the infant outcome was also modeled using the same excel-sheet (version 2013) after calculating the total cost for each item/activity. The number of mothers who visited was defined as the number of mothers who received one home-based visits during prenatal and five visits during post-natal period till six months of the infant age. The time-value of each consultation/visit was estimated for both PDs and mothers in the intervention arm. The total costs were analyzed and presented for each arm per costing categories for six months of intervention. We analyzed costs of implementing the intervention, but not the savings/costs reduced due to practicing EBF. Using the spread sheet, the mean value for each cost, the incremental cost/change in cost, change in effect and ICER were calculated. The result for cost-effectiveness analysis was presented. The probabilistic sensitivity analysis was also performed.

The HRQoL data measured from mothers were entered into Epidata 3.0, and exported into SPSS version 21.0 for analysis. The descriptive and summary measures were analyzed and presented. The data were post-intervention only. This was because of the unavailability of the baseline HRQoL data; rather we assumed that at baseline no significant difference of QOL could be

observed due to non-BF, no added intervention, and randomization would also make it similar at baseline. Principal component analysis was done to report the total variablity explained by the scales, and reliability of items was also checked. Normality was checked using histogram, and Kolmogorov-Smirnova and Shapiro-Wilk tests which were significant at 0.003 and 0.020 respectively. Multi-collinearity among independent variables was also checked with VIF<10. Hence, we used the re-scaled (0 to 1) score to calculate the cost-effectiveness of the intervention. The re-scaling was done using the percentages scale mean score (PSMS) formulae (185,187); ***%SMS=[Actual score-Potential minimum]/[Potential maximum-potential minimum])*100%,*** to have standardized utility/quality score. This score was multiplied by 0.5 year to estimate maternal QALYs within the period of intervention. Sub-group analysis was done to compare composite score by selected background characteristics of mothers. The significant difference in standardized mean score between the arms and/or groups was compared using the independent two samples t-test and analyses of variance (ANOVA-One Way) as appropriate at 95% of CI and p-value of <0.05. The variables which were significantly different between arms were adjusted while using the mixed-effects regression model to determine the magnitude of the intervention effect on maternal QALYs. The difference-in-difference (DID) in cost and effect was also analyzed to estimate the intervention effect on both outcomes considering it could be the same in both arms in the absence of the intervention.

Cost-Effectiveness Analysis (CEA)

The DALYs averted for infants and QALYs gained for mothers were used as the primary effect measures to determine cost-effectiveness of PDA; to understand whether the added intervention is feasible. The main outcome measures of the cost-effectiveness analysis were total and average seven months' cost, incremental DALYs and QALYs, and incremental cost-effectiveness ratios (ICERs) for both. We identified the points where PDA become the best strategy (with less cost per DALY averted and QALY gained) as an added value to the urban health extension program. We calculated the infants ICER as additional cost per DALY averted (such as EBF prevented suffering from common childhood diseases and immature death) in the intervention arm compared with the control arm. In the same way, for mothers QALYs gained was also compared. We applied the best and worst case scenarios for cost and effect to identify a possible range of

cost per DALY averted and QALYs gained. The ICER was calculated using the following formulae (168,188);

ICER: Δ cost/Δ effect=ΔC/E

ICER = Mean cost for intervention arm - mean cost for control arm

Mean effect for intervention arm - mean effect for control arm

= Incremental cost

Incremental benefit

Sensitivity analysis

Sensitivity analysis was conducted to reflect the uncertainty of variables which was done to see cost variability expended for the two arms. It was performed for the added PDA intervention costs with a discount rate to better understand the impact on the results keeping other cost-effect variables constant. A one-way sensitivity analysis was performed to estimate the impact of uncertainty by varying in different parameters. In the added intervention cost, a range of sensitivity analysis was 5% lower or higher to check the extent of variability in ICER. This means the deterministic sensitivity analyses considered 0-5% change of the input parameters, while 3-3.5% of the effects. This intervention had minimum fixed costs to run PDA among different participants regardless of any background and the cost used in our study was relatively low as compared to the payments effected by the other community–based routine programs to promote volunteerism. In the comparative analysis, we assumed that there was little variation between clusters with regard to the unit costs, and the activities/items were the same within an arm.

To understand the affordability of the added intervention in the routine set-up, the financial costs were varied within 0-5% with different scenarios. The baseline and research costs were not considered in both ICER and sensitivity analysis. The following scenarios were followed:

Scenario-I: no discount for cost and outcomes (QALYs gained and DALYs averted)

Scenario-II: 5% discounted and added for the total cost, while keeping the outcomes constant

Scenario-III: 5% discounted and added for only the dominant costs, while keeping the outcomes constant. We identified the input/cost item on which the overall ICER was highly dependent for separately discounting.

Scenario-IV: 5% discount for total cost and 3-3.5% discount for the two outcomes

Scenario-V: 3% of DALYs and 3.5% of QALYs discounted, while keeping the total cost constant. The DALYs discount rate was as recommended by global burden of disease study-2010 (174), and QALYs discount rate per annum was also referenced (189).This is due to the assumption that QALYs to be gained in the future are discounted to current values, to incorporate the idea that people prefer to receive health benefits now is more valued than in the future.

3.12. Ethical considerations

For the trial, ethical approval or clearance letter was secured from the Institutional Reviewing Board (IRB), Jimma University, Institute of Health with Ref. No: **IHRPGD/2095/2018** and dated as **22/01/2018**. Permission and support letters were obtained from Jimma town health office and respective health facilities. Written informed consent was obtained after subjects were informed about their full right to participate or refuse participation in the study. The data collectors explained every trial procedure and follow-up time using an information sheet. Participants were also informed about their right to withdraw at any time during the intervention and follow-up period if not feeling comfortable, keeping in mind the rationale of the study and benefits of their response to the study. Informed consent was also obtained from each mother enrolled into the intervention arm for visit at her home by positive deviants and data collectors. No mother withdrew/refrained from their consent during follow-up, and no missed visit was reported from the schedule since revisit made for some mothers. When PDs observe health problems with newborns and/or mothers, they linked them with the HEPs for further counseling and referral if needy. Codes were used to keep the anonymity and to link each subject's follow-up data. The trial was registered at PACTR registery indexed at WHO clinical trial registry data base with unique identification number*: PACTR201805003379263*.

In addition, for the follow-up studies (users' satisfaction and implementation outcome studies), again the letter of ethical approval was secured from the Institutional Review Board (IRB), Jimma University, Institute of Health with Ref. No: IHRPGD/728/2020 and dated as 27/08/2020. This was done because of these parts of the study methods were not included in the prior trial protocol and the first ethical approval would expire after a year. A permission/support letter was also obtained from Jimma town health office and respective clusters. Informed written consent was taken from each participant in addition to the prior consent obtained for the follow-up data collection. They were informed about their full right to participate or refuse participation in these

follow-up studies. Confidentially kept identifiers, taken during enrollment for the trial, were used to reach out for this follow-up study.

3.13. Plan for dissemination of the findings

The effectiveness findings were presented and submitted to the primarily funding institute (International Institute for Primary Healthcare-Ethiopia) in collaboration with Johns Hopkins University, USA. The two articles were published to international, peer reviewed high quality A1 journal with impact factors of more than 2.7 and the remaining three will be also published in relevant journals. Having the overall findings, it will be defended as part of the PhD dessertation requirement. This book will be submitted to the department of Health, Behavior and Society, and Jimma University's main library. Relevant parts of the findings will be presented to Jimma Town health office. Previously, preliminary findings were also shared to the implementing stakeholders.

Two articles such as effectiveness of PDA to promote EBF (93) and end-users' satisfaction with PDA (190) were published in reputable, open access journals, to avail baseline information to scientific communities. In addition, two papers were submitted to PLOS ONE journal and BMC-Implementation and Dissemination Sciences and one is ready for submission. So far, some parts of this research were presented at international workshop organized by the funding institute/iifphc-E in collaboration with John Hopkins University, and also presented to Joanna Briggs Institute (JBI) at evidence implementation training program workshop. It was also presented to the international 3rd RMNCAH/N Research Conference organized by the MCH Directorate of the Ministry of Health, Ethiopia; at Jimma University annual research conference and Addis Ababa Medical and Business private college international annual research conferences. Currently, parts of the study were submitted to national and international research conference for further presentation. Moreover, the research findings will be presented at seminars and conferences to be organized by Ministry of Health-Ethiopia and for the 'Agelgil (lunch time) evidence discussion session' to be organized by the MCH directorate with the support of Fenot Project of University of British Columbia.

Chapter Four

4. Results

4.1. Effectiveness of PDA in Improving EBF Practice

4.1.1. Background characteristics of participants

Response rates for both groups were 100% and 99.2% at baseline and midline, respectively. The response rate at the endline, however, was 99.2% for the control group and 98.5% for the intervention group. One mother in the control group was lost to follow-up in the second month and two mothers were lost to follow-up in the intervention group near to third and after fourth months due to change of living address and death.

Out of 260 mothers enrolled in the study, nearly half (45.4%) were 25-29 years old, with the average age at 25.58 years. Forty-one percent were Orthodox Christians and 44.6% were Oromo. Near to all of the mothers (96.2%) were married and the majority (70.8%) were literate or had received a formal education, with 63% having completed secondary school. Over a third were employed as merchants (36.5%) and 42.7% had a monthly income of 22.03USD or less. Seventy-one percent of the mothers had given birth to only one child at baseline. **(Table 4.1)**

There were no statistically significant differences between the two groups along with socio-demographic characteristics except occupational status: more than a third of the mothers in the intervention group were government employees, while 44.6% in the control group were merchants (P=0.001).In addition to this, there were no statistically significant differences with obstetric variables, baby's sex preference, previous experience of receiving a home visit and social support from different individuals, source of information about EBF, and intention to BF for the current baby between the two groups. **(Table 4.1)**

Table 4. 1. Comparing the background characteristics of the intervention and control group, implementation study, Jimma Town, 2018, (n=260, 130 in each group).

Variables with/without category		**Intervention Group (IG): N(%)/(Mean ± SD)**	**Control Group (CG):N(%)/(mean± SD)**	**P-value**
Age		25.9 ±3.7	25.2±4.3	0.135
Religion	Orthodox	55 (42.3)	53 (40.8)	0.192
	Muslim	51 (39.2)	51 (39.2)	
	Protestant	22 (16.9)	16 (12.3)	
	Catholic	1 (0.8)	4 (3.1)	
	Other*	1 (0.8)	6 (4.6)	
Ethnic group	Oromo	58 (44.6)	58 (44.6)	0.068
	Amhara	31 (23.8)	25 (19.2)	
	Yem	16 (12.3)	27 (20.8)	

	Dawuro	13 (10.0)	4 (3.1)	
	Kaffa	8 (6.2)	7 (5.4)	
	Other**	4 (3.1)	9 (6.9)	
Marital status	Married	127 (97.7)	123 (94.6)	0.388
	Divorced	1 (0.8)	4 (3.1)	
	Widowed	0 (0.0)	1 (0.8)	
	Single	2 (1.5)	2 (1.5)	
Educational Status	Illiterate	42 (32.3)	34 (26.2)	0.340
	Literate	88 (67.7)	96 (73.8)	
Occupational status	Housewife	42 (32.3)	27 (20.8)	0.001
	Merchant	37 (28.5)	58 (44.6)	
	Student	2 (1.5)	19 (14.6)	
	Govt. employee	45 (34.6)	20 (15.4)	
	Other ***	4 (3.1)	6 (4.6)	
Monthly income (ETB)[#] (overall median=800)		1112 ± 1104.7	1297.9 ±1448.2	0.246
Parity (overall median=1)		1.5± 0.8	1.3±0.6	0.065
Preference for sex of the baby	Not prefer	85(65.4)	79(60.8)	0.058
	Prefer-F	24(18.5)	23(17.7)	
	Prefer-M	21(16.2)	28(21.5)	
Place of delivery	HI	108(83.1)	104(80)	0.125
	Home	22(16.9)	26(20)	
Mode of delivery	VD	111(85.4)	114(87.7)	0.144
	C/S	19(14.6)	16(12.3)	
Received home visit from HEPs at least once	Yes	21(16.2)	26(20)	0.132
	No	109(83.9)	104(80)	
Received home visit from model mother at least once	Yes	16(12.3)	18(13.9)	0.546
	No	114(87.7)	112(86.2)	
Received support from relevant others	Yes	78(60)	84(64.6)	0.076
	No	52(40)	46(35.4)	
Main source of information about EBF	UHEPs	25(19.2)	23(17.7)	0.145
	Family	20(15.4)	22(16.9)	
	HPs	43(33.1)	48(36.9)	
	Mass media	40(30.8)	35(26.9)	
	Other	2(1.5)	2(1.5)	
Intention to BF	Yes	112(86.2)	114(87.7)	0.541
	No	18(13.8)	16(12.3)	

Other*=Adventist, Joba Other**=Guragie, Silte, Tigrie Other***=self-employed, farmer, private sector employee, [#] 1USD=27.24ETB during the study period

4.1.2. Ideation factors of breastfeeding

There were no significant differences between the groups on ideation factors of BF such as knowledge, attitude, and self-efficacy at baseline. The respective proportions in both groups were decreased from knowledge to attitude and then to self-efficacy at the three-time points.

Unlike the baseline, there were statistically significant differences observed on these ideation factors at midline and endline.The percentage of mothers in the intervention group who had good knowledge significantly increased by 16 points from baseline to midline and then increased by 20 points to endline, while increased by 7 points in the control group from baseline to endline. The percentage of mothers reported favorable attitude significantly increased by 22 points in the intervention group from baseline to endline, while remained almost the same in the counterparts. The percentage of mothers in the intervention group who had good self-efficacy significantly increased by 28 points from baseline to midline and then increased by 33 points to endline, while increased by 5 points in the control group from baseline to endline. Out of the three ideation factors, the maximum positive increment was reported in changing mothers' self-efficacy. **(Table 4.2)**

Table 4. 2. Summary of ideation factors of EBF between the intervention and control groups across the three time points, implementation study, Jimma Town, 2018.

Variables (Ideation factors)		**Baseline**			**Midline**			**Endline**		
		IG: N (%)	CG: N (%)	P-value	IG: N (%)	CG: N (%)	P-value	IG: N (%)	CG: N (%)	P-value
Knowledge	Good	78(60)	76(58.5)	0.667	98(76)	83(64.3)	0.01	103(80.5)	84(65.1)	0.001
	Poor	52(40)	54(41.5)		31(24)	46(35.7)		25(19.5)	45(34.9)	
Attitude	Favorable	65(50)	48(36.9)	0.054	92(71.3)	47(36.4)	0.001	93(72.7)	46(35.7)	0.001
	Unfavorable	65(50)	82(63.1)		37(28.7)	82(63.6)		35(27.3)	83(64.3)	
Self-efficacy	Good	56(43.1)	47(36.2)	0.052	92(71.3)	52(40.3)	0.01	98(76.6)	54(41.9)	0.01
	Poor	74(56.9)	83(63.9)		37(28.7)	77(59.7)		30(23.4)	75(58.1)	

4.1.3. Breastfeeding practices and exclusiveness

The intervention group showed improvements at midline for key BF practices. All mothers in the intervention group said that they had ever BF at midline and endline compared to 89.2% at baseline, which was significantly higher proportion compared to the control group. The proportion of mothers in the intervention group who BF within 24 hours of birth increased significantly by 27 percentage point at midline from the baseline while increased by 2 points in the counterparts. Significantly a higher proportion of mothers in the intervention group reported EBF within the last 24 hours from the survey date as compared to the control group at midline and endline. The proportion of mothers in the intervention group who practice EBF within the last 24 hours increased from baseline (42.3%) to midline (71.3%), and then decreased to endline

(66.4%), while consistently decreased in the counterparts. The proportion of mothers in the intervention group who reported EBF practice in the first three or six months increased from baseline (32.3%) to midline (58.1%) by 26 points and then decreased to endline (50.8%) by 7 points with statistically significant differences between the two groups. No significant difference in practicing pre-lacteal feeding, while there was in feeding expressed breast milk at midline and endline time. **(Table 4.3)**

Table 4. 3. Comparison of BF practices between the intervention and control groups across the three time points, Jimma Town, 2018.

Variables with category		Baseline			Midline			Endline		
		IG: N (%)	CG:N (%)	P-value	IG:N(%)	CG: N (%)	P-value	IG: N (%)	CG: N (%)	P-value
Ever BF	Yes	116(89.2)	120(92.3)	0.01	129(100)	100(77.5)	0.001	128(100)	100(77.5)	0.001
	No	14(10.8)	10(7.7)		0(0.0)	29(22.5)		0(0.0)	29(22.5)	
BF within 24 hrs. of birth	Yes	90 (69.2)	92 (70.8)	0.361	124(96.1)	94(72.9)	0. 01	124(96.1)	94(72.9)	0.01
	No	40(30.8)	38(29.2)		5(3.9)	35(27.1)		4 (3.9)	35(27.1)	
EBF within the last 24 hrs	Yes	55 (42.3)	73(56.2)	0.055	92(71.3)	63(48.8)	0.023	85(66.4)	60(46.5)	0.012
	No	75(57.7)	57(43.9)		37(28.7)	66(51.2)		43(33.6)	69(53.5)	
EBF for the 1st 6/3 months	Yes	42 (32.3)	40 (30.8)	0.365	75(58.1)	55(42.6)	0.031	65 (50.8)	40 (31)	0.01
	No	88(67.7)	90(69.2)		54(41.9)	74(57.4)		63(49.2)	89(69)	
Pre-lacteal feeding	Yes	75 (57.7)	57(43.8)	0.055	36(27.9)	40(31)	0.682	36(27.9)	40(31)	0.682
	No	55(42.3)	73(56.2)		93(72.1)	89(69)		92(72.1)	89(69)	
Expressed breast milk feeding	Yes	10(7.7)	15(11.5)	0.565	45(34.9)	24(18.6)	0.012	57(44.5)	20(15.5)	0.01
	No	120(92.3)	115(88.5)		84(65.1)	105(81.4)		71(55.5)	109(84.5)	

4.1.4. Indirect measures of BF intensity

There were significant differences among the two groups concerning menses return, bottle feeding practices, frequency of BF during night and day times, and duration of suckling breast. At the three points, the proportions of mothers whose menses returned and who reported duration of suckling were significantly different in both groups with percentage decrements in the second and third points in the intervention groups while almost the same in control groups. Menses return time, and bottle feeding practice in the intervention group were decreased by 48.6% and 64.2% respectively from baseline to endline. The proportion of mothers in the intervention group who reported BF between four and six per night increased from baseline to midline by 15.7% and to endline by 21.6%. However, with the same range of feeding frequency during day-times, the proportions decreased from baseline to midline and endline by 25.5% and 28.6%

respectively. The increased frequency during night-times and decrement during day-times showed the inconsistent and imbalanced BF practices per 24 hours of the day. This means the night-time BF practice is more intensive than the day-time which is expected to be 4 to 6 times per half of the day. The proportion of infants among intervention groups on the medium duration of suckling was increased by 11.6% and 35.2% from baseline to midline and endline respectively, while minimal increment was observed in the control groups. **(Table 4.4)**

Table 4. 4. Indirect measures of BF intensity among the groups, across the three time points, implementation study, Jimma Town, 2018.

Variables with category		**Baseline**			**Midline**			**Endline**		
		IG: N (%)	CG: N (%)	P-value	IG: N (%)	CG: N (%)	P-value	IG: N (%)	CG: N (%)	P-value
Menses return	Yes	113(86.9)	75(57.7)	0.001	34(25.8)	74(57.4)	0.001	49(38.3)	76(58.9)	0.001
	No	17(13.1)	55(42.3)		95(74.2)	55(42.6)		79(61.7)	53(41.1)	
Bottle feeding in the last 24hrs	Yes	116(89.2)	120(92.3)	0.521	16(12.5)	102(78.5)	0.001	32(25)	106(81.5)	0.001
	No	14(10.8)	10(7.7)		113(87.5)	27(21.5)		96(75)	23(18.5)	
Frequency of BF during night time	<4x	66(56.9)	76(63.3)	0.056	40(31)	75(75)	0.045	40(45.1)	72(72)	0.001
	4-6 x	34(29.3)	5(4.2)		58(45)	4(4)		58(50.9)	8(8)	
	>6 x	16(13.8)	38(31.7)		31(24)	21(21)		16(14)	20(20)	
Frequency of BF during day time	< 4x	4(3.4)	12(10)	0.160	36(27.9)	78(78)	0.001	36(31.6)	78(78)	0.001
	4-6x	79(68.1)	76(63.3)		55(42.6)	21(21)		45(39.5)	20(20)	
	> 6x	33(28.4)	31(25.8)		38(29.5)	1(1)		33(28.9)	2(2)	
Duration of suckling breast (in minutes)	Weak, <10	115(99.1)	86(71.7)	0.001	14(10.9)	75(75)	0.001	14(10.9)	25(25)	0.001
	Medium, 10-20	0(0.0)	25(20.8)		15(11.6)	25(25)		45(35.2)	50(50)	
	Strong,>20	1(0.9)	9(7.5)		100(77.5)	0 (0.0)		69(53.9)	25(25)	

4.1.5. Changes in BF practices and effect size on EBF

There were positive changes in all indicators of BF practice for the intervention group. The EBF rate increased by +18.5% in the intervention group, while +0.2% in control groups. The positive improvements in the intervention group were greater than one percent for all indicators except for the mean frequency of BF. The greatest change in the intervention group was in the initiation of BF, which increased by nearly 23 percentage points from the baseline unlike in the control group which decreased by almost 23 points. The net effect (difference-in-difference) was 18.2% in practicing EBF for the first six months. In addition, the net effect of the intervention on timely initiation of complementary feeding rate was increased by 16.7% in the intervention groups compared to counterparts. **(Table 4.5)**

Table 4. 5. Comparison of BF practice measures between the intervention and control groups, Jimma Town, 2018.

BF indicators	Baseline		Midline		Endline		Rate Change (in %)*
	IG: N (%)/ Mean (±SD)	CG:N (%)/ Mean (±SD)	IG: N (%)/ Mean (±SD)	CG: N (%)/ Mean (±SD)	IG: N (%)/ Mean(±SD)	CG: N (%)/ Mean (±SD)	
EBF rate	42 (32.3)	40 (30.8)	75 (58.1)	55 (42.6)	65(50.8)	40 (31)	I (+18.5) C (+0.2)
Predominant BF rate	63 (48.5)	60 (46.2)	55 (42.6)	62 (48.1)	46 (35.9)	73 (56.6)	I (-12.5) C (+10.4)
Never BF rate	14 (10.8)	10 (7.7)	0 (0.0)	29 (22.5)	0 (0.0)	29 (22.5)	I (-10.8) C (+14.8)
Initiation of BF in the first hour of life (rate)	45 (35.4)	65 (50)	78 (60.5)	35 (27.1)	78 (60.5)	35 (27.1)	I (+25.1) C (-22.9)
Mean duration of EBF(months)	4.2 (±2.1)	5.3 (±1.2)	2.8 (±0.2)	2.0 (±1)	5.3 (±0.7)	4.5 (±1.5)	I (+1.1) C (-0.8)
Mean frequency of BF in the last 24 hrs (hours)	8.9 (±3.3)	10.3(±5.6)	9.9 (±2.5)	7.5 (±3.2)	9 (±1.2)	8.1 (±2.5)	I (+0.1) C (-2.2)
Mean duration of lactational amenorrhea (months)	3.6 (±1.8)	3.4 (±2)	2.9 (±0.1)	2 (±1)	5.8 (0.2)	3.5 (1.5)	I (+2.2) C (+0.1)
Pre-lacteal feeding rate	75 (57.7)	57 (43.8)	36 (27.9)	40 (31)	36 (28.1)	40 (31)	I (-29.6) C (-12.8)
Partial/mixed BF rate	74(56.9)	80(61.5)	54(41.9)	45(34.9)	63(49.2)	60(46.5)	I(-7.7) C(-15)
Bottle feeding rate	116(89.2)	120(92.3)	16(12.5)	102(78.5)	32(25)	106(81.5)	I(-64.2) C(-10.8)
Complementary feeding rate (at 6 months)	41 (31.5)	37 (28.5)	-----	-----	65(50.8)	40(31)	I (+19.2) C (+2.6)

*Rate change=(Endline proportion) - (Baseline proportion) for each group, I=intervention Group, C=control group

There was no significant difference at baseline in practicing EBF, while there were increments in both groups till 3rd month of post-partum with different rates. Finally, there was a decline in both groups with different rate. From the initial point to the end point, the proportion of mothers who practice EBF was above/over the controlled group. EBF practice increased in the intervention group from baseline (32.3%) to midline (58.1%) and then decreased to endline (50.8%) with higher rate as compared to control group (**Figure 6**).

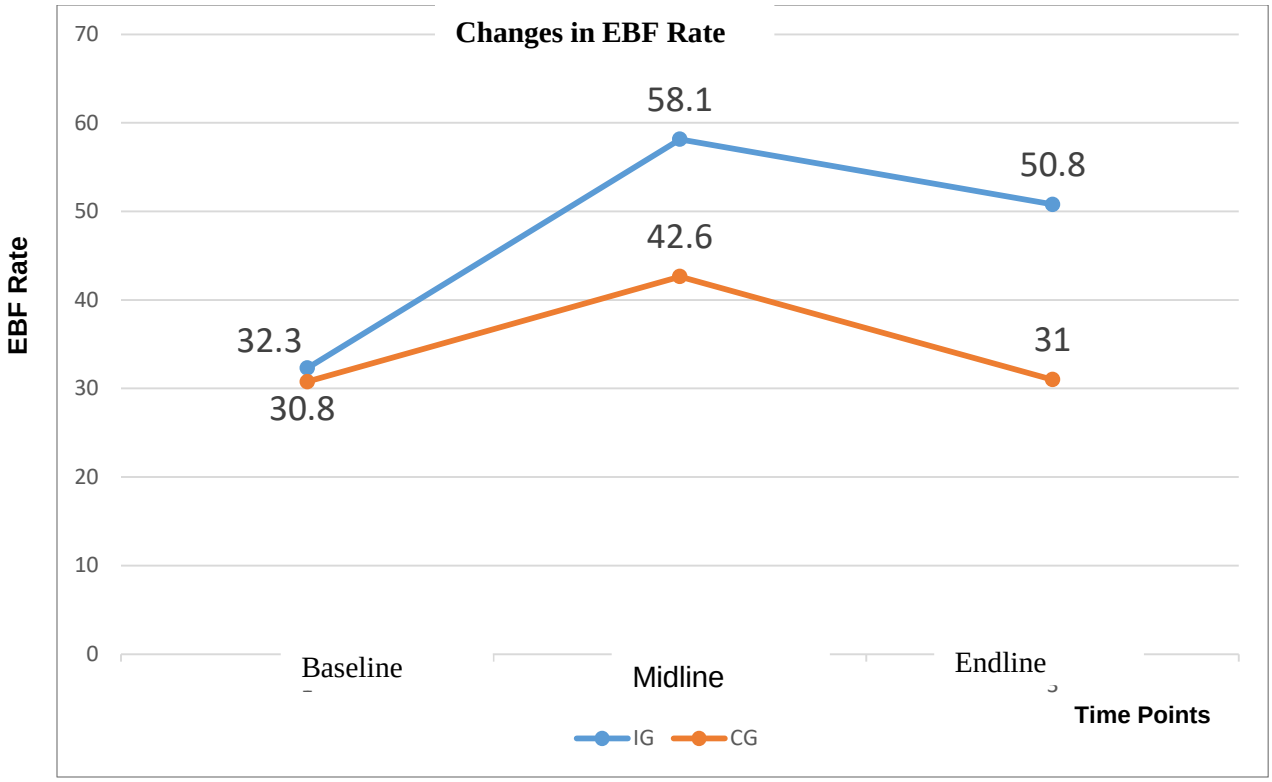

Figure 6. Comparing changes in EBF rate between the two groups, intervention study, Jimma Town, 2021.

The multivariate analysis of covariance was done through the GLM regression method by considering intention-to-treat analysis (260 mothers included to the final model). At baseline, the relative risk of avoiding EBF (Adjusted RR: 1.112, 95% CI: 0.645-1.964, P=0.679), practicing pre-lacteal feeding (ARR: 1.100, 95% CI: 0.335-1.877, P=0.886), and bottle feeding (ARR: 1.101, 95% CI: 0.556-1.899, P=0.698) were similar among the two groups-no significant difference observed. At follow-up, however, mothers in the intervention group were 2 times more likely to practice EBF (ARR: 2.294, 95% CI: 1.363-4.561, P=0.003), and 2 times more likely to initiate timely complementary feeding practice (ARR: 2.124, 95% CI: 1.234-3.251, P=0.012) compared to the counterparts. In another way, mothers in the intervention group were 3 times more likely to avoid bottle feeding (ARR: 3.245, 95% CI: 1.863-4.861, P=0.001) compared to those in the control groups. However, there was no significant difference between the groups with risk of practicing pre-lacteal feeding rate (ARR: 1.111, 95% CI: 0.845-1.864, P=0.779) after the intervention.

4.2. Effectiveness of PDA in Improving TIBF practice: The Time to Initiate BF and Survival Probabilities

4.2.1. Background characteristics of participants

Response rates for both groups were 100% and 99.23% at baseline and midline, respectively. Two mothers, one from each group were lost to follow-up in the second and near to the third months of post-partum. The two groups were similar at baseline except with occupational status, ever-BF, and duration of breast suckling (in minutes) as reported in the earlier article. According to the pooled baseline data, 75.2% of mothers who initiated BF timely were among the age group of greater than 24 years (adults). Among all 44.2% who initiated timely BF were orthodox, 41.6% were Oromo, 99.12% were ever married, 31.9% were able to read and write while 17.9% were merchants in occupation. Thirty one percent (31%) who initiated BF timely were primipara. Nearly one-third (29.3%) who initiated BF timely had no sex preference. Exactly one-third (33.2%) of mothers who initiated BF timely had ANC follow up, and 27.5% of them got information about EBF from HPs in the last 3 months. Less than half (44.1%) who initiated BF timely had previous experience of BF, and 42.8% had a plan to BF for the current baby. **(Table 4.6)**

Table 4. 6. Background characteristics of the study participants with BF initiation time, Jimma Town, 2018. (Pooled data from both arms, n=229 mothers who ever-BF for the current baby).

Background characterstics	**Category**	**BF initiation time (n=229)**	
		≤1 hour n(%)	**>1 hour n(%)**
Age (in years)	≤24 (youth)	28 (24.8)	49(42.2)
	>24 (adult)	85(75.2%)	67(57.8)
Religion followed	Orthodox	50(44.2)	43(37.1)
	Muslim	42(37.2)	48(41.4)
	Protestant	17(15)	20(17.2)
	Catholic	3(2.7)	2(1.7)
	Other *	1(0.9)	3(2.6)
Ethinic group	Oromo	47(41.6)	56(48.3)
	Dawuro	11(9.7)	5(4.3)
	Kaffa	10(8.8)	3(2.6)
	Amhara	22(19.5)	26(22.4)
	Yem	19(16.8)	20(17.2)
	Other**	4(3.5)	6(5.2)
Marital status	Ever married	112(99.12)	114(98.28)
	Never married	1(0.9)	2(1.7)
Educational status	Able to read and write	73(31.9)	88(38.4)
	Unable	40(17.5)	28(12.2)
Occupation	Housewife	28(12.2)	34(14.8)
	Merchant	41(17.9)	38(16.6)

	Student	6(2.6)	13(5.7)
	Gov't employe	35(15.3)	24(10.5)
	Other***	3(1.3)	7(3.1)
Parity	Primi-para	71(31)	88(38.4)
	Multi-para	42(18.3)	28(12.2)
Sex preference	Not prefer	67(29.3)	80(34.9)
	Prefer	46(20.1)	36(15.7)
ANC follow-up	Yes	76(33.2)	84(36.7)
	No	37(16.2)	32(14.0)
Previous experience of BF	Yes	101(44.1)	108(47.2)
	No	12(5.2)	8(3.5)
Plan/intention to BF	Yes	98(42.8)	98(42.8)
	No	15(6.6)	18(7.9)
Main source of EBF information in the last 3 months (other than PDs for the intervention group)	HPs including HEPs	63(27.5)	52(22.7)
	Relatives/friends	15(6.6)	23(10.0)
	Media outlets	18(7.9)	20(8.7)
	Other****	14(6.1)	24(10.5)

*Adventist, follower of traditional faiths, **Tigray, Gurage, Silte, *** private employee, urban farming worker, ****community health workers, model mothers, any visitors

At midline, 41.5% and 41.9% of mothers who initiated timely BF had given birth at the health institution and made SVD respectively. About 38%, 40.2%, 29.3%, 42.8%, and 27.5% of mothers who initiated BF timely had a baby with good health status, good own health status soon after birth, got support from relevant others, had good knowledge of EBF, and had good self-efficacy respectively. However, 25.8% of mothers with unfavorable attitude toward EBF initiated BF timely. **(Table 4.7)**

Table 4. 7. Background characteristics of the study participants with BF initiation time, Jimma Town, 2018. (Pooled midline data from both arms, n=229).

Characterstics (midline)	**Category**	**BF initiation time (n=229)**	
		≤1 hour n(%)	**>1 hour n(%)**
Place of delivery	HI	95(41.5)	91(39.7)
	Home	18(7.9)	25(10.9)
Mode of delivery	SVD	96(41.9)	104(45.4)
	C/S	17(7.4)	12(5.2)
Health status of baby soon birth	Good	87(38)	95(41.5)
	Poor	26(11.4)	21(9.2)
Health status of mother soon delivery	Good	92(40.2)	98(42.8)
	Poor	21(9.2)	18(7.9)
Support from relevant others	Yes	67(29.3)	67(29.3)
	No	46(20.1)	49(21.4)
Knowledge of EBF	Good	98(42.8)	77(33.6)
	Poor	15(6.60	39(17)
Attitude toward EBF	Favorable	54(23.6)	79(34.5)
	Unfavorable	59(25.8)	37(16.2)
Self-efficacy with EBF	Good	63(27.5)	67(29.3)

	Poor	50(21.8)	49(21.4)

4.2.2. TIBF practice and effect size

There were statistically significant differences between the groups in the proportion of mothers who practice ever BF, BF within 24 hours, and timely initiation at mid-points. In the intervention group, ever BF, initiation of BF within 24 hours and the first hour of life showed improvements at midline compared to baseline. At midline, all (100%) of the mothers in the intervention group had ever BF as compared to 89.2% at baseline, increased by10.8%. Breast feeding within 24 hours of birth among the intervention group was increased by 27 points at midline compared to the baseline, while increased by 2 points among control group. This difference between the groups was statistically significant with the net effect of 25% increment. Similarly, the proportion of mothers in the intervention group, who initiated BF within 1 hour of birth increased significantly (P=0.001) by 26 points (absolute difference-net effect of 27.3%) while a small decrement in counterparts. **(Table 4.8)**

Table 4. 8. Comparison of timely initiation of BF practices between the intervention (IG) and control groups (CG) across the two time points, Jimma Town, 2018.

Variables with category		**Baseline**			**Midline**		
		IG: N (%)	CG:N (%)	P-value	IG:N(%)	CG: N (%)	P-value
Ever BF	Yes	116(89.2)	120(92.3)	0.001	129(100)	100(77.5)	0.001
	No	14(10.8)	10(7.69)		0(0.0)	29(22.5)	
Initiated BF within 24hrs	Yes (≤24hrs)	90 (69.23)	92 (70.77)	0.361	124(96.12)	94(72.87)	0. 01
	No (>24hrs)	40(30.77)	38(29.23)		5(3.88)	35(27.13)	
Initiated BF within 1hr of birth (TIBF)	Yes (≤1hr)	45(34.6)	37(28.5)	0.350	78(60.47)	35(27.1)	0.001
	No (>1hr)	85(65.4)	93(71.5)		51(39.53)	94(72.9)	

Mothers in the intervention group initiate BF within 1 hour of birth (TIBF practice) almost 2 times higher than the rate in the counterparts at the midline adjusted for confounders (Adjusted RR:1.64, 95% CI:1.268-2.121; P: 0.000), while the same at baseline. This means the intervention implemented using PDA significantly reduced the risk of avoiding timely initiation rate by 64% among mothers in the intervention group relative to the counterparts. **(Table 4.9)**

Table 4. 9.Likelihood of initiating BF within the first hour of life (TIBF) between the groups, Jimma Town, 2018.

Trial arm	Timely initiated (TIBF)		ARR	95% CI	P-Value
	Baseline: n (%)	Midline: n (%)			
Intervention Group	45 (34.6)	78 (60.47)	1.64	1.268-2.121	0.000*

Control Group	37 (28.5)	35 (27.1)	Ref.	Ref.	

*Denotes significant level at P<0.001 estimated from the midline data.

4.2.3. The time to initiate BF (median and survival time)

The time interval used to initiate BF was varied among the groups and from one mother to another. Till the mid-point of the study, two mothers were lost to follow-up (censored) without responding to the event/TIBF. Hence, the time to event was not normally distributed, that is why we preferred the median time to be reported, and non-parametric survival analysis was done. The median time to initiate BF was 1 hour in the intervention group ranged from 0.25 to 26 hours, while 2 hours in the counterparts ranged from 0.25 to 36 hours. This was significantly different between the groups (95% CI: 0.953-1.047; P=0.000). **(Table 4.10)**

Table 4. 10. The median time to initiate BF between the two groups, Jimma Town, 2018.

Group	Median time (in hours)	Range (IQR)	95% CI	P-Value (Log Rank test)
Intervention Group	1.00	25.75 (1.00)	0.953-1.047	<0.001
Control Group	2.00	35.75(3.75)	1.648-2.352	

The KM survival functions showed as the probability of timely initiating BF in later time went down and asymptote to zero in both groups while it was 1 at the beginning for both groups. Hence, consistently falling time to initiate BF was plotted in both groups. The KM survival function of the control group was above that of intervention group, indicated as the mothers in the control group initiated BF after a long time compared to counterparts. This means mothers who were in the intervention group initiated BF timely and within a short period after birth relative to counterparts. The timely initiation survival probability was 65% in the intervention group, while 40% in counterparts. Contrarily, the hazard functions revealed that the risk/hazard of delayed initiation of BF was reduced in the intervention group compared to the control group. **(Figure 7 and 8)**

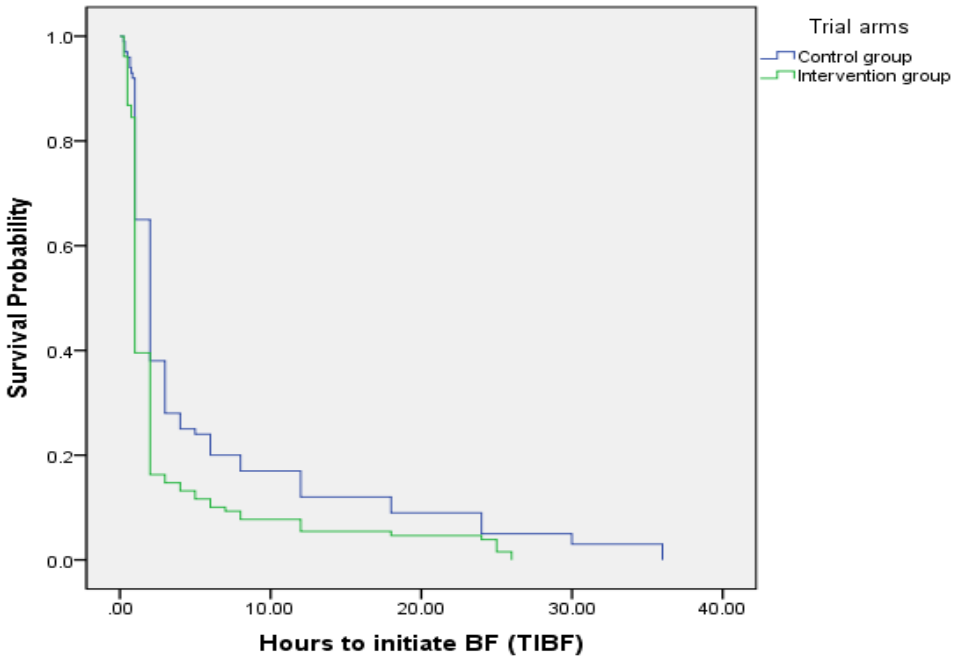

Figure 7. Kaplan-Meier survival functions for the time to initiate BF practice, Jimma, 2018.

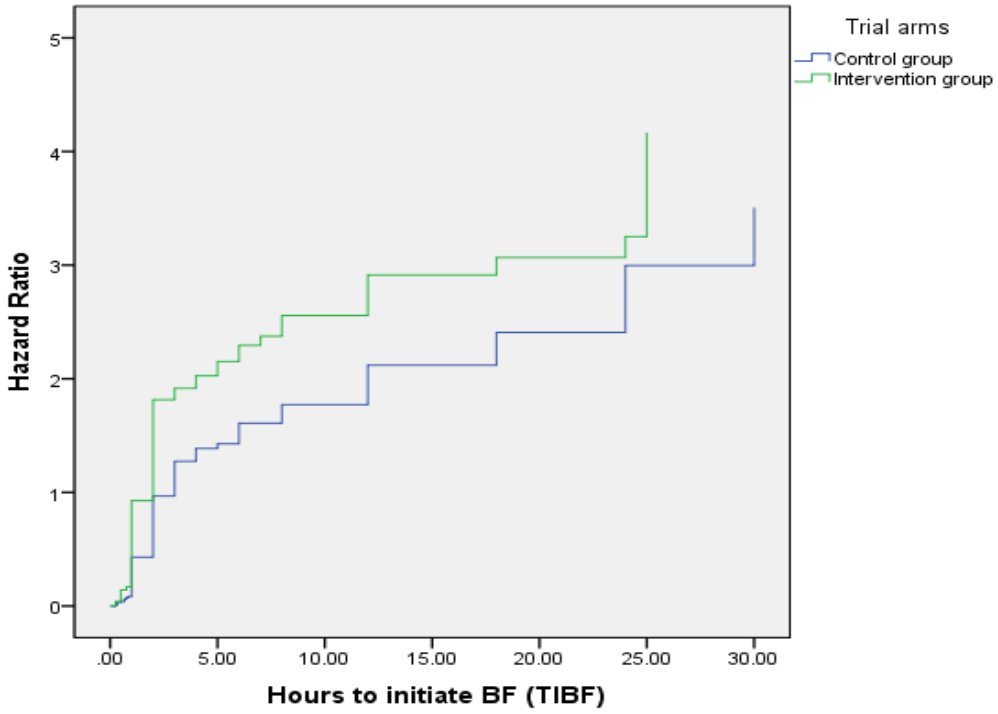

Figure 8. Kaplan-Meier hazard functions for the time to initiate BF practice, Jimma, 2018.

4.2.4. Predictors of time to initiate BF

Two cases were censored; one from each group and 29 cases were not ever BF in the control group, while the remaining 100 cases in the control group and 129 in the intervention group-initiated BF at different time points. Out of 20 variables, 13 candidates were identified using bivariate Cox- PH regression models such as age (P:0.222), educational status (P:0.240), occupation (P: 0.248), parity (P:0.241), sex preference (P:0.040), previous experience of BF (P: 0.033), intention to BF (P:0.249), source of info about EBF (P: 0.246), mode of delivery (P: 0.114), health status of mother soon after delivery (P: 0.246), receiving support from relevant others (P:0.248), knowledge on EBF (P:0.045), and attitude toward EBF (P:0.002). Then after fitting the candidates to the final multi-variable Cox-regression model, 7 variables become independent predictors of time to initiate BF.

The pooled proportion of TIBF among all study subjects was 113 (43.5%). Primipara mothers (AHR:1.56, 95% CI: 1.002-1.987, P: 0.043), who had no sex preference (AHR:1.99, 95% CI: 1.232-2.221, P: 0.031), with the good health status of mother soon after delivery (AHR: 1.88 95% CI: 1.213-2.021, P:0.021), who received support from relevant others (AHR: 2.00, 95% CI:1.675-2.856, P:0.045), and who had good knowledge of EBF at midline (AHR: 1.65, 95% CI: 1.132-1.998, P:0.032) initiate BF within the first hour of birth almost at a rate of 2 times greater than mothers in their counterparts. Furthermore, mothers who gave birth through SVD initiate timely BF 2.5 times higher than the rate of those who delivered via C/S (AHR: 2.45, 95% CI: 1.562-2.986, P: 0.011). However, the hazard rate/risk increases by 31.6% not to initiate timely for those who had favorable attitude toward EBF compared to their counterparts (AHR: 0.684, 95% CI: 0.507-0.924, P: 0.013). **(Table 4.11)**

Table 4. 11. Predictors of time to initiate breast feeding practice among all study participants (pooled data for survival analysis, n=229: Cox-PH regression), implementation study, Jimma, 2018.

Variables	Category	TIBF practice		Adjusted HR	95% CI	P-value
		Yes n(%)	No n(%)			
Age (in years)	≤24	28 (24.8)	49(42.2)	1.31	0.971-1.776	0.077
	>24 (Ref)	85(75.2)	67(57.8)			
Educational status	Able to read/write	73(31.9)	88(38.4)	0.96	0.701-1.312	0.792
	Unable (Ref)	40(17.5)	28(12.2)			
Occupation	Housewife	28(12.2)	34(14.8)	1.20	0.958-1.587	0.221
	Employeed(Ref)	35(15.3)	24(10.5)			
Parity	Primi-para	71(31)	88(38.4)	1.56	1.002-1.987	0.043*
	Multi-para(Ref.)	42(18.3)	28(12.2)			
Sex preference	Not prefer	67(29.3)	80(34.9)	1.99	1.232-2.221	0.031*
	Prefer (Ref.)	46(20.1)	36(15.7)			

Main source of EBF information	HPs	63(27.5)	52(22.7)	0.96	0.861-1.080	0.531
	Other (Ref.)[@]	57(24.9)	57(24.9)			
Previose experience of BF	Yes	101(44.1)	108(47.2)	0.78	0.484-1.248	0.297
	No (Ref.)	12(5.2)	8(3.5)			
Intention to BF	Yes	98(42.8)	98(42.8)	0.87	0.574-1.316	0.507
	No (Ref.)	15(6.6)	18(7.9)			
Mode of delivery	SVD	96(41.9)	104(45.4)	2.45	1.562-2.986	0.011*
	C/S(Ref.)	17(7.4)	12(5.2)			
Health status of mother	Good	92(40.2)	98(42.8)	1.88	1.213-2.021	0.021*
	Poor (Ref.)	21(9.2)	18(7.9)			
Supported by relevant others	Yes	67(29.3)	67(29.3)	2.00	1.675-2.856	0.045*
	No (Ref.)	46(20.1)	49(21.4)			
Knowledge on EBF	Good	98(42.8)	77(33.6)	1.65	1.132-1.998	0.032*
	Poor (Ref.)	15(6.60	39(17)			
Attitude towards EBF	Favorable	54(23.6)	79(34.5)	0.684	0.507-0.924	0.013*
	Unfavorable (Ref)	59(25.8)	37(16.2)			

*Significant at P<0.05, poor health status of newborn denotes if low birth weight, pre-term, hypothermic, unable to suck, and separated from the mother for any medical intervention; poor health status of mother denotes as the mother own perception as she was unable to BF and obstetric related condition that inhibit her not to BF for the time being. @ denotes that mothers who received information from relatives/family/friends living in Jimma town, media outlets, CHWs, model mothers and from any visitors.

4.3. End-Users Satisfaction with PDA as an Intervention to Promote EBF: A Multi-Level Analysis

4.3.1. Socio-demographic characteristics of the participants

The response rate for this follow-up study was 97.7% (254/260). The mean age was 30.2 (±8.1) ranging from 18 to 60 years. The majority (59.8%) were between the age group of 25-34 years. Three-fourths (76.4%) of the study respondents were females. Almost all (96.9%) were ever-married, and 70.9% can read and write. More than one third (37.8%) were merchants, and 65% had estimated monthly net income of 33.1 USD or less (during data collection, the average exchange rate was 1USD=36.65Birr). **(Table 4.12)**

Table 4. 12. Socio-demographic characteristics of end-users of the positive deviance approached intervention, a follow-up study, Jimma town, September 2020.

Number of respondents (n=254)	**Category**	**N (%)**
Age (in years)	15-24 years	45(17.7)
	25-34 years	152(59.8)
	>=35years	57(22.4)
Sex of the respondent	Female	194(76.4)
	Male	60(23.6)
Religion followed	Orthodox	102(40.1)

	Muslim	96(37.8)
	Protestant	52(20.5)
	Others	4(1.6)
Ethnic group belongs to	Oromo	93(36.6)
	Amhara	83(32.7)
	Yem	32(12.6)
	Dawuro	22(8.7)
	Kaffa	16(6.3)
	Others	8(3.1)
Marital status	Ever married	246(96.9)
	Never married (Single)	8(3.1)
Educational status	Can't read and write	74(29.1)
	Can read and write	180(70.9)
Occupational status	House wife	51(20.1)
	Merchant/trader	96(37.8)
	Student	25(9.8)
	Gov't employee	71(28)
	Other	11(4.3)
Estimated monthly net income	<=1000Birr	165(65)
	1001-2000Birr	51(20)
	>=2001Birr	38(15)

4.3.2. Description of the satisfaction measurment scales

Satisfaction measurement scales were identified using PCA/EFA. Each emerged latent component/scale (factor with Eigenvalue greater than one extracted) was named considering the common concept of all items loaded to it. Twenty-eight items having a communality of >0.50 were retained on five components/scales. These were named as *counselor/PD and counseling sessions, user empowerment, intervention approach (PDA) and health outcome, various aspects of the intervention (service delivered), and user engagement* with 9, 7, 6, 3, and 3 items retained respectively. In the process, two items were removed due to a commonality value <0.5. No item was removed due to cross-loading. The item loading value of >0.4 was considered as a cut-off point. The emerged scales explained 84.2% of the total variability which is greater than the cut-off point (60% of TVE). The higher factor score created on a factor analysis indicates a higher degree of satisfaction with PDA. The Cronbach alpha's reliability coefficient for these items loaded to the above five scales were 0.97, 0.92, 0.90, 0.85, and 0.82 respectively. **(Table 4.13)**

Among the items loaded to '*Counselor/PD and counseling sessions*' scale, the highest raw mean score belonged to the satisfaction with '*practical information (skill) shared to you about EBF*' and '*emotional supporting ability of PD/counselor*', 3.1 (SD1.3) and 3.1 (SD1.4) respectively.

Of the items measuring the '*user empowerment*' scale, the highest raw mean scored was to the satisfaction with '*way of information communicated to you is trialable*' and '*credible information you received*', 3.3 (SD1.3). Of the items measuring the '*intervention approach (PDA) and health outcome*' scale, the raw mean score for the satisfaction with '*positive deviant (counselor) assigned to you based on the new way*' was among the three items highly scored 3.1 (SD1.3). However, the raw mean scores for all items loaded to the '*various aspects of the intervention/service provided*', and '*user engagement*' scales, were highly and equally scored, 2.8 and 3.1 respectively. **(Table 4.13)**

Table 4. 13. Emerged satisfaction measurement scales with respective item loading resulted from PCA,and descriptive measures to each item, a follow-up study, Jimma, September 2020. (n=254).

Scale/item (Satisfaction with the...)	Item Loading	SD n(%)	D n(%)	N n(%)	S n(%)	SS n(%)	Mean (SD)
Counselor/PD and counseling sessions							
1. Relevance of each experience sharing sessions conducted	.913	39(15.4)	49(19.3)	69(27.2)	62(24.4)	35(13.8)	3.0(1.3)
2. Communication skill of PD/counselor	.906	52(20.5)	51(20.1)	71(28)	47(18.5)	33(13)	2.8(1.3)
3. Knowledge of counselor about EBF	.902	38(15)	48(18.9)	68(26.8)	67(26.4)	33(13)	3.0(1.2)
4. Appearance of PD/counselor	.899	38(15)	50(19.7)	76(29.9)	54(21.3)	36(14.2)	3(1.3)
5. Emphatic and value adding nature of PD/counselor	.889	39(15.4)	45(17.7)	90(35.4)	44(17.3)	3614.2)	3(1.2)
6. Practical information (skill) shared to you about EBF	.850	36(14.2)	48(18.9)	68(26.8)	60(23.6)	42(16.5)	3.1(1.3)
7. Length of consultation/counseling time	.850	53(20.9)	49(19.3)	72(28.3)	49(19.3)	31(12.2)	2.8(1.3)
8. Convenience of each supporting sessions	.834	62(24.4)	47(18.5)	64(25.2)	44(17.3)	37(14.6)	2.8(1.4)
9. Emotional supporting ability of PD/counselor	.834	40(15.7)	46(18.1)	64(25.2)	46(18.1)	58(22.8)	3.1(1.4)
User empowerment							
1. Experience of EBF you got/received	.910	68(26.8)	59(23.2)	45(17.7)	41(16.1)	41(16.1)	2.7(1.4)
2. Way of information communicated to you is trialable at each visit	.885	32(12.6)	43(16.9)	59(23.2)	66(26)	54(21.3)	3.3(1.3)
3. Credible information you received	.885	32(12.6)	43(16.9)	59(23.2)	66(26)	54(21.3)	3.3(1.3)
4. Transferable skill of BF you received	.850	69(27.2)	59(23.2)	43(16.9)	42(16.5)	41(16.1)	2.7(1.4)
5. Understanding you developed about EBF practice and information	.833	33(13)	44(17.3)	60(23.6)	71(28)	46(18.1)	3.2(1.3)
6. Skill of breast milk expression developed	.813	65(25.6)	61(24)	44(17.3)	42(16.5)	42(16.5)	2.7(1.4)
7. Confidence built to be a potential counselor in your social network	.761	60(23.6)	61(24)	44(17.3)	45(17.7)	44(17.3)	2.8(1.4)
Intervention approach (PDA) and health outcome							
1. Community-based (home-based) ways of promoting EBF	.926	46(18.1)	57(22.4)	68(26.8)	52(20.5)	31(12.2)	2.9(1.3)
2. Comfortability of the way you approached	.913	45(17.7)	60(23.6)	63(24.8)	54(21.3)	32(12.6)	2.9(1.3)
3. Positive deviant (counselor) assigned to you based on the new way	.893	36(14.2)	52(20.5)	63(24.8)	70(27.6)	33(13)	3.1(1.3)
4. Promoted component of newborn care that is EBF fitness with the approach	.891	47(18.5)	62(24.4)	61(24)	48(18.9)	36(14.2)	2.9(1.3)

5. Lived experience sharing approach	.836	36(14.2)	49(19.3)	65(25.6)	54(21.3)	50(19.7)	3.1(1.3)
6. Health outcome of EBF practice as you observed on your infant	.825	25(9.8)	57(22.4)	75(29.5)	59(23.2)	38(15)	3.1(1.2)
Various aspects of the intervention (service delivered)							
1. Content of counseling and experience shared at each visit about EBF	.870	68(26.8)	35(13.8)	69(27.2)	41(16.1)	41(16.1)	2.8(1.4)
2. Adequacy of number of visit to receive enough information/emotional support	.858	65(25.6)	37(14.6)	71(28)	52(20.5)	29(11.4)	2.8(1.3)
3. Understandability of BF information and appraisal support provided	.837	65(25.6)	37(14.6)	71(28)	47(18.5)	34(13.4)	2.8(1.2)
User engagement							
1. Support provided considering your interest (user centeredness)	.926	28(11)	67(26.4)	60(23.6)	41(16.1)	58(22.8)	3.1(1.3)
2. Your active involvement during each counseling sessions	.918	32(12.6)	65(25.6)	69(27.2)	44(17.3)	44(17.3)	3.1(1.4)
3. Practical/participatory aspect of BF experience sharing	.910	36(14.2)	57(22.4)	59(23.2)	61(24)	41(16.1)	3.1(1.3)

SD=Strongly Dissatisfied, D=Dissatisfied, N=Neutral, S=Satisfied, SS=Strongly Satisfied, SD=Standard Deviation, n=frequency

4.3.3. Level of satisfaction with the PDA intervention

The overall level of end-users' satisfaction (PSMS) with PDA as an intervention to promote EBF was 50.9% with a maximum score of 99% and a minimum of 8%. Of the emerged satisfaction measuring scales, the PSMS for user empowerment scale was the highest (53.7%) followed by user engagement (51.7%), while the PSMS for the counselor and counseling sessions was the lowest (49.2%). However, the scale's raw mean score of this factor was the highest (26.7 $\pm$ 10.3) which is an unstandardized one. All emerged scales taken together explained 84.2% of the total variability in users' satisfaction. When participants were categorized into two using a simple mean score, 54.3% of the end-users were satisfied (scored >=85.8), while by using the PSMS, 50.4% of the end-users' were satisfied (scored >=244.5). The overall satisfaction scales' raw mean score was 85.8 $\pm$ 22.3, while the PSMS was 50.9%. The satisfied proportion (50.4%) is almost consistent with the overall satisfaction's PSMS (50.9%=the sum of the five scales' PSMS divided by 5). **(Table 4.14)**

Table 4. 14. Standardized PSMS, and level of end-users' satisfaction with PDA intervention, a follow-up study, Jimma town, September 2020; (n=254).

Emerged factors(scales)	**Scale Mean Score(SMS)**	**PSMS (%)**
Intervention approach(PDA) and health outcome	17.9 $\pm$ 6.8	49.5
Counselor/PD and counseling sessions	26.7 $\pm$ 10.3	49.2
Various aspects of the intervention (service delivered)	18.1 $\pm$ 6.9	50.5

User empowerment		11.0 ± 5.3	53.7
User engagement		9.2 ± 3.7	51.7
Overall satisfaction		85.8 ± 22.3	50.9
Level of satisfaction	Satisfied	54.3%	50.4%
	Dissatisfied	45.7%	49.6%

PSMS(%SMS) is the standardized scales mean score as the percentage of possible maximum scale score, and it lies between 0 and 100%.

4.3.4. Individual-level characteristics and users' satisfaction with PDA

More than two-thirds (68.8%) of the satisfied and half (49.1%) of those dissatisfied with PDA as an intervention to promote EBF were between the age of 25-34 years. Most of the satisfied respondents (81.2%) were females. Most (94.9%) of the satisfied and nearly all (99.1%) of the dissatisfied respondents were ever-married. Of the satisfied group, one-third (32.6%) were government employees, while from the dissatisfied group, half (50%) were a merchant. Most (88.4%) of the satisfied, and (93.1%) of the dissatisfied with PDA intervention had previous experience of BF or supported the mother to do so. Similarly, most of (84.8%) the satisfied and dissatisfied (88.8%) group had an intention to BF for the current baby or support the mother. More than two-thirds (70.3%) from the satisfied group, and 69% from dissatisfied group had a good knowledge of BF. Similarly, more than half (52.9%) from the satisfied group and 57.8% from the dissatisfied group had a favorable attitude towards BF. Although the majority (61.6%) of the satisfied group had good self-efficacy about BF, half (50.9%) of the dissatisfied group had poor self-efficacy about BF. **(Table 4.15)**

Table 4. 15. Individual-level characteristics and satisfaction of end-users with positive deviance approach of intervention, a follow-up study, Jimma town, September 2020.

Number of respondents (n=254)		**Outcome variable (Users' satisfaction)**		
Individual-level variables	**Category**	**Satisfied N (%)**	**Dissatisfied N (%)**	**Total (%)**
Age (in years)	15-24 years	25(18.1)	20(17.2)	45(17.7)
	25-34 years	95(68.8)	57(49.1)	152(59.8)
	>=35years	18(13)	39(33.6)	57(22.4)
Sex of the respondent	Female	112(81.2)	82(70.7)	194(76.4)
	Male	26(18.8)	34(29.3)	60(23.6)
Religion followed	Orthodox	53(38.4)	49(42.2)	102(40.1)
	Muslim	56(40.6)	40(34.5)	96(37.8)
	Protestant	25(18.1)	27(23.3)	52(20.5)
	Others	4(2.8)	0(0)	4(1.6)
Ethnic group belongs to	Oromo	49(35.5)	44(37.9)	93(36.6)
	Amhara	45(32.6)	38(32.8)	83(32.7)

	Yem	18(13)	14(12.1)	32(12.6)
	Dawuro	13(9.4)	9(7.8)	22(8.7)
	Kaffa	11(8)	5(4.3)	16(6.3)
	Others	2(1.4)	6(5.2)	8(3.1)
Marital status	Ever married	131(94.9)	115(99.1)	246(96.9)
	Never married (Single)	7(5.1)	1(0.9)	8(3.1)
Educational status	Unable to read and write	37(26.8)	37(31.9)	74(29.1)
	Able to read and write	101(73.2)	79(68.1)	180(70.9)
Occupational status	House wife	23(16.7)	28(24.1)	51(20.1)
	Merchant/trader	38(27.5)	58(50)	96(37.8)
	Student	24(17.4)	1(0.9)	25(9.8)
	Gov't employee	45(32.6)	26(22.4)	71(28)
	Other	8(5.8)	3(2.6)	11(4.3)
Estimated monthly net income	<=1000Birr	82(59.4)	83(71.6)	165(65)
	1001-2000Birr	31(22.5)	20(17.2)	51(20)
	>=2001Birr	25(18.1)	13(11.2)	38(15)
Previous experience of BF/supporting lactating mother	No	16(11.6)	8(6.9)	24(9.4)
	Yes	122(88.4)	108(93.1)	230(90.6)
Intention to BF/support for the current baby	No	21(15.2)	13(11.2)	34(13.4)
	Yes	117(84.8)	103(88.8)	220(86.6)
Knowledge of BF	Poor knowledge	41(29.7)	36(31)	77(30.3)
	Good knowledge	97(70.3)	80(69)	177(69.7)
Attitude toward BF	Unfavorable	65(47.1)	49(42.2)	114(44.9)
	Favorable	73(52.9)	67(57.8)	140(55.1)
Self-efficacy to BF	Poor self-efficacy	53(38.4)	59(50.9)	112(44.1)
	Good self-efficacy	85(61.6)	57(49.1)	142(55.9)

4.3.5. Community-level characteristics and users' satisfaction

Of all respondents, 31.5%, 34.6%, and 33.9% were living in Cluster-I, Cluster-II, Cluster-III respectively. At the community-level before the PDA intervention, more than one-third (38.4%) of the satisfied, and 35.3% of the dissatisfied respondents with PDA as an intervention strategy to promote EBF were mainly received BF information from urban HEPs. The majority (61.6%) of the satisfied and 57.8% of the dissatisfied received home-based visit/support from urban HEPs previously. The majority (67.4%) of the satisfied, and 62.1% of the dissatisfied were perceived as no functional HDA network in their village. However, three-fourths (75.4%) of those who were satisfied were participating in any social support activities. Whereas majority (64.7%) of those dissatisfied with the new approach were not participating or had limited participation in any social support activities. The majority (63%) of the satisfied, and 54.3% of those dissatisfied

were living in the same village/zone where the assigned positive deviant is living. Around two-thirds (64.5%) of those satisfied respondents with PDA were counseled and supported by a PD who can read and write. However, more than half (55.1%) of the satisfied, and 92.2% of the dissatisfied perceived as no community support to practice EBF. (**Table 4.16)**

Table 4. 16. Community-level characteristics and satisfaction of end-users with the positive deviance approach of intervention, a follow-up study, Jimma town, September 2020.

Number of respondents (n=254)		**Outcome variable (Users' satisfaction)**		
Community/Cluster level variables	**Category**	**Satisfied N (%)**	**Dissatisfied N (%)**	**Total (%)**
Residency area/Clusters	Cluster-I	79 (57.2)	1(0.9)	80(31.5)
	Cluser-II	49 (35.5)	39(33.6)	88(34.6)
	Cluster-III	10(7.2)	76(65.5)	86 (33.9)
Main source of BF information (previously)	HEPs	53(38.4)	41(35.3)	94(37)
	Mass-medias	42(30.4)	27(23.3)	69(27.2)
	Family/relatives	40(29)	38(32.8)	78(30.7)
	Others	3(2.2)	10(8.6)	13(5.1)
Previously received home-based visit/support from HEPs	No	53(38.4)	49(42.2)	102(40.2)
	Yes	85(61.6)	67(57.8)	152(59.8)
Existence of functional HDA network	No	93(67.4)	72(62.1)	165(65)
	Yes	45(32.6)	44(37.9)	89(65)
Participation in any social support activities	No/limited	34(24.6)	75(64.7)	109(42.9)
	Yes	104(75.4)	41(35.3)	145(57.1)
The village/zone where the assigned PD is living	The same with the mother	87(63)	63(54.3)	150(59.1)
	Different from the mother	51(37)	53(45.7)	104(40.9)
Educational status of the assigned PD	Able to read and write	89(64.5)	65(56)	154(60.6)
	Unable to read and write	49(35.5)	51(44)	100(39.4)
Perceived community support for BF	Not supportive	76(55.1)	107(92.2)	183(72)
	Supportive	62(44.9)	9(7.8)	71(28)

4.3.6. Measure of variation in satisfaction

Multi-level mixed model random-effects were analyzed to check the variation of satisfaction score due to the leveled factors considered in this study. The empty model showed that there was a significant variation in the grand mean score of satisfaction among the three clusters (MV: 85.75, 95% CI: 83.00-88.50, $p < 0.05$). All the subsequent models remained significant at 95% CI ($p < 0.05$). At the empty model, a standard error of 43.97 was observed indicating significant variation before adjustment for individual and community-level factors while decreased along

with the subsequent models. At the empty model, 16.1% of the variations in satisfaction could be attributed to community characteristics without controlling other factors. The higher the ICC, the more relevant were the community characteristics. Accordingly, the mixed model was fitted to determine the predictors of satisfaction. **(Table 4.17)**

As reported in the ICC (model 1), 14.2% variability in the satisfaction score was due to community-level factors after controlling for individual-level factors, while in the final model, 25.6% of the variation in the satisfaction score was observed after adding individual and community-level factors. The Variance Change in Percentages' Mean Score (VCPMS) was used to show the change in cluster-level variance between the empty and consecutive models. This means the variability on satisfaction score was explained for successive models using this variance change. The AIC (log-likelihood) values were consistently decreased from the empty model to Model 3 implying the models were a better fit to the data. This was also confirmed by comparing with Bayesian information criterion (BIC) values. In each model, all the AIC values are less than BIC values. The consistent decrement in these values helps to select covariance structure with the best fit model. About 57.4% (Adjusted-R^2) of the satisfaction score was explained by the empty model considering clusters as an explanatory variable. This shows there was still unexplained variation (42.6%) among the clusters. There was no multicollinearity in all models. **(Table 4.17)**

Table 4. 17. Multi-level mixed model random-effects (measure of variation) of users' satisfaction with the PDA intervention, a follow-up study, Jimma town, September 2020; (n=254).

Measure of variation	**Empty model (Model 0)**	**Model 1**	**Model 2**	**Model 3**
MV (95% CI)	85.75 (83.00-88.50)	87.32(75.11-99.54)	83.08(74.45-91.70)	76.53(60.31-92.76)
SECE	43.97	32.36	16.33	12.98
ICC	16.1%	14.2%	32.8%	25.6%
PCV (VCPMS)	Reference	30.3%	16.7%	37%
Model fitness AIC (-2loglikelihood)	2297	2219	2059	2001
Model fitness (Adjusted R^2)	0.574	0.152	0.415	0.478
Multicollinearity (Individual values)		<4	<3	<4

Dependent variable: Satisfaction composite score, **Empty model (model-0)**: Model without explanatory variables, **model-1**: model adjusted for individual-level factors, **model-2**: model adjusted for community-level factors, **Model-3**: is a full model adjusted for both individual and community-level factors, **MV**: mean variance at 95% confidence interval, **SECE**: standard error of covariance estimate, **ICC**: Intra-class correlation coefficient in percentage, **PCV(VCPMS)**:Proportional change in variance using variance change in percentages' mean score, **AIC**: Akaike information criteria, **Adjusted R^2**: the proportion of variance in the satisfaction score explained by a statistical model.

4.3.7. Multi-level predictors of satisfaction

Independent predictors of end-users satisfaction with PDA as an intervention to promote EBF were determined using four successive linear mixed models. Before fitting each model, candidate variables were selected at P<0.25. Then candidates were fitted into the successive models and significant predictors were retained and reported. Finally, the full (mixed) model revealed that age, occupational status, experience of BF/support, knowledge of BF, attitude towards BF, self-efficacy of BF, main source of information about BF at community-level, previous home visit/ support received from HEPs, participation in any social activities and perceived community-level support for BF were independent predictors. **(Table 4.18)**

A year increment in age resulted in a decrement of the satisfaction score by 10.3 (β=-10.3, 95% CI:-12.8 to -8.2). However, the satisfaction score was 13.5 times (β=13.5, 95% CI: 7.81-19.22) higher among government employees as compared to the housewives. Similarly, it was 3.04 times (β=3.04, 95% CI: 0.05-6.21) higher among those without experience of BF or supporting lactating mothers compared to their counterparts. The satisfaction score was 8.9 times (β=8.95, 95% CI:3.11-13.22), and 5.15 times (β=5.15, 95% CI: 0.23-10.45) higher among those who had poor knowledge, and unfavorable attitude towards BF as compared to their counterparts respectively. Also, the satisfaction score was 5.8 times (β=-5.8, 95% CI: -10.2 to -0.02) lower among those with a good level of self-efficacy compared to their counterparts. The satisfaction score was 1.5 times (β:1.5, 95% CI: 0.03-3.95) higher among those who informed of BF from HEPs as compared to those who informed from any other sources. In the same way, the satisfaction score was 2.7 (β=2.7, 95% CI:0.04-5.12) times higher among those who previously received support from HEPs compared to their counterparts. The satisfaction score was 10.2 times (β=10.2, 95% CI: 3.85-16.22) higher among those who participated in any social activities compared to their counterparts. The satisfaction score was 5.5 times (β=5.5, 95% CI:0.06-8.15) higher among those who perceived no community support for BF compared to their counterparts. **(Table 4.18)**

Table 4. 18. Multi-level predictors of end-user satisfaction with the PDA intervention using linear mixed models, a follow-up study, Jimma town, September 2020; (n=254).

	Empty Model(0)	**Mode 1**	**Model 2**	**Model 3**
		Individual-level factors	**Community-level factors**	**Mixed factors**
Variables		**β/estimate(95%CI)**	**β/estimate(95%CI)**	**β/estimate(95%CI)**

Age (in years)		-12.3(-15.9 to -8.2)*		-10.3(-12.8 to -8.2)**
Sex	Female	9.98(2.48-17.48)*		3.11(-1.48-8.23)
	Male	0		0
Occupational status	Gov't employee	15.4(10.71-20.13)**		13.5(7.81-19.22)**
	Merchants	2.77(0.65-6.89)*		1.02(-0.65-3.72)
	Housewives	0		0
Experience of BF/support	Yes	0		0
	No	5.66(0.04-11.97)*		3.04(0.05-6.21)*
Intention to BF	Yes	2.58(0.55-6.67) *		0.98(-0.55-2.32)
	No	0		0
Knowledge of BF	Good	0		0
	Poor	9.03(3.04-15.01)*		8.95 (3.11-13.22)*
Attitude towards BF	Favorable	0		0
	Unfavorable	5.96(0.44-11.97) *		5.15(0.23-10.45)*
Self-efficacy	Good	-5.8(-11.7 to -0.04)*		-5.8(-10.2 to -0.02)*
	Poor	0		0
Main source of BF info	UHEPs		1.54(0.02-4.56)*	1.5(0.03-3.95)*
	Other sources		0	
Received Support from HEPs	Yes		2.8(0.05-6.1)*	2.7(0.04-5.12)*
	No		0	0
Participation in any social activities	Yes		10.4(2.85-18.67)**	10.2(3.85-16.22)**
	No		0	0
Perceived community support of BF	Not supportive		5.58(0.02-11.15)*	5.5(0.06-8.15)**
	Supportive		0	0

Intercept for empty model (0): 85.75, Model 1: 56.3, Model 2: 87.79, Model 3: 49.17, while *P<0.05, ** P<0.001.

4.4. Assessement of Implementation Outcome Measures for PDA as a New Strategy to Promote EBF: A Psychometric Follow-up Study

4.4.1. Background characteristics of participants

The response rate was 96.9% (372/384). The mean age was 30.7 (±6.9SD) ranging from 18 to 60 years.The majority (66.1%) were between the age group of 25-34 years. More than three-fourths (80.9%) of the study participants were females, and 83.6% were married. The majority (62.6%) can read and write through formal education. More than one third (34.9%) were merchants, and the majority (60.2%) had estimated monthly net income of 33.1USD or less (during data collection period, the average exchange rate was 1USD=36.50Birr). The majority (68.3%) of study participants were end-users who were mothers and their relevant others. More than half (54.3%) reported as they are highly or actively engaged during implementation. Similarily,

54.6% and 54% of them reported as they were highly confident, and competent enough to promote EBF through PDA respectively. **(Table 4.19)**

Table 4. 19. Background characteristics of the participants, a follow-up study, Jimma town, 2020.

Variables (n=372)	**Category**	**N (%)**
Age (in years)	15-24 years	45(12.1)
	25-34 years	246(66.1)
	>=35years	81(21.8)
Sex of the respondent	Female	301(80.9)
	Male	71(19.1)
Religion	Orthodox	147(39.5)
	Muslim	136(36.6)
	Protestant	78(21)
	Others	11(2.9)
Ethnic group	Oromo	162(43.5)
	Amhara	122(32.8)
	Dawuro	44(11.8)
	Kaffa	33(8.9)
	Other	11(3)
Marital status	Married	311(83.6)
	Divorced	26(7)
	Widowed	17(4.6)
	Single	18(4.8)
Educational status	Can't read and write at all	101(27.2)
	Can read and write without formal education	38(10.2)
	Can read and write through formal education	233(62.6)
Occupational status	Housewife	76(20.4)
	Merchant	130(34.9)
	Gov't employee	87(23.4)
	Private employee*	62(16.7)
	Other	17(4.6)
Estimated monthly net income	<=1000Birr	224(60.2)
	1001-2000Birr	77(20.7)
	>=2001Birr	71(19.1)
Role in the PDA implementation	Facilitator and/or trainee	105(28.2)
	Counsellors/change agent	13(3.5)
	End-user	254(68.3)
Perceived level of engagement during PDA intervention	Highly/actively engaged	202(54.3)
	Medium	128(34.4)
	Lowly engaged	42(11.3)
Perceived level of confidence to promote EBF through PDA	Highly confident enough	203(54.6)
	Medium	58(15.6)
	Lowly confident	92(24.7)

	Uncertain	19(5.1)
Perceived level of competency to implement or run the PDA	Highly competent enough	201(54)
	Medium	59(15.9)
	Lowly competent	81(21.8)
	Uncertain	31(8.3)
Importance of relevant others to promote/practice EBF	Yes, important	294(79)
	Not	48(12.9)
	I am not sure	30(8.1)

***** Employeed at private and non-governmental organizations.

4.4.2. Description of IOs measurement scales

Implementation outcomes (IOs) measurement scales were identified using PCA/EFA. Each emerged latent variable was named considering the common concept of items loaded to it. Fifty-two items having a communality of >0.50 were retained on nine components/scales. These were named as *acceptability, fidelity, appropriateness, feasibility, penetration, sustainability, adaptability, organizational readiness, and implementation cost* with 7, 7, 7, 6, 6, 4, 5, 5 and 5 items retained respectively. Sixteen (16) items were removed due to a commonality value <0.5. The other two items were removed due to cross-loading value of >0.4. An item with a highest mean score indicates that the item was highly rated in that scale. In this study, highly rated item with a mean score of 4.09±1SD was loaded to *acceptability*. In contrarly, an item with the lowest mean score (2.09±1.1SD) was loaded to *feasibility* scale/factor. The Cronbach alpha's reliability coefficients for these items loaded to *appropriateness, acceptability, fidelity, adaptability, penetration, implementation cost, feasibility, organizational readiness, and sustainability* were 0.964, 0.906, 0.920, 0.952, 0.887, 0.923, 0.840, 0.851, and 0.911 respectively. **(Table 4.20)**

Table 4. 20. Discriptive parameters (emerged scales) for the measures of implementation outcomes of PDA as an intervention to promote EBF, Jimma, 2020.

Measurement scales	**Items**	**Communalities**	**Loading**	**Mean (SD)**	**α**
Appropriateness (Factor 1)	This PDA seems proper /applicable to promote EBF	.952	.971	3.97(±0.9)	.964
	The PDA with informational counseling and social support service seems right at home level	.952	.971	3.97(±0.9)	
	The criteria used to select PDs are reasonable to work with PDA	.952	.971	3.97(±0.9)	
	The PD approach was fit for the purpose in promoting EBF	.952	.971	3.97(±0.9)	
	The PDA with informational counseling and social support service was useful/relevant	.847	.909	4.01(±1.0)	
	This PDA seems well aligned/ a good match with the objective	.847	.909	4.01(±1.0)	
	PDA seems suitable/compatible with the providers and client need	.547	.665	3.93(±1.2)	
Acceptability	Promoting EBF practice using the PDA is compatible with mother's interest	.728	.819	3.86(±1.1)	.906

(Factor 2)	This PDA is appealing/interesting	.733	.809	4.09 (±1.0)	
	The PDA is useful in promoting EBF	.648	.783	3.79(±1.3)	
	PDA is pretty good to have skillful promotors of EBF	.701	.767	4.06(±1.1)	
	This PDA is Okay to promote EBF	.660	.746	4.02(±1.2)	
	Promoting EBF practice using the PDA is suitable/fine	.615	.732	3.91(±1.0)	
	Promoting EBF through the PDA seems good enough (palatable)	.545	.679	3.75(±1.2)	
Fidelity (Factor 3)	There was information redundancy at different visit ®	.765	.808	3.93(±1.1)	
	Program participants complied to the program protocol	.680	.783	3.82(±1.1)	
	Dose or number of home visit for counseling was enough to initiate and sustain EBF practice	.763	.776	4.06(±1.1)	
	Emotional responsiveness (ability to respond empathically) during informational counseling was well considered as hall mark of this approach	.717	.765	3.79(±1.0)	.920
	Collecting signature of PD by the end-user/mother was well performed technique to follow performance	.735	.751	3.88(±1.0)	
	The PD approach would maintains its intended effects	.643	.724	3.80(±1.1)	
	The intervention was implemented as it was prescribed in the original protocol	.598	.706	3.95(±0.9)	
Adaptability (Factor 4)	Mother involved in the process can be a counselor in the future	.920	.889	2.35(±1.1)	
	Intention to practice EBF would be a fertile ground to inherit the PDA	.920	.889	2.35(±1.1)	
	The PD approach need additions of new components/services ®	.914	.881	2.32(±1.1)	.952
	The PD approach need major modification to promote EBF ®	.783	.797	2.49(±1.2)	
	The PDA would improve the uptake of EBF information	.709	.741	2.62(±1.2)	
Penetration (Factor 5)	The approach may not be successful through home visit ®	.728	.797	2.84(±1.2)	
	The approach may not go with the existing community structure®	.701	.777	2.85(±1.3)	
	Full engagement of participants is done to ensure reachability of the intervention	.686	.769	2.75(±1.3)	
	The spillover effect will increase the intervention's coverage in the community	.639	.729	2.75(±1.3)	.887
	Every eligible mother could be reached-out with such approach in urban setting	.598	.719	3.05(±1.2)	
	The approach is well integrated with the existing practice of urban HEP.	.598	.686	3.01(±1.3)	
Implementation Cost(Factor 6)	Implementing this approach is less costly in terms of cash	.892	.867	2.12(±1.2)	
	The cost (time and/or cash) that expended is more than the benefit got from this intervention ®	.892	.867	2.12(±1.2)	
	The cost of implementing this approach is less as compared to the social/health value to be promoted	.820	.841	2.26(±1.2)	.923
	Implementing this approach is less costly in terms of time	.685	.731	2.37(±1.1)	
	Refreshment cost/incentive is enough to refresh during intervention activities	.641	.713	2.49(±1.2)	
Feasibility (Factor 7)	This PDA seems workable/implementable	.646	.738	2.09(±1.1)	
	This PDA seems realistic/doable	.612	.728	2.20(±1.2)	
	The PDA seems practical at urban setting/Jimma Town	.603	.724	2.16(±1.2)	.840
	Number of visit is adequate but need to re-adjust its date ®	.581	.713	2.34(±1.1)	
	This PDA seems easy to promote EBF	.548	.670	2.47(±1.2)	
	The PDA seems viable/possible to promote EBF	.511	.593	2.47(±1.2)	
Organizational	Intervention participants (we) feel committed to implement	.748	.808	2.92(±1.3)	.851

Readiness (Factor 8)	PDA and confident in collective abilities				
	We program implementers/participants value the social support given to mothers	.745	.805	2.85(±1.3)	
	Resource availability matters as part of readiness for this new approach	.618	.679	2.95(±1.3)	
	There is cooperation among implementers in operating the new approach and ready for change	.547	.677	3.35(±1.2)	
	There is supportive community structure to use PDA	.584	.651	2.78(±1.2)	
Sustainability (Factor 9)	PDA is institutionalized within a community structure	.777	.776	2.97(±1.3)	.911
	PDA is maintained within a community	.759	.776	3.06(±1.3)	
	There is full community/ stakeholders support that are capable to run the program	.746	.761	3.13(±1.3)	
	Volinteerism is a centeral aspect of this approach that would support maintenance of the intervention	.749	.760	3.18(±1.3)	

® denotes as the response for that item was reversed before analysis, SD=standard deviation, α= Reliability coefficient

4.4.3. Summary measures for implementation outcomes

Implementation outcomes of the PDA as an intervention to promote EBF was summarized using the scale mean scores and the Total Variablity Explained(TVE) by the emerged components. The higher factor score created on a factor analysis indicates a higher degree of importance of that factor with regard to implementing PDA to promote EBF. The minimum mean score was belonged to *implementation cost* scale 11.37 (5.2SD), while the maximum mean score was for *appropriateness* scale 27.81 (6.5SD). The highest variance score (Var: 42.3) was also recorded to *appropriateness* scale which indicated that the response variance (change) in this scale was high. The overall mean score of the nine outcome measures was 164.18(26.8SD). The study participants highly rated *appropriateness* scale which is followed by *acceptability* scale. In contrarly, the lowly rated scale was *implementation cost.* These highest and lowest mean score implies the intervention participants hold a perception that the PDA to promote EBF is more likely appropriate, while costly to implement. The nine components/scales explained 72.1% of the total variability in psychometrically measured implementation outcomes of PDA. This is greater than the recommended cut-off point-60%. This means the implementation outcomes of the approach were well explained or measured by the nine emerged scales. Appropriateness, acceptability, fidelity, penetration, organizational readiness and sustainability scales were rated above the expected potential mean score, while they rated below the mean score for feasibility, adaptability, and implementation cost scales. This means, the PDA was perceived as appropriate, acceptable, fidable, penetrable, organizationally/structurally ready, and sustainable to promote EBF, while not feasible, adaptable, and costly. **(Table 4.21)**

Table 4. 21. Summary measures for implementation outcomes of PDA as an intervention used to promote EBF, Jimma town, 2020.

S.No	Measurment scale (N=372)	Mean	Std. Deviation	Variance	Total Variance Explained(TVE)
1.	*Appropriateness*	27.81	6.502	42.279	72.1%
2.	*Acceptability*	27.47	6.278	39.414	
3.	*Fidelity*	27.23	6.011	36.132	
4.	*Penetration*	17.26	5.910	34.924	
5.	*Organizational readiness*	14.85	4.907	24.074	
6.	*Sustainability*	12.33	4.403	38.824	
7.	*Feasibility*	13.73	5.248	27.536	
8.	*Adaptability/adoption*	12.14	5.132	26.338	
9.	*Implementation cost*	11.37	5.155	26.574	
Composite score (minimum score: 66 and maximum score:260)		164.18	26.817	719.171	
To be said highly rated, the scale mean score should be >50% of the raw score (No of item x5/2).					

4.4.4. Inter-scale correlation (relationship between outcome measures)

Multiple correlation tests were done between the measurement scales of implementation outcomes of PDA as an intervention to promote EBF practice. The findings from Pearson's correlation coefficients (r) showed that the majority of the psychometric measurement scales were significantly correlated with each other either positively or negatively with different level of strength. Implementation fidelity (r=.600, p< 0.01), penetration(r=.132, p< 0.05), organizational/community readiness(r=.195, p< 0.01), and sustainability(r=.265,p<0.01) scores were positively and significantly correlated with acceptability of the approach. Of these, acceptability score was strongly correlated with the implementation fidelity score. Except for appropraitness and implementation cost; all the remaining scales (feasibility, penetration, sustainability, adaptability, and organizational readiness) were significantly and positively correlated (weak to moderate) with the fidelity score. However, the perceived appropriateness score for PDA was only negatively correlated with two scales such as feasibility score (r=-.104, p<0.05) and sustainability score (r=-.161, p<0.01). Except for acceptability score, all the other scales' score were correlated (weak to moderate) with the feasibility score. Except for appropriateness score, all other constructs were positively correlated (weak to moderate) with the intervention penetration score. Sustainability score was negatively-weakly correlated with

appropriateness score, while positively-moderately correlated with the remaining all scales' score. The highest and lowest correlation with the sustainability score of the approach was that of perceived penetration (r=.500, p<0.01) and appropraitness (r=-.161, p<0.01) score respectively. Adaptability score of the approach was positively correlated with other six scales, of which it was strongly correlated with implementation cost (r=.517,p<0.01), while weakly correlated with implementation fidelity(r=.127,p<0.05). Organizational readiness score was positively correlated (P<0.01) with seven scales, except with appropraitness score. Among the five significantly correlated scales with implementation cost, the lowest positive and significant correlation was observed with sustainability scores (r=.314, p< 0.01). **(Table 4.22)**

Table 4. 22. Discriptive statistics and Pearson's correlation (relationship) coefficients between measurement scales used for implementation outcomes of PDA, Jimma town, 2020.

Variables/scales		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1.	Acceptability	1.00								
2.	Fidelity	.600**	1.00							
3.	Appropraitness	-.022	-.031	1.00						
4.	Feasibility	.099	.110*	-.104*	1.00					
5.	Penetration	.132*	.225**	-.101	.355**	1.00				
6.	Sustainability	.265**	.347**	-.161**	.372**	.500**	1.00			
7.	Adaptability	.050	.127*	-.039	.448**	.381**	.335**	1.00		
8.	Organizational readiness	.195**	.245**	-.091	.454**	.326**	.402**	.447**	1.00	
9.	Implementation cost	.049	.096	-.006	.396**	.427**	.314**	.517**	.332**	1.00
Number of items		7	7	7	6	6	4	5	5	5
Range (in score)		28	28	28	24	24	16	20	20	20
Number of respondents		372	372	372	372	372	372	372	372	372

****** Correlation is significant at the 0.01 level (2-tailed), and ***** Correlation is significant at the 0.05 level (2-tailed).

4.4.5. Characterizing the mean difference against selected background

OneWay ANOVA (or independent samples t-test) showed that except for some of the measurement scales, all the remaining scales' score were not significantly different by any of the background characterstics. In this table, the significant mean differences against the background characterstics only reported. Since there was no significant composite mean

diffence between any of these grouping variables, the respective mean values and F/T-statistics were not reported. The test showed that appropraitness mean score was significantly (F=27.18 and M=30.49; p=0.000) different between male and female participants.The mean score for implementation scale was significantly different between those who can't read & write and can read & write with/out formal education.The mean score for perceived acceptability, fidelity, feasibility and organizational readiness scales were significantly different between facilitators and end-users as a role played during implementation. However, the mean score for appropraitness scale was significantly different between counsellors (PDs=change agent) and end-users. Also the mean score for implementation cost scale was significantly different between those who perceived themselves as highly/actively engaged and lowly engaged during implementation period. **(Table 4.23)**

Table 4. 23. The scale mean difference by background characterstics of the study participants, a follow-up study, Jimma town, 2020 (significant differences only reported).

Scale with grouping variable	**M(SD) with 95%CI**	**F/T-statistics(df)**	**p-value**
Appropraitness by sex			
Female (n=301)	27.18(6.9); 26.39-27.96	-3.941(df=370)	0.000
Male (n=71)	30.49(2.9); 29.81-31.17		
Implementation cost by educational status			
Can't read & write at all (n=101)	11.17(5.1); 10.16-12.18		
Can read & write without formal education(n=38)	13.669(5.4); 11.87-15.45	4.247 (df=369)	0.033
Can read & write without formal education(n=38)	13.669(5.4); 11.87-15.45		
Can read & write with formal education (n=233)	11.099(5.1); 10.43-11.74	4.247 (df=369)	0.013
Acceptability by their role-played during implementation			
Facilitator (n=105)	26.10(6.1); 24.92-27.29		
End-user (n=254)	28.07(6.3); 27.28-28.85	3.787(df=369)	0.021
Fidelity by their role-played during implementation			
Facilitator (n=105)	25.69(5.7); 24.59-26.78		
End-user (n=254)	27.80(6.1); 27.04-28.56	5.002(df=369)	0.007
Appropraitness by their role-played during implementation			
Counsellors/change agent(n=13)	33.54(1.9); 32.37-34.71		
End-user (n=254)	27.46(7.6); 26.51-28.40	5.580 (df=369)	0.003
Feasibilty score by their role-played during implementation			
Facilitator (n=105)	15.01(5.5); 13.94-16.08		
End-user (n=254)	13.15(5.1); 12.52-13.77	5.021(df=369)	0.006
Organizational readiness by their role-played during implementation			
Facilitator (n=105)	16.27(4.4); 15.42-17.11	6.668(df=369)	0.002

End-user (n=254)	14.35(4.9); 13.72-14.98		
Implementation cost by perceived level of engagement			
Highly/actively engaged (n=202)	10.99(5.2); 10.27-11.71		
Lowly engaged(n=42)	13.40(4.8); 11.92-14.89	3.890(df=369)	0.017
Appropraitness by perceived level of confidence to promote EBF using PDA			
Highly confident enough (n=203)	28.31(6.5); 27.41-29.20		
Uncertain (n=19)	21.11(8.9); 16.82-25.39	9.616(df=368)	0.000
Medium (n=58)	29.55(3.4); 28.66-30.44		
Uncertain (n=19)	21.11(8.9); 16.82-25.39	9.616(df=368)	0.000
Lowly confident(n=92)	27.00(6.7); 25.62-28.38		
Uncertain (n=19)	21.11(8.9); 16.82-25.39	9.616 (df=368)	0.001

4.4.6. Explained variation among IO measures

In addition to identifying the mean differences, the explained variation (interdependency) among those moderately to strongly correlated scales was checked using coefficient of determination (r^2). Accordingly, less than half of the variation (36%) in the acceptability scale score was explained due to the implementation fidelity. Among all the explained variations between the measurement scales, the maximum variation explained was observed between acceptability of the approach and implementation fidelity. The next highest explained variation was seen between adaptability of the approach and its perceived implementation cost. This means the variation observed in adaptability score was due to the implementation cost that is explained by 26.7%. Worth to explain, quarter of the variation (25%) in the penetrability of the PDA intervention was due to the sustainability score as perceived by the study participants. As we can see in the table, the minimum coefficient of determination/variation explained (r^2) was observed between sustainability and implementation cost scales, in which 9.9% of the variation in sustainability score was due to the perceived implementation cost of the approach. The minimum variation explained implies that the intervention participants were not much worried about the implementation cost while rating the sustainability of the approach. (**Table 4.24)**

Table 4. 24. Explained variation (interdependency) of scales among those moderately to strongly correlated once, a follow-up study, Jimma town, 2020.

S.No	Correlated measurement scales	r**	r^2	%
1.	Acceptability*fidelity	.600	0.360	36.0%
2.	Fidelity*sustainability	.347	0.120	12.0%
3.	Feasibility*penetration	.355	0.126	12.6%
4.	Feasibility* sustainability	.372	0.138	13.8%
5.	Feasibility* adaptability	.448	0.201	20.1%
6.	Feasibility*organizational readiness	.454	0.206	20.6%

7.	Feasibility* implementation cost	.396	0.157	15.7%
8.	Penetration* sustainability	.500	0.250	25.0%
9.	Penetration*adaptability	.448	0.201	20.1%
10.	Penetration* organizational readiness	.326	0.106	10.6%
11.	Penetration* implementation cost	.427	0.182	18.2%
12.	Sustainability* adaptability	.335	0.112	11.2%
13.	Sustainability* organizational readiness	.402	0.162	16.2%
14.	Sustainability* implementation cost	.314	0.099	9.9%
15.	Adaptability* organizational readiness	.447	0.200	20.0%
16.	Adaptability * implementation cost	.517	0.267	26.7%
17.	Organizational readiness * implementation cost	.332	0.110	11.0%

****** Correlation is significant at the 0.01 level (2-tailed)

4.5. Cost-effectiveness of PDA in promoting EBF: Using a Mixed Decision Model

4.5.1. Baseline characteristics of mothers

The response rate was 98.8% (257/260) at the end-line to assess HRQoL of the mothers who were enrolled into both arms, while the baseline variables were measured with 100% response rate. At baseline, there were no statistically significant differences between the two groups along with socio-demographic characteristics except occupational status with different proportion in both arms (P=0.001). In addition to this, there were no statistically significant differences with obstetric variables such as parity, baby's sex preference, place and mode of delivery between the two groups. However, the proportion of ever-breast fed (P=0.000), and EBF (P=0.001) at the end-line survey was significantly different between the two arms. **(Table 4.25)**

Table 4. 25. Comparing the background characteristics and BF related practices between the two arms, an interventional study, Jimma Town, 2018.

Variables		**Intervention Group (IG): N(%)/(Mean ± SD)**	**Control Group (CG):N(%)/(mean± SD)**	**P-value**
Age		25.9 ±3.7	25.2±4.3	0.135
Religion	Orthodox	55 (42.3)	53 (40.8)	0.192
	Muslim	51 (39.2)	51 (39.2)	
	Protestant	22 (16.9)	16 (12.3)	
	Catholic	1 (0.8)	4 (3.1)	
	Other*	1 (0.8)	6 (4.6)	
Ethnic group	Oromo	58 (44.6)	58 (44.6)	0.068
	Amhara	31 (23.8)	25 (19.2)	
	Yem	16 (12.3)	27 (20.8)	
	Dawuro	13 (10.0)	4 (3.1)	
	Kaffa	8 (6.2)	7 (5.4)	
	Other**	4 (3.1)	9 (6.9)	

Marital status	Married	127 (97.7)	123 (94.6)	0.388
	Divorced	1 (0.8)	4 (3.1)	
	Widowed	0 (0.0)	1 (0.8)	
	Single	2 (1.5)	2 (1.5)	
Educational Status	Illiterate	42 (32.3)	34 (26.2)	0.340
	Literate	88 (67.7)	96 (73.8)	
Occupational status	Housewife	42 (32.3)	27 (20.8)	0.001
	Merchant	37 (28.5)	58 (44.6)	
	Student	2 (1.5)	19 (14.6)	
	Govt. employee	45 (34.6)	20 (15.4)	
	Other ***	4 (3.1)	6 (4.6)	
Monthly income (ETB)[#] (overall median=800)		1112 ± 1104.7	1297.9 ±1448.2	0.246
Parity (overall median=1)		1.5± 0.8	1.3±0.6	0.065
Preference for sex of the baby	Not prefer	85(65.4)	79(60.8)	0.570
	Prefer-F	24(18.5)	23(17.7)	
	Prefer-M	21(16.2)	28(21.5)	
Place of delivery	HI	108(83.1)	104(80)	0.125
	Home	22(16.9)	26(20)	
Mode of delivery	VD	111(85.4)	114(87.7)	0.144
	C/S	19(14.6)	16(12.3)	
Ever breastfed for this infant	Yes	128(100)	100(77.5)	0.000
	No	0(0.0)	29(22.5)	
EBF for the first 6 months	Yes	65(50.8)	40(31.0)	0.001
	No	63(49.2)	89(69.0)	

Other*=Adventist, Joba Other**=Guragie, Silte, Tigrie Other***=self-employed, farmer, private sector employee, [#]1USD=27.24ETB during the study period

4.5.2. Comparison of composite mean by background characteristics

One way ANOVA and independent samples t-test was done to see the variation against the background characteristics of mothers as a sub-group analysis considering the composite mean score as an outcome variable. There was no significant composite mean difference between categories of different socio-demographic and obstetric characteristics of mothers who enrolled into both arms. However, there was statistically significant mean difference between those who ever-breastfed and not (P=0.024), and EBF practitioners and not (P=0.000) at the end-line. The composite mean score for those who ever breast-fed and exclusively BF mothers was higher as compared to their counterparts; 131.7 (SD20.6), and 136.7(SD20.4) respectively. This higher mean score indicates that those mothers who practiced EBF have higher HRQoL during the first 6 months of post-partum period. **(Table 4.26)**

Table 4. 26. Comparison of HRQoL composite mean score by mothers' background characteristics and BF related practices (pooled data from both arms, n=257).

Background characteristics (n=257)		**N**	**Mean**	**SD**	**P-value**
Age (in years)	15-29years	205	130.1	21.3	0.347
	30-49years	52	133.1	18.6	
Religion	Orthodox	107	129.8	20.3	0.301
	Muslim	100	131.3	20.8	
	Protestant	38	134.7	21.5	
	Catholic	5	115.8	27.8	
	Other	7	124.6	18.3	
Ethnic group	Oromo	114	132.9	19.3	0.098
	Dawuro	17	140.1	18.3	
	Kaffa	15	125.0	21.8	
	Amhara	56	129.7	21.5	
	Yem	42	126.6	24.2	
	Other	13	123.3	15.8	
Marital status	Married	247	131.2	20.9	0.242
	Divorced	5	117.4	9.8	
	Widowed	1	103.0	.	
	Single	4	125.5	19.5	
Educational status	Can't read and write	75	131.9	22.2	0.549
	Can read and write	182	130.2	20.2	
Occupational status	House wife	68	132.2	23.2	0.054
	Merchant or trader	94	130.4	19.2	
	Student	21	122.7	16.2	
	Gov't employee	62	134.5	21.0	
	Other	12	119.3	19.6	
Monthly income	0-3000birr	244	130.7	20.8	0.665
	>=3001birr	13	131.3	22.5	
Parity	Multipara	234	130.1	20.6	0.122
	Grand-para	23	137.1	22.0	
Sex preference of the baby	Not prefer	163	128.5	20.2	0.083
	Prefer-F	46	134.6	19.7	
	Prefer-M	48	134.4	23.0	
Place of delivery	Health institution	210	129.7	20.7	0.122
	Home	47	134.9	21.0	
Mode of delivery	VD	223	130.1	20.1	0.204
	C/S	34	134.9	24.5	
Ever breast fed for this infant	No	29	122.5	20.7	0.024

	Yes	228	131.7	20.6	
EBF for the first 6 months	No	152	126.6	20.1	0.000
	Yes	105	136.7	20.4	

4.5.3. Cost, infant health outcome(DALYs) and ICER

Out of all enrolled (IG=130, CG=130), 128 of the mother-infant pairs completed the intervention, while 129 finished the follow in the control arms. All mother (128) received the allocated intervention from the PDs with a total of 6 visits per the protocol. As we reported above, most of the baseline characteristics were not significantly different between the arms. Although the baseline characteristics of mothers who lost-to-follow-up was analyzed, BF related practices were not known at 3rd and 6th month of post-partum.

The total cost of the PDA intervention as part of the trial for the 7 months (1 month pre- and 6 months post-delivery) was 760.1USD. The intervention costs were direct project expenses and indirectly time-value estimated costs such as PDs' recruitment and PD inquiry process, training and workshop, supervision, PDs counseling and supporting services, mothers received the counseling/support cost. The other similar costs for both arms were the baseline cost (8HEPs were available per arm whose total basic salary was 11,012USD for 6 months; 229.4USD per person/month), and the research costs (4678.45USD per arm). The average (per mother) cost in the intervention arm was 5.9USD more than the usual care (SOC). The total and average (per person) incremental cost of the added intervention was also 760.1 and 5.9USD respectively over a 7-months period. Keeping the baseline DALY constant, the total and mean incremental DALY of the intervention estimated/modeled was 8.0 and 0.40 respectively over 59months. However, the incremental DALY over 6 months (0.01) was less than to that of 59 months (0.40).This indicates that the health benefit of promoting EBF intervention using PDA is more detectable as the time goes forward till 5 years. In both timeframes, the PDA intervention was effective in reducing the infants' DALYs. In sum, the ICER was 14.75/DALYs averted which imply that to avert each extra DALYs for infants using the PDA, the health system need to cost 14.75USD. Each extra DALYs averted by this intervention relative to the usual care costed such amount of US dollar. The mean difference in DALYs (0.4) indicates that 60% of the first five years lived were free from diarrhea, pneumonia and related deaths among those infants who EBF with the PDA intervention as compared to their counterparts. **(Table 4.27)**

Table 4. 27. Cost, infant health outcome (DALYs) and ICER, PDA intervention to promote EBF, Jimma, 2018.

Intervention activities/costing	Cost							DALYs averted				ICER
	Quantity	Valuation	IG (PDA; n = 128)		CG (SOC; n = 129)			Time	PDA (mean)	SOC (mean)	Mean diff.	
	Unit	Average price (USD)	no	cost (USD)	no	cost (USD)	Diff (IG - CG) (USD)					
Direct intervention cost												
PDs recruitment and PDI process*	Person	6.60	13.0	85.8	0	0	85.8					
Training and workshop costs**	Sessions	17.53	9.0	157.8	0	0	157.8					
Supervision	Full days equivalent	11.59	24.4	282.5	0	0	282.5	**Baseline**	1.00	1.00	----	
Indirect costs (time value estimated)												
PDs (counselors)	Full days equivalent	1.60	73.1	117.0	0	0	117.0					
Mothers' received counseling/support	Full days equivalent	1.60	73.1	117.0	0	0	117.0	***6months***	0.86	0.85	0.01	
Total cost (from health system perspective)				**760.1**	**0**	**0**	**760.1**					
Average cost				**5.9**	**0**	**0**	**5.9**	***59months***	**8.00**	**7.60**	**0.40**	**14.75$^{\Delta}$**
Other direct costs (not considered in the above analysis because of similarities in both arms/groups)												
Baseline average cost-salary (n=8)	Person/month for 6 months		11,012		11,012		0	----------				
Research cost***	Person/days and materials		4678.45		4678.45		0					

**PD inquiry and recruitment including evaluating PDs, orientation, HEPs time, Supervision*

***Training and workshop (cost for trainees, trainer and logistics): session is a half day activity*

****Training, logistics including refreshment, guideline development, pre-test, data collection, supervision, data entry, materials printing, communication, review meeting, preliminary and main findings dissemination costs.*

Δ calculated as ICER=Δcost/Δeffect=5.9/0.4

SOC denotes that the usual routine community based services given by UHEPs

4.5.4. Sensitivity of the cost and infant health outcome (DALYs)

Sensitivity analyses were done to see the variation in average cost, DALY and ICER value. The first analysis was done by discounting 0-1%, next by discounting and adding 5% of the average cost, finally keeping the cost constant and discounting the DALYs by 3%. These analysis revealed the variation of ICER from 14 to 15.9/DALY. This shows the best ($14) and worst ($15.9) cost per DALYs to be averted. This was done with an assumption of the single PD assigned for 10 mothers should be continued if the health system wants to adapt. Considering this, the best and worst scenarios were applied from 0-5% discounting and adding to the cost incurred, keeping the activities and number of participants in the intervention constant. This analysis was also done for the major/dominant sources of cost of the intervention to see the cost per person and ICER variation. Therefore, the PDA is less costly and more effective while discounting the overall cost by 5% and keeping the DALYs constant. The sensitivity analysis showed that the addition of the PDA intervention is the best strategy if the cost is $14/DALY. At the cost of $5.6 and 0.39DALYs, the intervention was less costly and more effective than the control. **(Table 4.28)**

Table 4. 28. Sensitivity analysis for the cost and infant health outcome/DALYs, interventional study, Jimma, 2018.

Manipulation of variables/cost	**Incremental cost(USD)**	**Incremental DALYs**	**ICER ($/**DALYs averted)
Considering the estimated cost as it is (0% discount) and 1% discount	5.9	0.4	14.75
5% discounting the overall cost (best scenario)	5.6	0.4	14
5% increasing the overall cost (worst scenario)	6.2	0.4	15.5
5% discounting the dominant costs (supervision, training and workshop costs)	5.8	0.4	14.5
5% increasing the dominant costs (supervision, training and workshop costs)	6.1	0.4	15.3
5% discounting the overall cost and 3% discounting DALYs	5.6	0.39	14.4
5% increasing the overall cost and 3% discounting DALYs	6.2	0.39	15.9
Considering the cost to be constant and 3% discounting DALYs	5.9	0.39	15.1
Deviation by 3-5% manipulation of cost and outcome	**5.6 to 6.2/infant**	**0.39 to 0.40**	**14 to 15.9**

4.5.5. Cost, maternal QALYs, ICER and sensitivity to change

As we have reported above, the total cost of the PDA intervention was 760.1USD. The average (per mother) cost of the intervention was 5.9USD. The total and average (per person) incremental cost of the added intervention was also 760.1 and 5.9USD respectively. The mean incremental QALY of the intervention was 0.18 (ranged from 0 to 1) over 7 months of intervention. The ICER was 32.8/QALY gained. This means to gain each extra QALY, the health system need to run the PDA intervention as an added strategy and invest an incremental cost of 32.8 US dollar. **(Table 4.29)**

Sensitivity analyses were done to see the variation in cost, mean difference and ICER value. The analyses were done by discounting and adding 0-5% of the average cost. Finally, keeping the cost constant and discounting the QALYs by 3.5%. These analysis revealed the variation of ICER from 31.1 to 36.5/QALY. This shows the best and worst cost per QALY to be gained. The assumption to this analysis was as of the sensitivity analysis reported above. The sensitivity analysis was also done for the major/dominant sources of cost of the intervention to see the variation. Therefore, the PDA is less costly and more effective either discounting the overall cost only or discounting both overall cost and QALYs by 5% and 3.5% respectively. The sensitivity analysis showed that the addition of the PDA intervention is the best strategy if the cost is $31.1/QALY, while become the worst if it is 36.5/QALYs. **(Table 4.29)**

Table 4. 29. Cost, maternal QALYs, ICER and sensitivity analysis for the first 6 months, PDA intervention to promote EBF, Jimma, 2018.

Variable	**Incremental Cost(IG–CG) ($)**	**Incremental QALYs (mean Diff.)**	**ICER ($/QALY gained)**
Direct cost	526.1	-----	32.8/QALY gained
Indirect cost	234.0		
Total change in cost	760.1		
Average cost/mother	5.9	0.18	
Sensitivity analysis			
5% discounting the overall cost (best scenario)	5.6	0.18	31.1
5% discounting the overall cost (worst scenario)	6.2	0.18	34.4
5% discounting the dominant costs (supervision, training and workshop costs)	5.8	0.18	32.2
5% increasing the dominant costs (supervision, training and workshop	6.1	0.18	33.9

costs)			
5% discounting the overall cost and 3.5% discounting QALYs	5.6	0.17	32.9
5% increasing the overall cost and 3.5% discounting QALYs	6.2	0.17	36.5
Considering the cost to be constant and 3.5% discounting QALYs	5.9	0.17	34.7
Deviation by 3.5-5% manipulation of cost and/or outcome	**5.6 to 6.2/mother**	**0.17 to 0.18**	**31.1 to 36.5**

4.5.6. Scale mean differences

Scale-based mean comparison was done using independent samples t-test. There was significant mean differences between the intervention and control arms with mobility and social activity (p=0.000), self and infant care (p=0.000), and anxiety and depression scales (p=0.000), while no mean differences with daily home activity (p=0.237), and pain and discomfort (p=0.828) scales. However, the overall composite mean score (p=0.000) and percentages scale mean score (p=0.000) were significantly different between the two arms. The highest mean difference-incremental mean score (mean=11.9; 95% CI: 9.96, 13.80) was observed on anxiety and depression scale between the mothers who were enrolled into the two arms. This was followed by the mobility and social activity scale mean score (mean=8.5; 95% CI: 6.81, 10.22) difference. The lowest mean difference (mean=-0.1; 95% CI: 0.56,-1.23) was observed in relation with pain and discomfort scale between the arms. Mothers enrolled into intervention arm reported higher HRQoL as compared to the control group, except for the mean score of pain and discomfort scale to which they scored less. Overall, the intervention increased the PSMS/HRQoL measure of each mother by 25.2 (95% CI: 21.1, 29.3). This means it can increase their QALY by 18% (95%CI: 15.1, 20.9) considering as it was the same for both arms at baseline in the absence of this intervention. Hence, applying the PDA intervention to promote EBF, an incremental cost of $81.9 ($14.75/0.18QALYs) needed to improve maternal QALY by one during the first 6 months of post-partum. The DID (net effect of the intervention) was 0.18QALYs.**(Table 4.30)**

Table 4. 30. Comparison of HRQoL mean scores between the two arms using five domains/scales (EQ-5D), interventional study, Jimma, 2018; (endline life quality assessment).

HRQoL measuring scales	**IG (n=128)** Mean(SD)	**CG (n=129)** Mean(SD)	**Mean difference (95% CI)**	**P-value**
Mobility and social activity	36.2(5.3)	27.7(8.2)	8.5(6.81, 10.22)	0.000

Self and infant care	34.4(3.9)	30.1(8.0)	4.2(2.67, 5.77)	0.000
Daily home activity	19.0(4.5)	18.3(5.2)	0.7(-0.47, 1.89)	0.237
Pain and discomfort	19.2(4.3)	19.3(4.7)	-0.1(0.56,-1.23)	0.828
Anxiety and depression	34.6(5.9)	22.7(9.3)	11.9(9.96,13.80)	0.000
Composite score	143.3(15.5)	118.1(17.5)	25.2(21.1, 29.3)	0.000
PSMS (in %)	77.4%	59.4%	**18%**(15.1, 20.9)	0.000

4.5.7. Magnitude of the intervention effect on maternal HRQoL

Simple linear regression was done to identify the candidate variables. All the background characteristics were checked with the value of QALYs calculated as PSMS of HRQoL considering for 6 months of post-partum. Then these candidates with p-value of<0.25 were fitted into the mixed-effects linear regressions model. The model identified as the intervention variable was a significant predictors of PSMS of HRQoL. The model explained the outcome variable by 45.8% (adjusted R Square=0.458). Mixed-effects linear regression model was fitted by adjusting for occupational status, ever breast fed and EBF practice which were significantly different between the arms. The PSMS of HRQoL (QALYs) was 0.674 times higher among mothers in the intervention group as compared to their counter parts in the first 6 months of post-partum period. **(Table 4.31)**

Table 4. 31. Mixed-effects linear regression model fitted to identify the effect size on improving maternal QALYs gained, intervention study, Jimma, 2018.

Predictor	**Comparators**	**Estimate (Beta)**	**95% CI**	**P-value**
Intervention as a variable	Intervention	.674	(0.239, 1.109)	0.019
	Control (Ref.)			

R=.690, R-Square=.476, Adjusted R Square= .458, Intercept=0.777, Dependent variable=PSMS, P-value significant at <0.05.

Chapter Five

5. Discussion

In this section, key findings from each study were explained, compared, and implied at program level. In addition, interrelated findings from those five studies were conceptualized and discussed from theoretical and practical perispectives. Moreover, detail discussion was made based on each study objectives [under sub-headings] including their implication, limitation and strengths.

Suboptimal BF affects entire life and adversely affects next generation (191). Out of the current nutrition strategies, enhancing timely and exclusive BF through informational counseling and social support based on behavior change principles was recommended (192). Based on this, we designed a community-based participatory approach integrated with PDA that was added to the existing care for the intervention group. The effectiveness of the PDA to improve TIBF and EBF was tested in a cluster randomized trial. To better understand how implementation of this approach led to the positive client, behavioral and health outcomes were also measured and estimated including its cost-effectiveness.

From the evaluation of the effect of PDA–guided intervention on EBF and ideations factors, using as a new intervention strategy through identifying PDs to cousel, support and share lived experiences can substantially improves knowledge, attitude, and self-efficacy (skills of BF) of mothers. In the same way, EBF and TIBF practices were improved in the intervention group as compared to the routine community-based services. In addition, the time to initiate BF and the median time were also shortened in the intervention group as compared to the control group.

This study demonstrated that using PDs who were directly identified from the community and qualified with theoretical and practical training successfully improved these practices in urban settings. Positive deviance-led informational counseling and support intervention significantly increased TIBF by 27.3% and EBF by 18.2%, compared to routine healthcare service. At follow-up, mothers in the intervention group were 2 times more likely to practice EBF compared to those in the control group while no significant difference at baseline. There were positive changes in all standard indicators of BF practice for the intervention group such as duration of feeding, frequency of feeding, and timely initiation of complementary feeding practices. The timely initiation survival probability was increased by 25% (control groug-40%, while intervention group-65%) in the intervention group compared to the counterparts. Therefore, the PDA resulted in a significant improvement in primary and secondary outcome of this study. This

study revealed that PDA can ensure TIBF within the first hour of life and EBF for the first 6 months. These are consistent with other studies report (193–197). Our findings were also in line with the few RCTs conducted in Sub-Saharan African countries such as Malawi, Kenya, and the PROMISE EBF trial (194–196).

The highest success of the PDA intervention was in improving TIBF, EBF, and self-efficacy which could be explained by several reasons. Firstly, scientific reports showed that cognitive and affective domain changes alone may not bring change in behavioral outcomes (198,199), rather self-efficacy would help. In this interventional study, mothers who received PD's support with a minimum of 6 visits as per the schedule. In addition, since the risk of breaching EBF may happen in the first day of delivery, the first two visits took place on before delivery and on the date of delivery. Furthermore, they delivered practical support during the scheduled or with extra visits if the women experienced any EBF problem. Thus, the timing, type and intensity of support received may have helped to build the mothers' confidence, improve feeding technique, and prevent or resolve breastfeeding problems. This can be supported by the theory of behavior change where others in the community copy the behavior of others (200).

Moreover, according to the theory of planned behavior, people tend to perform certain behaviors when they believe as their "relevant others" think they should perform (201). Hence, based on this fact, PDs came from the community; work for and with the community and to the community with involvement of key releveant others. The positive changes in knowledge, attitude and self-efficacy may help for a behavior change with the availability of social support (202). This means, as reflected in the theory of planned behavior, the intervention provided using PDA might have influenced the mothers to understand what meant by EBF and its benefits, to develop a positive attitude, to have demonstrable self-efficacy and a greater sense of confidence and commitment, might lead them to the adoption of the behavior (201,203). In contrary, other evidences showed that knowledge, attitude, and self- efficacy are not a garantee for practice rather might be necessory (204). However, if the intervention on ideation factors integrated with practical social support and arrangement of enabling factors highly influence the practice (205). Even though predicting the final behavior is complex, this research provides directions to nutrition education programs to tailor their content to the context and be more efficient in intervention by using volunteer from the community to contribute to the improvement of EBF and TIBF.

Paradoxically, the positive findings in this study refute reports of communitywide interventional studies conducted in Australia and Gutemala (206,207). These studies revealed that there was no significant difference observed on initiation and exclusiveness of BF, although there was increment in the proportion of EBF which suggested that communitywide programs become more effective over time. However, in our study, the PDA was effective both at midline and end-line times. We argue that an effective community-based intervention demands appropriate design, and consideration of the context to which PDA fit. We have ensured this by our participatory design while planning the intervention at the community level. In addition, implementation fidelity might be one of the contributing factors for the observed effectiveness in our study. Our team exerted maximum efforts to ensure sufficient time and dosage of the intervention. Hence, the good adherence and compliance to the protocol might help us to celebrate its effectiveness. To achieve optimal BF practices, giving equal or prior attention to social factors of women about BF is needed as of addressing systemic and health factors. Moreover, assessing implementation outcomes such as acceptability, feasibility, appropriateness, fidelity and sustainability, client outcome (users' satisfaction) and cost-effectiveness helped us more to understand the process.

The intervention significantly shorted the median time (1 hour) to initiate BF among the intervention group. This implies that most of the mothers in the intervention group initiated BF at one hour which is recommended by WHO (50) and also similar to the pooled prospective data analyzed and reported by WHO (58). In addition, the maximum time of initiation was short in the intervention group (26 hours) while longer in the control group (36 hours). On the other hand, the number of mothers who initiated BF within the first hour among intervention group was significantly higher than the numbers in the conrol group. This finding was supported by a study conducted in Bangladesh which reported the median time to initiate BF was 38 minutes (76). Even if the median values such as 1 hour in our case and 38 minutes in Bangladesh case different, both are in the same range of the recommended time of initiating timely BF. This is also in-line with what was reported from rural Ethiopia as the BF education and support was effective in initiating timely BF (208). The reason for this success might be due to sufficient time-response and partnership building with mothers, relevant others and implementers. Hence, we can conclude that additional community-based support using PDA with a participatory design involving the community members, implementers, and implementation designers is effective in

improving TIBF. The survival probability of timely initiating BF was also improved in in the intervention group. This means the risk of delayed initiation of BF was reduced as compared to the control group. This finding supported by another study which revealed there was a higher probability of timely initiation if mothers supported (209). Although it was not significant, there was also improvement in the control group. To understand this, pooled proportion of TIBF was analyzed to identify predictors other than the intervention variable by controlling information contamination (main source of BF information at endline). These predictors would enable us to explain why improvement was observed in both groups.

Breastfeeding is very important for both parties (mother and child). BF not only prevents the child from various health problems but also it is a protective for the mother such as from breast cancer, breast pain and engorgement and unplanned pregnancy. However, such practices are not as expected especially in urban setting which pose serious health risks to both parties. However, most of the studies conducted globally regarding BF practices are cross-sectional, rather should be interventional. Those studies identify the gaps in ideation factors (poor knowledge, beliefs and subjective norms) and recommend that health professional should work on this during antenatal follow-up or after delivery. This study was unique as we did a trial targeting multiple outcomes by the help of PDs keeping the basic principles of PD inquiry. However, in our case, the proportion of EBF (50.8%) practice at 6 month was less as compared to the study reported from India (65.7%), while the proportion of TIBF (60.5%) was comparable with what reported from the same study (60%) (128). But the net changes in both variables were higher in our case compared to that study. Comparably, many of the interventional and cross-sectional studies around the globe documented as we can change knowledge of BF significantly using different interventions strategies and applying a tailored means of communication(128,210–212). However, impacting the subsequent behavioral chains such as attitude, self-efficacy, behavioral intention and the actual behavior need rigorous and intensive and systematic community-based interventions are relevant.

In addition to measuring the effectiveness of PDA on behavioral outcomes (EBF and TIBF), we also assessed the end-users satisfaction and the multi-level predictors that explain the variability. This is because of out of the intermediate results of a certain intervention, satisfaction is the main measure from the end-user perspective that is why we conceptualized and measured it (22,24,117) to understand whether the intervention satisfied them. Measuring intermediate

service outcomes can address both the concern of program responsiveness, client responsiveness, and the interaction towards each other (117). However, in this study, we measured only client responsiveness (user's satisfaction) which is the reflection of both. Client satisfaction represents a complex mixture of perceived need, individually determined expectations, and experience of care/service received from the PDA intervention which could be health or non-health-related matters (24,118). User satisfaction is one of the main proxy indicators of service outcome measurement (24). In this study, more than half of the users of the PDA as an intervention to promote EBF were satisfied. Of the emerged satisfaction measuring scales, the PSMS for user empowerment scale was the highest. Higher satisfaction score implies the higher responsiveness of the approach to the needs of the mothers and their relevant others in practicing and promoting EBF. This concept was supported by a study conducted elsewhere (185). The overall level of satisfaction observed in our study is less compared to the baby-friendly interventional study reported from Norway (76.2%)(213). This discrepancy might be due to the setting (urban and rural) difference; in our case, the urban community might expect more that would affect their level of satisfaction. In addition, the approach difference might be also a reason. In our case, it is a community-based approach (by, from, and to the community) unlike the other's in which they followed a mixed approach (facility and community-based approach). Worth to report, in our study, the user satisfaction was highly explained (84.2%). Measuring and understanding this intermediate service outcome and its multi-level predictors would improve the quality of decisions about the use of the PDA-guided intervention. This means we can understand what to consider, how, and on whom the PDA be implemented effectively to the satisfaction of the end-users. Our findings indicated that end-user satisfaction was predicted by multi-level factors such as individual-level, community-level and mixed-effect factors. Considering these factors will help to achieve the desired outcome such as EBF and TIBF (22,24,25,115), in turn the health outcomes. The observed level of satisfaction with PDA might be one of the reasons for the effectiveness result we reported. Therefore, to use PDA as an intervention to promote EBF, the two-level factors should be considered to satisfy mothers and their relevant others, with especial focus to the community-level factors.

Moreover, we intended to assess and develop specific scales related with implementation outcomes of PDA as an intervention to promote EBF. This enabled us to understand more in depth about the implementation process in addition to assessing the end-users satisfaction. Our

aim is supported by other scholars (214) who argue that measures need to be pragmatic if they are to be useful outside the context of research. Among the pragmatic features of these measures, psychometric strength, actionability, conceptual and content clarity and relevance to stakeholders are considered in our study. It was developed with experts and stakeholders' input and therefore might reflect what stakeholders view as important. We worked with experts to comment these measures, with the goal of developing new scales that can be used to assess the pragmatic nature of the PDA intervention outcomes with psychometric properties that fit for the context (133). As part of this assessment, valid and reliable measurement scales were developed. The nine newly developed scales (with a total of 52 reliable items) were acceptability, fidelity, appropriateness, feasibility, penetration, sustainability, adaptability, organizational readiness, and implementation cost. For those valid and reliable items, the mean score was determined to understand the degree of importance as rated by intervention participants. An item with a highest mean score indicates that the item was highly rated in that scale. In this study, highly rated item was loaded to acceptability scale/factor, while an item with the lowest mean score was loaded to feasibility scale. Beside the variation in score (degree of rate), all valid items were internally consistent (reliable) to measure implementation outcomes of PDA to promote EBF practice. Scholars agreed that the development of such tested measurement scales would advance implementation science, especially in conducting a new intervention (29,93,136).

Implementation outcomes of PDA were summarized using the scale mean scores and the TVE by the emerged components. The higher factor score created on a factor analysis indicates a higher degree of importance of that factor with regard to implementing PDA to promote EBF. The maximum mean value was determined for appropriateness scale and the highest variance was belongs to it. The respective mean values indicated that the study participants highly rated appropriateness and acceptability scale, while lowly rated implementation cost scale. These highest and lowest mean score implies the intervention participants hold a perception that the PDA to promote EBF is more likely appropriate and acceptable, while costly to implement. In sum, the nine contextually developed scales explained 72.1% of the total variability in psychometrically measured implementation outcomes of PDA. This means these outcomes are well measured by these scales. The findings showed that majority of the scales' mean were considerably rated above the expected score (>50% of the respective potential score), while feasibility, adaptability, and implementation cost scales were rated below. This means, the PDA

was perceived as appropriate, acceptable, doable (implementable as planned with quality), penetrable through organizationally/structurally ready community setting, and sustainable to promote EBF, while it was not feasible, adaptable, and costly. This negative perception to some scales might be due to much of the intervention activities were conducted through volunteerism and minimal incentives, beside the deviance inquiry process is time demanding and need much effort to adapt to the context (93,128). Many of the highly rated scales were more theoretically relevant and can be judged from mere understanding about PDA from the inception training, whereas those all lowly rated scales might be due to the perception developed through practical experience. However, lowly rating these three scales and highly rating the sustainability of the new approach need further study, since empirically less feasible, difficult to adapt and costly approach couldn't be sustainable (24,27).

We also analyzed the cost-effectiveness of this approach to have meaningful evidence for child and maternal health programing and it would answere the perceiption based less feasible finding through actual cost analysis. In this study, cost-effectivess of PDA was analyzed considering the costs of the baseline and added intervention as input parameters and childhood common causes of morbidity and mortality such as pneumonia and diarrhea (in terms of DALYs averted) and maternal HRQoL in the first 6 months of post-partum (in terms of QALYs gained) as effect variables. The reason for considering these childhood diseases is as per the finding reported from elsewhere (215). The review documented that compared to infants who were non-exclusively breastfed, the odds of having an illness with fever in the last 2 weeks among infants who were exclusively breastfed decreased by 66%. Similarly, exclusively breastfed infants had lower odds of having an illness with a cough and having diarrhea compared to non-exclusively breastfed infants. We also confirmed this by analyzing the EDHS-2016 data set to estimate the health outcomes in the method section. The result shows the probability of having pneumonia (cough for 2 weeks and fever) and diarrhea among those who EBF lower compared to the counterparts during childhood periods. One of the main drawbacks of this study is not considering to measure infant/child health outcomes directly from this study participant. This is because of lately aware of the need of health outcome to conduct cost-effectiveness analysis. However, there is convincing evidence that BF reduces the incidence and severity of the most common childhood infections such as lower respiratory tract infections such as pneumonia, and diarrhea (61). Consistently, a review study (216) found that peer counselling intervention can reduce the

prevalence of diarrhea, and another trial from India also revealed a similar effect (217). Such tailored intervention has also a beneficial effect in improving maternal quality of life during post-partum period.

Having this evidence, we modeled the infant and maternal health outcomes and analyzed against the intervention cost. In this study, the mean PDA intervention cost per person (infant-mother pair) was $5.9 more than the usual care estimated for 6 (for infant and mothers) to 59 months (for infant only). This indicates that the cost of intervention was higher by 5.9USD compared to the control group which had the same baseline cost as of the intervention arm. This implies that if some thing gives us more benefit with an added cost, we should align with the willingness to pay(WTP) to sustain such approach. However, it need careful analysis since a health budget is fixed, spending more on a new intervention may require spending less on existing activities or increasing the annual expenditure per capita. But the WHO commission in health (218) interpreted that 1x to 3x GDP/capita is an appropriate cost-effectiveness threshold. This means that it is minimal cost to consider without impact the existing activities. The mean incremental DALYs (child) and QALYs (mother) in the intervention group were 0.40 and 0.18 respectively. The Incremental Cost-effectiveness Ratio (ICER) was $14.75/DALY averted and $32.8/QALY gained. Each extra DALY averted for infants and QALY gained for mothers by the PDA as an intervention to promote EBF relative to the control group costed (or will cost) $14.75 and $32.8 USD respectively. The sensitivity analysis shows the minimum and maximum possible incremental costs determined per DALY and QALY were in acceptable range. Since the intervention improved the short-term and long-term infant and maternal health outcomes, it could help decision makers to consider the approach in disease preventive role of primary care through integrating with the existing health system. The PDA is a feasible and cost-effective strategy, compared to nationally and globally recommended thresholds (219–223) that can be used to promote EBF in addition to the usual services.

In the long run, mothers could perceive as their time costed is to be gained from the health of her baby and unnecessary health expenditure due to pnemonia and diarrhea, while PDs could be only volenteers. Hence, the health system will be free even from the minimum $14 cost to avert 0.39DALYs during childhood period till 59 months. As compared to different global and national cost-effectiveness thresholds, this approach is highly cost-effective with a cost per DALY verted and QALYs gained considering the GDP per capita. This means the PDA to

promote EBF at urban community settings does not have significant impact on other health expenditure. In fact, this study only assessed morbidity and mortality to estimate DALYs, not years lived with disability beyond 59 months. Hence the estimation might be underestimated as the intervention would be anticipated to also reduce impairment and later mortality. Otherwise, suboptimal breastfeeding would increase the risk of pneumonia and diarrhea morbidity and mortality outcomes (215,224). In addition, the annual burden of diarrhea related DALYs per household with one child will continue in sub-Saharan Africa including Ethiopia (225). Not only for the benefit of the baby, but also continuation of EBF till 6 months with PDA intervention can improve quality of life of mothers (QALYs gained) that could adjust the physiologic changes and mood fluctuations (143).

In summary, from all of these studies we conducted, we can understand that if the implementation outcomes of PDA are highly rated by the intervention participants/stakeholders, the end-users are more likely to be satisfied, and then the probability of TIBF and EBF practices will be high. If these are well practiced, the child and maternal health outcomes will be turned out good. This theory of change (finding based assumption) can be moderated by maternal and her relevant others' sociodemographic and obstetric variables, pre-disposing, enabling and reinforcing factors of BF. For future scale-up or nationwide piloting of this approach, the CEA was also relevant, and we found as it is cost-effective approach.

Deviated from different studies conducted to improve different health outcomes and health behaviors (16–19,106,123), we used the PDA to test on EBF and TIBF uniquely. The assumption is that the observed "favorable" practices followed by PDs despite facing hardship are feasible and culturally acceptable because they are indigenously derived. The PD approach differs from most of the usual health communication strategies derived from the diffusion of innovations or social marketing theory. Such assumptions assumed the end-users as a passive receiver of persuasive information. The PD approach challenge these long-lasting understandings, and prefer innovative ideas which are often existing within the community, so that the role of the change agents is to facilitate a process whereby the community can self-discover these ideas, co-create messages and prove by themselves to exercise in more sustainable and desirable ways. In this approach, people come to believe that they can adopt a different practice that already prevailing in their community, with some practitioners who are an icon for that specific behavior. Since the

required behaviors are already in practice, the solutions can be implemented without delay or waiting for access to outside resources.

Furthermore, our findings are against the premises of PDA that was assumed by the founders. At the beginning scholars of PDA thought that the assumption of conventional learning theories (knowledge will change attitudes, then attitude change practice) doesn't work, rather this approach is deeply rooted in changing practice first, then learning may come after that. This means when people change their actions, their knowledge or attitude or both may change later. However, this may not work in every scenario specifically for EBF in urban settings. Our finding challenges this previous concept of PD approach which still needs to be tested in different settings for different behaviors. We can conclude that separately understanding behavior, knowledge, and attitude, and trying to draw linearity is not acceptable. This was verified by both EBF, TIBF practices and ideation factors were significantly improved in this study. Probably, the prediction direction between these might be bi-directional or simultaneous. Practically, one special thing added in our study is that PDs were not simply started the visit to share their experience, rather qualified with training to conduct informational counseling and social support, unlike other studies(16–19,106,123,125). Hence, the PD approach has important implications for researchers and practitioners who are trying to address global nutrition challenges through local community-based solutions. Therefore, the evolving paradigm of the PDA is still calling researchers to generate additional evidence in a different context.

5.1. Effectiveness of PDA on EBF

The findings of this study showed that the PDA had the intended-desirable effect on improving EBF practices. Mothers in the intervention group had a better practice of EBF, duration of feeding, frequency of feeding, and timely initiation of complementary feeding compared to the control group. Hence, PDA was effective in improving proportion of EBF practice. There were positive changes in all standard indicators of BF practice for the intervention group. The net change difference of EBF rate in the intervention group increased by 18 points, which is more than the expected effect size at the design stage, compared to the control group for which almost no change was observed. The positive improvements in the intervention group were greater than one percent for all indicators except for the mean frequency of BF, unlike the counterparts.

This finding remained significant after controlling relevant baseline characteristics of the mothers, which is supported by an earlier study(128) in that a community-based intervention

improved BF practices. The acceptance and support for the PDA by the implementers, community members, mothers, spouses, relevant others, and relatives may have contributed for the effectiveness of this approach. Consistently, a systematic review(193) also concluded that counseling, education and peer support considering the culture and local resources can improve EBF starting from the initiation to sustained duration. However, our intervention was not effective in significantly decreasing pre-lacteal feeding, improving intensified BF practice and mean frequency of BF. We were not able to explain the non-significant difference but higher decrement in the intervention group and lower decrement in the counterparts such as why and how pre-lacteal feeding decreased in the control group.

Paradoxically, the positive findings in this study refute reports of communitywide interventional studies conducted in Australia and Gutemala(206,207). These studies revealed that there was no significant difference observed on initiation and exclusiveness of BF, although there was increment in the proportion of EBF which suggested that communitywide programs become more effective over time. However, in our study, the positive deviance approach was proved to be effective both in the short and long-term period as compared to the baseline. We argue that an effective community-based intervention demands appropriate design, and consideration of the context to which PDA fit. We have ensured this by our participatory design while planning the intervention at the community level. In addition to this, implementation fidelity might be one of the contributing factors for the observed effectiveness in our study. Our team exerted maximum efforts to ensure sufficient time and dosage of the intervention. Hence, the good adherence and compliance to the protocol might help us to celebrate its effectiveness. To achieve optimal BF practices, giving equal or prior attention to social factors of women about BF is needed as of addressing systemic and health factors.

The change in the proportions of EBF at the third and sixth months of post-partum from the baseline to midline (+26%) and endline (+18%) were much more than the assumed effect size at the design of this study. This finding is unlike that of the Gutemala study which reported only +2.1% increment in the intervention group while -3.9% in the control group(207). This indicates that simple mother-to-mother support may not be effective unless positive deviants and deviated behaviors are identified and intervened accordingly. The higher increment of proportion from the baseline to the midline and declining from the midline to the endline was inconsistent with what the Guatemala study reported. That study revealed sharp decrement from 29% to 23% then to

12% unlike ours. Basically EBF expected to increase in the first few months and decrease while post-partum period goes forward. This means every mother tries their level best to feed their breast in the first few months due to cultural support and motherhood exercise as shown in the control group. This might result in increased proportions in both groups till the third month. Then, to sustain EBF practice requires better knowledge, favorable attitude, good self-efficacy, and social support from relevant others and PDs. Courage to solve work-related challenges and self-positioning (strong stand) against negative subjective norms prevailed in the community are also essential to be impacted by this approach.

Although mothers in both groups were at the same and low level of practicing EBF (30-32%) at baseline, sharp increment was observed in both groups, regardless of the magnitude. However, later at six months steady decrement was seen in the intervention group with significant change, while sharp decrement shown in the control groups which ended-up without significant change. This is contrary to what the WHO recommends children under the age of 6 months should be exclusively BF. In fact, the most recent demography and health survey (EMDHS 2019) reported that the percentage of EBF decreases sharply with age (from 73% of infants at 0-1 month to 68% at 2-3 months and further, to 40% at 4-5 months). However, the practice of EBF for children till the age of 6 months has increased from 49% in 2005 to 59% (41). However, our finding showed 58.1% at third month while 50.8% at six months. This lower practice of EBF till age of 6 months in our study might be due to the urban study setting while EDHS includes both rural and urban settings. This means EBF is more affected in urban settings such as in the case of Jimma town-33.3%(7) as compared to rural settings 67% (6). Besides this justification, our intervention couldn't achieve the current national proportion of EBF practice (41), and Nigeria-58.8% (226). This difference might be due to the cross-sectional nature of both of the other studies, and the latter was national which included both rural and urban settings. The decline after the midpoint could be prevented if the number of visits increased, probably, planning an additional visit around the fifth month. This recommendation is actually in conflict with the WHO standard number of visits that is only five (two at pre-natal and three within 7 days of birth(3,15).

PDA increased the practice of EBF at 3 and 6 months through engaging and supporting strategies. Social support through active engagement of relevant others can help mothers to improve the practice of EBF. Such social supports are not addressed well in the developing countries-one of the failure of health system responsiveness. Addressing social needs require

social and community support and safety; building environment and health care-related behavior and improved ideation factors-related gaps. The role of relevant others such as grandmother and/or husband can be used as a form of family support, who were engaged in our intervention by positive deviants to facilitate the practice of BF. Current lifestyle changes the role of a mother to have a dual role as a career woman and a housewife. If parents (mothers and fathers) have a career, the responsibility of caring for baby is mostly given to grandmothers. Hence, the effectiveness of our intervention may not be referred to mothers' only but also considerable contiribution of relevant others in the process of implementing PDA matters.

The intervention group showed improvements at midline for key BF practices. Ever BF increased by 11% in the intervention group compared to the control group (89%) at follow-up. The mothers in the intervention group who reported BF within 24 hours was almost twice as compared to the counterparts. However, nationally, 6% of infants under age 6 months were not BF at all. Hence, this intervention is still effective in improving ever BF practice(41). This finding was supported by an earlier study conducted in Ethiopia (84) which reported timely initiation of BF. In our case, after initiation, the proportion of mothers in the intervention group who EBF within the last 24 hours, increased from baseline to midline and then decreased to endline. The highest point of EBF among mothers in the intervention group was at midline. This indicates the appropriateness of this community-based PDA intervention that improved those BF practices, and prevented decline of EBF after the third month.

In the contrary, there were no significant differences among the groups concerning pre-lacteal feeding practice across the three-time points. The pre-lacteal feeding declined in both groups by midline, although the change in percentage decrease in the intervention group was more than twice that of the control group. However, there were significant differences among the two groups on feeding expressed breast milk during their absence at midline and endline. The baseline proportion of this practice is low as compared to other BF practices in both intervention and control groups. The proportion of mothers who expressed breast milk in the intervention group increased overtime, while there were no significant increments in the counterparts. This finding is supported by another study, in which increament of expressing breast milk within six hours of delivery was observed (227).

When we see the indirect measures of BF intensity, the intervention was effective in delaying menses return, decreasing bottle-feeding practices, increasing frequency of BF during the night

(4 to 6 times) and day times (4 to 6 times) and increased duration of suckling breast, compared to control groups. From this finding, we can learn that delayed menses return and decreased bottle-feeding practices among intervention group could be due to intensive BF and exclusiveness. However, the frequency of BF at day and night times was inconsistent and imbalanced in terms of the number of practitioners. To declare the frequency of BF is intensive, the day-time (4 to 6 times) and nighttime (4 to 6 times) feeding should be balanced in terms of proportion of practitioners. The general recommendation of BF frequency per day (8 to 12 times) (1,3) is vague and not indicative of BF intensity. The fact that frequency and duration of BF are not accurate measure of intensity(50,179,228), rather used for estimation and to draw a connection between the effectiveness of PDA in improving EBF practice and its indirect measures. In the beginning, we assumed that if EBF practice improved, other indirect measures should be improved, otherwise, the recall bias would be the major limitation of this study. Generally, those indirect measures are used to estimate till the first six months since no significant natural decrement of feeding frequency and duration of suckling expected and since no complementary feeding is recommended. Sometimes, the frequency and duration of suckling are reversely related when the infant gets older and more than 6 months: more frquet at the beginning with short duration of suckling, then reverse while gets older. In support of this, the proportion of infants, by the duration of suckling, increased from weak to strong at midline and endline in the intervention groups compared to control groups, and who were on the medium duration of suckling (expected) increased from baseline to end line.

Although BF is sufficient and beneficial for infant nutrition in the first 6 months of life, and for the health of mother whose knowledge, attitude, and self-efficacy to practice EBF might be necessary but not sufficient conditions. The respective proportions in both groups were decreased from knowledge to attitude and then to self-efficacy at the three-time points. This means, those mothers who had good knowledge might not have a favorable attitude and those who have a favorable attitude might not practice BF, which is supported by a study conducted in Nigeria-76.8% of knowledge with 40% of practice(229). Unlike the baseline, there were significant differences observed on these ideation factors at midline and endline. The percentage of mothers in the intervention group who had good knowledge, favorable attitude, and good self-efficacy were increased by 20, 22, and 33 points from baseline to endline, while minimal increments in the counterparts. The reason for no change in favorable attitude at control group

might be due to the existence of many subjective norms that need planned community-based intervention, unlike knowledge and self-efficacy which are prone for change due to minimal practice and receiving information. In addition, mothers who were in the control group might also learn from the repeated measure of this study. Out of the three ideation factors considered in this study, the maximum positive increments were recorded on good self-efficacy followed by a favorable attitude when the time goes forward. This implies that the PDA (counseling and social support) intervention is effective overtime to improve ideation factors. In addition to this, intention to BF (which was almost equal and high at baseline in both groups) might not be sufficient to practice EBF, since no significant change in EBF practice in the control group at the end. In addition, studies on PDA reported that without having proper knowledge and a favorable attitude, feeding practice can be adopted(230). However, the earlier view didn't work in this study since the reverse happened (change in practice lead to a change in ideation factors) because both ideation factors and practice positively changed. Because, while mothers adopt a certain behavior, she ask why and how and who do that and compatibility with the norm at a time. Evidences showed that studies tested the PDA were conducted in rural settings where people may mostly affected by subjective norms. They want to practice what others did and they progressively try to learn it to improve their knowledge and attitude(16), unlike urban women of our study who had exposure to different information and want to verify which one is good to catch and follow, then practice if they believe and understand it.

Although the PD approach had been effectively utilized to address diverse health and social problems in different parts of the world (16–19,106,123), but not tested in improving EBF practice in urban settings. The PD approach differs from most of the usual health communication strategies derived from the diffusion of innovations or social marketing theory. Such assumptions assumed the end-users as a passive receiver of persuasive information. The PD approach challenge these long-lasting understandings, and prefer innovative ideas which are often existing within the community, so that the role of the change agents is to facilitate a process whereby the community can self-discover these ideas, co-create messages and prove by themselves to exercise in more sustainable and desirable ways. In this approach, people come to believe that they can adopt a different practice that already prevailing in their community, with some practitioners who are an icon for that specific behavior. Since the required behaviors are

already in practice, the solutions can be implemented without delay or waiting for access to outside resources.

Furthermore, our findings are against the premises of PDA that was assumed by the founders. At the beginning scholars of PDA thought that the assumption of conventional learning theories (knowledge will change attitudes, then attitude change practice) doesn't work, rather this approach is deeply rooted in changing practice first, then learning may come after that. This means when people change their actions, their knowledge or attitude or both may change later. However, this may not work in every scenario specifically for EBF in urban settings. Our finding challenges this previous concept of PD approach which still needs to be tested in different settings for different behaviors. We can conclude that separately understanding behavior, knowledge and attitude, and trying to understand linearly is not acceptable. This might be verified by both EBF practices and ideation factors were improved in this study. Probably, the prediction direction between these might be bi-directional. Practically, one special thing added in our study is that PDs were not simply started the visit to share their experience, rather well trained to conduct informational counseling, and actual social support, unlike other studies(16–19,106,123,125). Hence, the PD approach has important implications for researchers and practitioners who are trying to address global nutrition challenges through local community-based solutions. Therefore, this evidence will be an added value to this paradigm (PDA).

5.1.1. Limitations and strengths/implications of this study

Although the effectiveness of PDA was analyzed and discussed, the unintended-desirable and undesirable effects were not documented and reported. Self-report bias, recalling bias and social desirability bias could be considered as limitations especially in measuring the primary outcome variables. To minimize reporting bias, items were prepared to verify each other and indirect measures were used. To minimize recalling bias, the baseline information was limited to the last 5years for the last child only and the 24-hour recall method for some outcomes.

Since it is randomized trial study, it might be also limited concerning internal and external validity. Internally by; experiences of subjects had between three-point measurements may be changed overtime (e.g, knowledge change as a result of pre-intervention interviews), changes in EBF practice as a result of participation in a study, Threats to external validity may arise from differences between target populations and source populations. For example, interaction between selection criteria/process and intervention (participants who fulfilled the criteria for selection

may be more or less likely to benefit from an intervention compared to the general population). Interaction between study setting and intervention (participants who knew that they were under study may react differently to the intervention compared to the target population).

However, still we can generalize this finding to urban settings. Masking subjects in such community trial is difficult, even impossible, but we blinded the data collectors. Since the outcome is sensitive to change (rate/proportion), lost follow-up mothers were included in the subsequent analysis so that the difference between the groups might not be overestimated. For this reason, following the intention-to-treat analysis implies some of the effect size (rates) may be underestimated. The good thing was that the rate of lost follow-up was not more than 2%, which was (3/260*100=1.2%).

Although the intervention and control group were living in non-adjacent clusters/kebeles, still there might be information contamination since all are living in the same Town with narrow buffering zones. To minimize this, cluster randomization takes advantage of individual randomization which might lead to substantial information contamination. Comparing the last 5years' baseline information with the current practice of EBF may underestimate or overestimate the change in proportion/rate.

Besides these limitations, the study was strong in terms of retaining mothers throughout the study period, with a minimal percentage (1.2%) of lost follow-up from both groups. Our achievement might be due to the appropriate number of subsequent doses/visits provided by the mothers (PDs) to the mothers at their home. The other strength is its rigorous scientific design using a cluster randomized control intervention which included a large sample size and was an integral part of the existing community health system. As far as we know, this study is the first in Ethiopia and Africa that evaluated the effect of PDA intervention on EBF practices under the age of 6 months.

The results of this study may have a meaningful contribution to the existing knowledge regarding community intervention programs and should encourage future research and policy making. Improved knowledge, attitude and transferable skill from PDs to mothers, the spill-over effect of remained information in the community, and solving the community's problem by, from, and to the community are some of the practical implications and strengths we learned from this study. In addition, this rigorously examined approach will help other researchers to learn procedural and methodological replicability in applying this approach. Measuring implementation outcomes

of this intervention and further investigation in different contexts and behavior is recommended using this finding as baseline information. Ethiopia has implemented the urban HEP at the grassroots level since 2009, through household modeling approach in urban settings. Therefore, the existing health system should scale-up this approach as an added value. This means, FMOH and Jimma Town Health Office should consider this strategy in increasing coverage of home visit specific for promoting EBF and as a mechanism of future task shifting and reducing loads from UHEPs to PDs.

In concluding the findings from this particular study, the PDA intervention was effective in increasing EBF practice. We recommend the promotion and use of the positive deviance approach as a strategy to improve EBF practice in urban community settings. It was also effective in improving the secondary outcomes such as knowledge, attitude, and self-efficacy toward EBF practices. Based on this finding, scaling up PDA intervention would improve BF practices where by to ensure nutritional adequacy. Moreover, prioritizing PDA intervention at urban settings could have a significant impact on overall child health outcomes in Ethiopia. Applying the PDA has been significantly associated with improved BF and timely initiation of complementary feeding practices. Hence, the health system should explore the adoption of the PD approach as way of promoting optimal BF. In line with this, adopters should consider interventions focusing on improving maternal ideation factors, which in turn might improve BF practices or the reverse, could happen. This type of intervention should consider designing and funding of community-based promotion of EBF practices to change the state of the art-subjectively and negatively prevailing in discouraging the practice in urban settings.

5.2. Effectiveness of PDA on TIBF

This study determined the effectiveness of PDA as an intervention to promote timely initiation of BF, the survival probability of the time to initiate, and predictors for that. The results revealed that there were significant differences between the groups in the proportion of mothers who practiced TIBF. In the intervention group, initiation of BF within the first hour of life showed greater improvement at midline compared to the counterparts. The proportion of mothers in the intervention group, who initiated BF within 1 hour of birth, increased the net effect by more than one-fourth. In another way, mothers in the intervention group were almost 2 times more likely to initiate BF within 1 hour of birth (TIBF practice) as compared to counterparts at the midline. This means the intervention reduced the risk of avoiding timely initiation of BF or increased the

probability of timely initiation by two-third among mothers in the intervention group relative to counterparts. This finding was consistent with a cluster RCT study reported from rural Ethiopia as the peer-lead BF education and support increased early initiation by 25.9% (208). However, it is different as compared with another study from Bahir Dar, Ethiopia reported as the practice of TIBF was suboptimal besides many community-based interventions in place(84). This might be due to the complex nature of BF practice related with traditional feeding practices, pre-lacteal feeding and discarding colostrum, mother-in-law's opinion, lack of information, misperception, lack of support and milk insufficiency and poor decision making power of the mother are some of the barrier among many others (87). These factors were well considered in designing our intervention process unlike the others. The predictors identified in this study can also explain this difference. Considering such factors, unreserved efforts to encourage mothers should be part of the primary public health intervention strategy to promote timely BF initiation.

The proportion of TIBF achieved in our study (60.47%) was higher than the sub-Saharan Africa (58.3%), Chad(24%), Nigeria(38.8%), Tanzania (46.1%), Addis Ababa (58.3%) (72,83,231,232). Whereas, it is lower than Burundi(86%), Malawi(76.9%), Bangladesh (67%), Ethiopia-nationally (73%), Motta Town(78.8%), Denbecha-Ethiopia(73.1%) (6,73,75,76,231,233). However, it is comparable with Ankara city, Turkey (60.1%) and Debre-Birhan-Ethiopia (62.6%) (74,234). Being higher in our case might be due to the good implementation and practice-based adherence to the protocol with an acceptable approach we followed including counseling and support made on how, when, and why do express breast milk. Being lower in our case might be due to other studies include rural settings or were being national studies that might increase the proportion. Many studies reported that timely initiation and sustained exclusively feeding practices increased in rural settings than urban(6,75,231). This comparable finding with Debre Birhan Town implies this concern. This means the proportion achieved in our study is consistent with other urban settings, not with rural settings that have a different understanding, beliefs, and practices regarding TIBF. However, still, we couldn't deny that all other findings we cited from cross-sectional studies simply detected the community-level prevalence of TIBF, while ours happened after a rigorous and planned intervention. We are in difficulty to reason out why such difference across Ethiopian cities observed. In our case, the higher increment recorded from the baseline might be due to making the first counseling and social support visit before the delivery, late 3rd trimester, which could be widely implemented as a strategy in the future. Beside a high number

of facility deliveries in both groups but a significantly different proportion of TIBF practice shows the relevance of the first visit which took place near to the expected date of delivery. The good thing is that among exclusively breastfed infants, all-cause mortality risk did not differ between early and late initiators (49). However, the risk of morbidity reduced among timely initiators due to breast milk is rich in protective factors such as antibodies (51). However, the low risk of repeated attack from infections causes of morbidity indicated low risk of mortality as supported by other strong evidences and clinical trials (49–51,55).

The intervention made a positive significant difference on the median time to initiate BF among the intervention group to be 1 hour, while 2 hours in the counterparts. This implies that most of the mothers in the intervention group initiated BF at one hour which is recommended by WHO (50), while beyond that (2 hours) in the control group. In addition, the maximum time of initiation was short in the intervention group (26 hours) while longer in the control group (36hours). On the other way, the number of mothers who initiated BF within the first hour (less than or equal to 1hour) among intervention group was significantly higher than the numbers in the conrol group. Therefore, the PDA intervention was effective on early initiation and timely initiation of BF. This finding was supported by a study conducted in Bangladesh which reported the median time to initiate BF was 38 minutes (76). Even if the median values such as 1 hour in our case and 38 minutes in Bangladesh case different, both are in the same range of the recommended time of initiating timely BF. This is also in-line with what was reported from rural Ethiopia as the BF education and support was effective in initiating timely BF (208). The reason for such success might be due to good implementation fidelity. The intervention also took the required sufficient time-response and partnership building for successful implementation with a good level of adherence to the planned protocol. Hence, we can conclude that additional community-based support using PDA with a participatory design with the community members, implementers, and implementation designers is effective in improving TIBF. The median time in our case was also similar to the pooled prospective data analyzed and reported by WHO (58). Our result as compared to those cross-sectional reports implied that without such rigorous community-based intervention, it could have not been similar with them; rather it could be less than the current achieved median value.

This study revealed that the survival probability of timely initiating BF at the beginning, soon after delivery, was 100% in both groups while in later time decreased to zero in both groups at

different time points. Hence, consistently falling time to initiate BF was observed in both groups with different paces. The KM survival function of the control group was above that of intervention group, indicated as the mothers in the control group initiated BF after long time compared to counterparts. This means mothers who were in the intervention group initiated BF timely and within a short period after birth relative to counterparts. Therefore, the intervention was effective in reducing and shortening the time to initiate BF or increasing the probability of early initiation of BF. The timely initiation survival probability was around two-third in the intervention group, while two fifths in counterparts. Reversely speaking, the risk of delayed initiation of BF was reduced in the intervention group compared to the control group. This finding supported by another study which revealed there was a higher probability of timely initiation in Indonesia(209).

The pooled proportion of TIBF among all study subjects was 43.5% which much lower than studies reported from different countries of the world including Ethiopia(6,73,75,76,231,233). This difference might be due to the low proportion of mothers who initiated BF timely in the control group that reduced the overall pooled prevalence. In addition, our study was conducted typically at urban settings in which BF is much lower and more likely to be initiated late, unlike other studies conducted at mixed settings, or national level or systematic review result.

In this study, the predictors of TIBF were being primipara, have no sex preference, good health status of mother soon after delivery; receiving support from relevant others, good knowledge of EBF and vaginal delivery. Vaginal delivery was the strongest predictor of timely initiation (within one hour of birth) while other predictors are moderate. These findings are supported by other recent studies regardless of regional and residency variations(72–76,83,231–234). This implies that the community-based maternal and child health program should consider such modifiable factors to improve TIBF. For example, counseling primipara mothers focusing on those who have sex preference, promoting facility delivery to improve maternal health at post-partum and encouraging vaginal delivery unless it is a must to do C/S. In this regard, promoting relevant others' support and BF education to improve mothers' knowledge is paramount.

However, a favorable attitude toward EBF negatively affects the timely initiation. This means those mothers who had a favorable attitude towards EBF were at risk of delayed initiation of BF by 31.6% compared to counterparts. This finding is not consistent with any available shreds of evidence. This might be due to either unclear attitude they have towards EBF or the counseling

and measurement limitations. This means, sometimes mothers might be confused by the existing value and what counselors informed them. At this time, they might keep their positive attitude while remain unapplied. Another possible explanation might be due to the intervention objectives that primarily target the timely initiation and exclusiveness of BF. However, the secondary outcomes should be also impacted through capacity building. Hence, increasing knowledge and buffering the existing negative norms may positively affect TIBF. In addition, the counseling and social support intervention towards improving attitude was focusing on exclusive BF, not specific to timely initiation. Lastly, we can guess that the proportion on the outcome variable was pooled from both groups which mean those mothers in the control group might have a favorable attitude but failed to practice TIBF due to the absence of additional support. Saying this, still we can't conclude that favorable attitude did not have a positive influence on TIBF; rather we recommend other studies to test the relationship. It is not only the reverse impact of attitude but also non-predicting nature of self-efficacy need further study.

This study might be limited due to self-report of the time to initiate BF since mothers might be overwhelmed and stressed due to labor or cesarean pain in the first some hours after birth. Hence, they might forget the exact minute of initiation, rather they might estimate and guess the specific time from their immediacy or delayed commencement of BF. Other methodological and design-related limitations were reported in the earlier study. Otherwise, the findings of this study could be generalizable for other similar contexts or target population.

To sum-up the key findings, PDA was an effective intervention strategy used to increase the probability and practice of timely initiation, and reduced and shortened the time to initiate BF among intervention group. TIBF was significantly different between the groups at midline while the same at baseline. A significantly higher proportion of mothers in the intervention group initiated timely BF compared to the counterparts with more than one-fourth of effect size which is far higher than the assumed at designing stage. Mothers in the intervention group were almost 2 times more likely to initiate timely BF due to the help of the PDA intervention. Half of the BF initiation occurred in the first hour of birth in the intervention group while takes longer time in counterparts with the median time of 1 hour to initiate BF among the intervention group. The timely initiation survival probability was increased by 25 points in the intervention group compared to the counterparts.

Parity, sex preference, mode of delivery, the health status of mother soon after delivery, support from relevant others, knowledge, and attitude of EBF were independent predictors of TIBF. Therefore, this effective approach should be promoted and implemented as a new strategy to improve TIBF in urban settings. The future program should encourage mothers to receive support from positive deviants so that to improve TIBF. This approach may support the inadequate number of urban HEPs to implement the community-based packages in the era of rapid urbanization.

5.3. End-users' satisfaction with PDA

Out of the service outcomes (intermediate results), satisfaction is the main measure from the end-user perspective that is why we conceptualized and measured satisfaction from their point of view (22,24,117) to understand whether the intervention satisfied them. Measuring intermediate service outcomes can address both the concern of program responsiveness, client responsiveness, and the interaction towards each other (117). However, in this study, we measured only client responsiveness (user's satisfaction) which is the reflection of both. Client satisfaction represents a complex mixture of perceived need, individually determined expectations, and experience of care/service received from the PDA intervention which could be health or non-health-related matters (24,118).

In the measurement and validation process of users' satisfaction, PSMS was analyzed to standardize the measurement scales and to facilitate comparison with other future findings regardless of the number of items and response categories used. This concept was verified by our findings that the standardized mean score showed as satisfaction related to the user empowerment was the highest that contribute for the overall satisfaction level. Whereas the raw mean (unstandardized) resulted as satisfaction related with counselor and counseling sessions was the highest contributor. This fact was reflected on the overall level of satisfaction differently, which means when responses were dichotomized using a simple/raw mean score, 54.3% of the end-users were satisfied; while by using the PSMS, 50.4% of them were satisfied.This implies that categorizing responses using the raw (unstandardized) mean score overestimates the level (proportion) of satisfaction under the study. The 50.4% of satisfaction is almost consistent with the overall satisfaction's PSMS (50.9%). This indicates that we should always use the standardized scale mean score to generalize the finding and to compare with others' findings regardless of the number of items and response categories. Hence, using the standardized

(PSMS) mean score to dichotomize respondents is more acceptable and avoids misclassification which is also supported by other studies (184,185).

In this study, the level of end-users satisfaction with the PDA intervention and its multi-level predictors were measured and analyzed, considering it as one of the main proxy indicators of service outcome measurement (24). Overall, more than half of the users of the PDA as an intervention to promote EBF were satisfied. Of the emerged satisfaction measuring scales, the PSMS for user empowerment scale was the highest. Higher satisfaction score implies the higher responsiveness of the approach to the needs of the mothers and their relevant others in practicing and promoting EBF. This concept was supported by a study conducted elsewhere (185). The overall level of satisfaction observed in our study is less compared to the baby-friendly interventional study reported from Norway (76.2%)(213). This discrepancy might be due to the setting (urban and rural) difference; in our case, the urban community might expect more that would affect their level of satisfaction. In addition, the approach difference might be also a reason. In our case, it is a community-based approach (by, from, and to the community) unlike the other's in which they followed a mixed approach (facility and community-based approach). However, in our study, the user satisfaction was highly explained (84.2%).

We considered user satisfaction as an intermediate service outcome where knowledge of its multi-level predictors would improve the quality of decisions about the use of the PDA-guided intervention. This helps to understand what to consider, how, and on whom the PDA be implemented effectively to the satisfaction of the end-users. Our findings indicated that end-user satisfaction was predicted by multi-level factors such as individual-level, community-level and mixed-effect factors. The mixed-effect model revealed that age, occupation, experience of BF/support, knowledge, attitude, self-efficacy, main source of BF information, previous home visit/support received from HEPs, participation in any social activities, and perceived community-level support to practice BF were independent predictors of satisfaction with the PDA intervention.

Our findings are consistent with those of earlier reports (16,17,106). Those studies revealed as community-based intervention modified the dietary practices through identifying community-level factors, community factors influence the intervention effect, and psycho-social variables were associated with healthy infant growth. Also a study conducted in Norway shows the intervention participants were well satisfied due to integrated intervention with community-level

structure(213). Hence, satisfaction with PDA as an intervention to promote EBF is highly context-specific being influenced by community-level factors in addition to the individual variations. This was further supported by the results of measure of the variations of satisfaction in our study. The empty model showed that there was a significant variation in the grand mean score of satisfaction among the three clusters, the standard error indicated significant variation before adjustment for multi-level factors, and 16.1% of the variations in satisfaction could be attributed to community characteristics without controlling other factors. This finding implied that community characteristics are very relevant for a better understanding of individual variation in satisfaction which is consistent with what others reported (213,235). About 57.4% (Adjusted R^2) of the satisfaction score was explained by the empty model considering clusters as an explanatory variable. This shows there was still unexplained variation (42.6%) among the clusters that could be attributed to other factors.

The estimated value showed that when users' age increases, their satisfaction with the PDA intervention decreased significantly. This might be due to having ample experience related to infant care and EBF, in that case, they may not need additional support or could be unhappy about the informational and social support provided. In fact, 'I know all type' and 'nothing new' biases might affect the supporting process (236) and their satisfaction. In addition, government employees were highly satisfied as compared to housewives. While this is not straightforward to reason out, one of the service packs (breast milk expression) may be attractive for those who are working, and those on maternity leave might have time to receive the support. Likewise, those who have no experience of BF or supporting lactating mothers were more satisfied than their counterparts. This result supports the aging-related dissatisfaction, and it might be due to seeking help and support is the concern of those with less or no experience leading to a higher level of satisfaction. Such socio-demographic variables were also reported as a predictor elsewhere (237). This explains why those with poor knowledge, unfavorable attitude, and poor self-efficacy were highly satisfied compared to their counterparts.

The community-level factors implied that those who previously received support from HEPs, and who were informed about BF by HEPs were highly satisfied with PDA compared to their counterparts. This indicates that the new approach could supplement and synergize the existing strategies of promoting EBF by HEPs (128).Participating in any social activity was also a positive driver of satisfaction with the new approach. This nature of the intervention promotes

social support, information exchange, and break urban social distancing which is all easier for those who participate in social activities. This finding supports the sustainability (scale-up) of the PDA which could minimize the negative perceptions about EBF prevailing in the community. This means, through this approach, those who feel as EBF is impossible, non-beneficial, and not supported by the community, could be encouraged to practice and get satisfied by the support (93,128). Without improving end-users' satisfaction, achieving the desired outcome such as EBF may not be possible (22,24,25,115). The observed level of satisfaction with PDA might be one of the reasons for the reported effectiveness in the earlier study (93).

5.3.1. Implications and limitations of this study

The observed level of satisfaction and identified predictors imply that although all respondents are living in the same city, community/cluster level variation can differently influence end-users satisfaction beyond their individual differences. Hence, community-based interventions such as the one used in the earlier trial should be well-informed by contextual factors with special due attention to the community-level factors as emphasized by other evidences (106,213). This means, PDA as an intervention to promote EBF can satisfy end-users if its multi-level predictors are considered during intervention regardless of the positive deviants' educational status, common living area with the mother to be supported, and existence of functional HDA. The measures of variation confirm that factors influence satisfaction should be considered while designing PDA to promote EBF in similar settings. Although some variation is inevitable, it could be minimized to ensure that majority of the clients/users are satisfied by considering the two-level factors that explained part of the unexplained variations (42.6%).

Our study had some limitations, such as self-report bias, recall bias, social desirability bias, and misclassification bias while dichotomizing at analysis. To minimize reporting bias, participants were assured about the study objectives and anonymity. Recall bias is a possibility since this survey was conducted as a follow-up study after 18 months of the actual intervention. However, this may not be much of a problem since the intervention period was 7 months with intensive and active involvement of the users. To minimize misclassification bias during analysis, the standardized mean score was used (184,185) and the data were normally distributed. In fact, this is more relevant for only cluster-level analysis, unlike ours which was both at individual and clusters level. Multi-level factors might not be restricted only to the variables included in this study; rather other factors could be there to explain the unexplained variations.

In conclusion, more than half of the end-users of the PDA intervention were satisfied. The total variability in users' satisfaction with PDA was well explained by the five satisfaction measurement scales for which the user empowerment contributed the highest. A higher satisfaction implies the higher responsiveness of the approach to the need of the mothers and their relevant others in practicing and promoting EBF. End-users satisfaction was predicted by two-levels such as individual and community factors. The final mixed-effect model revealed that participants' age, occupation, experience of BF/support, knowledge of BF, attitude toward EBF, self-efficacy to BF, main source of BF information, previous home visit/support received from HEPs, participation in any social activities and perceived community-level support for BF were independent predictors. These confirm the context-based nature of the approach that is sensitive to such variability. Therefore, to use PDA as an intervention to promote EBF, the two-level factors should be considered to satisfy mothers and their relevant others.

5.4. Implementation outcome measures of PDA

This study assessed and examined implementation outcomes of PDA as a strategy to promote EBF practice. As part of this assessment, valid and reliable measurement scales were developed. The nine newly developed scales (with a total of 52 reliable items) were acceptability, fidelity, appropriateness, feasibility, penetration, sustainability, adaptability, organizational readiness, and implementation cost. During the validation process, the number of items reduced significantly that will make easy for future research use. For those valid and reliable items, the mean score was determined to understand the degree of importance as rated by intervention participants. An item with a highest mean score indicates that the item was highly rated in that scale. In this study, highly rated item was loaded to acceptability scale/factor, while an item with the lowest mean score was loaded to feasibility scale. Beside the variation in score (degree of rate), all valid items were internally consistent (highly reliable) to measure implementation outcomes of PDA to promote EBF practice. Scholars agreed that the development of such tested measurement scales would advance implementation science, especially to conduct a newly approached intervention (29,93,136). This means, contextually developed items reflect and truly measure the conceptual content of the nine implementation outcomes.

Implementation outcomes of PDA was summarized using the scale mean scores and the TVE by the emerged components. The higher factor score created on a factor analysis indicates a higher degree of importance of that factor with regard to implementing PDA to promote EBF. The

maximum mean value was determined for appropriateness scale and the highest variance was belongs to it. The respective mean values indicated that the study participants highly rated appropriateness and acceptability scale, while lowly rated implementation cost scale. These highest and lowest mean score implies the intervention participants hold a perception that the PDA to promote EBF is more likely appropriate and acceptable, while costly to implement. In sum, the nine contextually developed scales explained 72.1% of the total variability in psychometrically measured implementation outcomes of PDA. This means these outcomes are well measured by these scales. The finding showed that appropriateness, acceptability, fidelity, penetration, organizational readiness and sustainability scales were considerably rated above the expected average potenail score, while feasibility, adaptability, and implementation cost scales were rated below. This means, the PDA was perceived as appropriate, acceptable, fidable (implementable as planned with quality), penetrable through organizationally/structurally ready community setting, and sustainable to promote EBF, while it was not feasible, adaptable, and costly. This negative perception might be due to much of the intervention activities were conducted through volunteerism and minimal incentives, beside the deviance inquiry procees is time demanding and need much effort to adapt to the context (93,128). Many of the highly rated scales were more theoretically relevant and can be judged from mere understanding about PDA from the inception training, whereas those all lowly rated scales might be due to the perception developed through practical experience. However, lowly rating these three scales and highly rating the sustainability of the new approach need further study since empirically less feasible, difficult to adapt and costly approach couldn't be sustainable (24,27).

Studies reported that these implementation outcomes are best represented from an empirical perspective to have differenciable constructs though they are highly complex (24,27,29). Hence, this study contributes to the science by developing valid and reliable measures of implementation outcomes that would fit to the context, clarify the concept, promote common terms as discussed by other study (238), and concerns about the state of measurement that can explain the process of the PDA implementation (23,132,239). Although such outcome measures are centeral to understand the extent to which implementation is successful, valid and reliable measures are lacking and mostely not documented well (27). This study fills that gap by developing valid and reliable measures of implementation outcomes that are important to replicate in a range of implementation studies that will use a PDA in a pilot or effectiveness studies. As far as the

implementation study is conducted to disseminate for further implementation(240), integrating effectivensess with implementation study is very important. As effectiviness study need ultimate outcome measure to understand its effect, the implementation outcome aspect is equally relevant and need to be measured to understand weather it is acceptable, appropriate, sustainable, feasible and so on(241,242). These outcomes are relevant to assessing intervention participants' perceptions of such public health interventions as well as assessing perceptions of implementation strategies, which are assumed to be new or complex (24,243,244). Assessing these outcomes early in the research process may ensure that interventions and implementation strategies are optimized and fit with end-users' preferences. However, we assessed such outcomes during post-implementation period just to learn from the process, and to contiribute for future implementation science advancement, rather our intervention/trial was over in the study area. Most importantly, this study will benefit the health system if want to adapt the PDA or to sustain as per our scale-up plan, in the study area, to promote EBF.

The majority of the psychometric measurement scales were significantly correlated with each other either positively or negatively with different level of strength. Implementation fidelity, penetration, organizational/community readiness and sustainability were positively and significantly correlated with acceptability of the approach. This means these outcome measures are interdependent to each other and increased positively so that to influence the practice of EBF through PDA intervention. This also implies that the PDA intervention was implemented as per the protocol with expected quality (fidelity), penetrated through the existing organizational and community structure in acceptable way to the participants so that would be sustainable. The strongest (245) relationship observed between the acceptability and implementation fidelity support this concept. Once a certain thing is acceptable, it can be implemented as designed, or the reverse can happen (24,29). The other relationship shows a feasible, penetrable, sustainable, adaptable approach can be integrated within organizationally ready setting if it was implemented as expected (fidelity). However, we are not clear why the perceived appropraitness and implementation cost were not correlated with fidelity that disproves the pre-existing theoretical relation (22–24). In addition, why the perceived appropriateness has reverse relationship (when appropriateness score increased, the other two scales' score decreased) with feasibility and sustainability of the approach needs further study. Indeed, this tells us the appropriate approach may not be feasible and sustainable which also confirm the pre-existing conceptual difference

(22,24). The other finding also conform to the generic understanding that acceptable intervention may not be feasible, and its appropriateness will not be a guarantee for its penetration. However, to have a sustainable approach/intervention, all the remaining six implementation outcomes could be rated positively regardless of its appropraitness which could be perceived reversely. Practically this study revealed that sustainability is highly related with penetration unless which its continuity will be threatened.

Adaptability of the approach was positively correlated with many of the other scales, of which it was strongly correlated with implementation cost, while weakly correlated with implementation fidelity.This is in agreement with the classical conceptual framework of fidelity that do not address the issue of how to adapt an intervention while still maintaining its effectiveness. In theory, the implications of adaptations on fidelity may be different. When adding something new, fidelity can be easily maintained. When a component is suppressed or modified, fidelity is threatened. In general, adaptability may or may not be affected by fidelity depending upon the modifications made regardless of the challenge to measure those outcomes (29,136). In Addition to this, perceived appropraitness and implementation cost may not be necessary causes to have receiptive organization rather the remaining measures could matter. Organizational readiness is likely to be highest when organizational members not only want to implement an organizational change but also feel confident, empowered and accept the approach that they can do so (24,29).

Our study considered all the intervention participants to measure the implementation outcomes of PDA in promoting EBF that makes the first of its kind in integrating implementation and trial study. In this regard, its appropraitness was differently perceived by male and female participants for which males rated highly.This may be due to the higher feeling of males in need to help those lactating mothers through other experienced deviants. This suggests some clue about the importance of engaging males while intervening to promote EBF. Also implementation cost was differently perceived by those who can't read & write as compared to their counterparts. This scale was lowly rated by those who can't read & write which is difficult to fully explain in this study. Roughly, it might be due to the fact that learning and understanding concepts and complex ideas increase with increasing educational status. This implies that considering educational status while designing and implementing such community-based counseling and social support intervention is paramout. The role of participants they had during implementation affected their perceiption, to view its acceptability, fidelity, feasibility, appropriateness and organizational

readiness, differently between facilitators, end-users and counsellors/PDs. Acceptability and fidelity were highly rated by the end-users as compared to the facilitators, while feasibility and organizational readiness were highly rated by the facilitators. But appropriateness was highly rated by the cousellors/PDs. This generally implies the role we have, the activity we conducted and the actual and perceived level of engagement can affect participants' understanding to rate a given implementation outcomes differently. This also informs us using PDs as a social actors and credible sources of EBF information and skill sharing resources in the urban community. Surprisingly, the implementation cost was higly rated by those who perceived as they have low level of engagement during implementation. Self-report and information biases were clearly reflected here which may mislead the future action. Otherwise, successful community-based programmes are often characterized by increased acceptability, appropriateness and fidelity of the intervention that in turn ensure its sustainability (246,247). The social support and experience sharing nature of learning how to EBF might have been contributed to the increased fidelity (248), in addition to the shared plan had at the beginning with the stakeholders at inception training. Our finding suggests the need to consider individuals' background while dealing with such a new approach to minimize a perceiption difference so that to boost effort together for success and sustainability issues.

The observed higher and positive perceptions towards the implementation outcomes reported in our study may be due to many reasons such as multi-stakeholders engagement from inception to implementation till evaluation stages, influences of the positive perceiption to the acceptability and appropraiteness of the PDA among the key stakeholders, and the improved community/parental acceptance of the informational and social support given by the PDs. Such findings imply that there is a possibility to intensify and replicate PDA as a new strategy to promote EBF and learn from different realities at urban setting. However, perception of the implementation participants toward feasibility, implementation cost and adaptability need great attention to be succussfull during implemenetation, and to achieve the desired outcome.

In addition to considering background characterstics, the explained variation (interdependency) among those correlated scales is important. Accordingly, less than half of the variation in the acceptability was due to the implementation fidelity which is the maximum variation explained. The next highest explained variation was seen between adaptability of the approach and its perceived implementation cost. This means one-fourth of the variation observed in adaptability

was due to the perceived implementation cost. Worth to explain, quarter of the variation in the penetrability was due to the perceiption of raters having about sustainability. Minimal variation observed in sustainability was due to the perceived implementation cost of the approach. This implies that the intervention participants were not much worried about the implementation cost while rating high to the sustainability of the approach. Implementation costs may vary according to vary in their complexity, type of implementation strategy used, settings of varying complexity and overheads, and the overall costs of delivery will vary by the setting.

Evidences showed that sustainability of a certain intervention approach is affected by the characteristics of the implementing individuals (coordinators, suppervisors, facillitors, change agents, and end-users) in addition to the organizational and community supports (249–251). It was reported that the quality of staff training and level of engagement could empower the stakeholders for future performance (252). This is also supported by previous studies that programs with higher levels of fidelity and adaptability are likely to be sustainable (253,254). However, sustainability can be affected by two ways such as ignoring the supporting parameters at designing and implementation stage (255) and/or shortlived trial study which have no a plan for scale-up. This calls for proactive thinking for careful designing of the program components such as training, partnerships, stakeholders' engagement, role identification in order to enhance the continuation of the program in acceptable way. Another study revealed that the adoption of community-based interventions depends on the extent of community and stakeholders' involvement and acceptance which in turn influence sustainability(248). The influence of adaptability on sustainability might be due to the degree of the intervention's fitness with the local context, needs, and health program. This means a well integrated intervention with the existing health system would be institutionally maintained (250,256). With a sense of mutual benefit if intervention participants have clear duties and responsibilities the implementation outcomes will be highly rated. High rates for such outcomes of PDA depend on the capabilities of the raters to implement the approach, the resources and material supports and community involvement and readiness to build sense of ownership(257). Otherwise, a service giver and receiver type of approach doesn't work with PDA.

5.4.1. Strengths/implications and limitations

We intended to assess and develop specific scales related with implementation outcomes of PDA as an intervention to promote EBF. Our aim is supported by other scholars (214) who argue that

measures need to be pragmatic if they are to be useful outside the context of research. Among the pragmatic features of these measures, psychometric strength, actionability, conceptual and content clarity and relevance to stakeholders are considered in our study. It was developed with experts and stakeholders' input and therefore might reflect what stakeholders view as important. We worked with experts to comment these measures, with the goal of developing new scales that can be used to assess the pragmatic nature of the outcomes with psychometric properties that address/fit for our stakeholders (133). We recommend researchers who are working in the similar approach and settings to apply these pragmatic implementation outcome measures such as being useful in informing decision-making, compatible with the settings, easy to use, and acceptable (258), especially they are relevant for resource-limited settings (131,259).

Among the strengths, we developed brief outcome measures that were started with developing as much as high number of items per constructs, tested through psychometric measurement ways, and developed each items as specific as possible to the approach, behavior under promotion, and context. For instance, acceptability items are specific to the purpose. The context- or treatment-specific nature of the tool will increase the chances of its use broadly in implementation research and practice. It is known that in implementation science, the majority of current measures are developed for the purpose of a generic study (usually with minimal conceptual clarity and psychometric testing) which is difficult to use again.

However, as a limitation, we are indecisive to declare weather the developed measures can address a study conducted in different contexts for different behaviors as it is. Specifying a wide range of the PDA principles, assumptions, and activities would ultimately enhance ownership and develop a positive perception about implementation outcomes. The measurements used in our study to examine these outcomes of PDA could provide methodological solutions to the recently growing implementation sciences (260). Thus, this result contributes to fill gaps in evidence on the application of the PDA from the design to sustainability as perceived by the participants in resources limited settings. The lesson learned from the perspectives of the key stakeholders would help to advance effective methods to use, to engage, empower and retain participants to promote EBF. As a strong side, our study conceptualized and measured implementation outcomes (process outcome) which act as an intermediate indicators between the intervention and its service outcome in short way, while between the intervention and desired

effects in long way. This is useful to understand the relationship between the intervention and desired effects (24).

Moreover, self-report, recalling, social desirability and information bias could be the possible limitations. To minimize reporting bias, items were prepared to verify each other (negatively stated items included that help to catch attention). Future research would benefit from further analyzing the discriminant and predictive validity using Structural Equation Modeling (SEM) between latent constructs at different level of structure. Replication is also recommended. Sensitivity to change and specificity of those measures/scales can be tested using advanced regression model. In the process, discriminate and structural validity with test-re-test reliability and prediction modeling could be done. This would give an opportunity to see the cause-effect relationship beyond merely correlation. Causation always implies correlation but correlation does not necessarily imply causation (245). Testing the measures with people who have different background characteristics and roles (during implementation) as we did in this study would benefit generalizability. Further study can be also done to examine the rate of decline or improvement in implementation outcomes over time to predict EBF practice while using PDA. We encourage researchers to replicate this methodology and suggest further refinements for the same approach and behavior in different context.

In summary, this study identified nine valid implementation outcome measures (acceptability, fidelity, appropriateness, feasibility, penetration, sustainability, adaptability, organizational readiness, and implementation cost) of PDA as a new strategy to promote EBF which are important indicators used to explain the implementation process. The process revealed 52 items which are valid and reliable measures of these outcomes. The correlation and variation explained in our context support the theoretical/conceptual relationship. Except for perceived feasibility, adaptability and implementation cost, the remaining six outcomes of PDA were highly rated by intervention participants. These findings suggested that the higher rate for an outcome meaure implies as it is a promising approach in promoting EBF in urban community by PDs. Therefore, the informational couseling and social support intervention using PDA should consider such imtermediate outcomes to be successful in improving EBF practice. Moreover, addressing the perceiption of intervention participants about feasibility, adaptability and cost issues need great attention throughout the implementation period to minimize the implementation challenges.

These specific psychometric measurement scales can be used in a formative evaluation (have a potential to understand the process) of pragmatic properties by adapting to the context.

5.5. Cost-effectiveness of PDA

This is the first study analyzed the infant and maternal health outcome against the cost of PDA as an intervention used to promote EBF. The trial-based controlled intervention improved DALYs for infants and QALYs for the mother with the total incremental cost of 760.1USD. This cost is the sum of the direct and indirect costs used (or to be used) while implementing the PDA intervention to promote EBF. The average (per infant) incremental cost of the added intervention was 5.9USD over a 7-months period of implementation. This indicates that the cost of intervention was higher by 5.9USD compared to the control group which had the same baseline cost as of the intervention arm. This implies that if some thing gives us more benefit with an added cost, we should align with the willingness to pay(WTP) to sustain such approach. This assumption should consider as health budget is fixed, spending more on a new intervention may require spending less on existing activities or increasing the annual expenditure per capita. WHO comission in health (218) interpreted that 1x to 3x GDP/capita is an appropriate cost-effectiveness threshold.

The mean incremental DALY of the intervention estimated was 0.40 for 59 months. However, the incremental DALY over 6 months (0.01) was less than this.This indicates that the health benefit of promoting EBF intervention using PDA is more detectable as the time goes forward till 5 years. In both timeframes, the PDA intervention was effective in reducing the infants' DALYs. The ICER was 14.75/DALYs averted which imply that to avert each extra DALYs for infants using the PDA, the health system need to cost 14.75USD. Each extra DALYs averted by this intervention relative to the usual care costed (will cost) such amount of dollar which is very low compared to other finding and threshold (219). The mean difference in DALYs (0.4) indicates that 60% of the first five years lived were free from diarrheal, and pneumonia morbidities, and from such related deaths among those infants who EBF with the PDA intervention as compared to their counterparts. Considering the Ethiopian-2019 per capita GDP of $856 (220), the PDA cost per DALY averted represents 1.7% of GDP per capita. When we look the maximum threshhod, 3x GDP gives $2,568 which is very high WTP thresholds – implying almost everything is cost-effective. This is because of the GDP is not related to opportunity cost of health spending that may limit absolute comparison with such a single study

findings. Another study recommended that for Ethiopia-in 2019, $167 - $221/DALY averted is acceptable cost range (221). The WHO cost-effectiveness thresholds were $1410 (three times GDP per capita) per DALY averted for possible serious bacterial infection treatment or prevention at community level to be considered cost-effective (222). The maximum threshold according to Ochalek (221) was $215 (46% of GDP per capita), while Woods and his collegues (2016) reported to be $288 (61% of GDP per capita) and $19 (4%) based on cross-sectional data so that the PDA to be considered cost-effective.

Therefore, our finding showed as it was highly cost-effective to promote EBF as an added intervention strategy to the existing UHEP (171). Another study considered the Ethiopian willingness to pay threshold at US$2000 per DALY averted (223) acknowledging as this is an arbitrary threshold. However, more in-depth analysis should be done to set such cutt-off point for better comparative reference. If we also compare with the current/2021 Ethiopia health expenditure per capita projected from 2019 (per capita $26.74) using the growing annual average rate of 9.54% (261), it is $31.84. In this case also the PDA is cost-effective. However, we recommend to invest on it by integrating with other community-based interventions through promoting volenteerism to become more feasible and effective in increasing proportion of EBF practice. Since the private sector is expending on health with 40.7% of the share of health expenditure (261), the government can shift to the community-based promotive and preventive services. Evidences showed as almost all of the maternal and neonatal health interventions have low ICERs. Although these services are stated as high priority services in Ethiopian, still there is low coverage and effectiviness. A study showed that how child mortality has decreased substantially in Ethiopia, and now neonatal morality makes up 46% of the under-5-mortality (262). For most policy makers, it is well known that maternal and child care services are effective and efficient interventions, while neonatal interventions have received less attention. Hence, the PDA to promote EBF has lowest ICERs value. The ICERs for these interventions are between $6 and $17/DALY averted and the expected net health benefits are expected to be 143 700 DALYs averted in total (263). In the resent EDHS-2016 and 2019, neonatal mortality rate is 29 deaths and 30 per 1000 deliveries respectively (6,41).

Sensitivity analyses showed as the variation of ICER was from 14 to 15.9/DALY averted. This shows the best ($14) and worst ($15.9) cost per DALYs to be averted. This was done with an assumption that assigning one PD for 10 mothers is feasible if the health system wants to invest

on this approach. Considering this, the best and worst scenarios were applied from 0-5% discounting and adding to the cost incurred, keeping the activities and number of participants in the intervention constant. This analysis was also done for the major/dominant sources of cost of the intervention to see the cost per person and ICER variation. Therefore, the PDA is less costly and more effective while discounting the overall cost by 5% and keeping the DALYs as it was. The addition of the PDA intervention is the best strategy if the cost is $14/DALY averted where the cost of $5.6 could avert 0.39DALYs as compared to the control. This comparison also confirm its cost-effectiveness. This implies that if this approach is integrated with the routine urban health programs, six visits (one pre- and 5 post delivery) per mother should be considered to bring this level of effect. This means the cost per mother and per visit are implemented to the minimum threshold considering the promotion of volenteerism. However, once the program changed into the routine system, the number of workshop and review meeting could be minimized and the suppervision could be intensified. This is due to the urban HEPs spend their much of time with outreach program through suppervision that will not incure additional cost as reported elsewhere in Ethiopia(264).

In the long run, mothers could perceive as their time costed is to be gained from the health of her baby and unnecessary health expenditure due to pnemonia and diarrhea, while PDs could be only volenteers. Hence, the health system will be free even from the minimum $14 cost to avert 0.39DALYs during childhood period till 59 months. As compared to different global and national cost-effectiveness thresholds, this approach is highly cost-effective with a cost per DALY considering the GDP per capita. This means the PDA to promote EBF at urban community settings does not have significant impact on other health expenditure. In fact, this study only assessed morbidity and mortality to estimate DALYs, not years lived with disability beyond 59 months. Hence the estimation might be underestimated as the intervention would be anticipated to also reduce impairment and later mortality.

The total, average and incremental mean cost of the PDA intervention was the same to analyze with the effect on infant and mother health outcomes. This is because of no intervention activity that only benefit either of them rather could be seen for mutual benefit for infant-mother pair. However, there is a difference in ICER values since the outcome for mother is QALYs which was 32.8/QALY gained. This means to gain each extra QALY, the health system need to run the PDA intervention as an added strategy and invest an incremental cost of 32.8 US dollar. This

cost could vary from 31.1 to 36.5/QALY gained. This shows the best and worst cost per QALY gained (or to be gained). As per the sensitivity analysis done for the dominant sources of cost of the intervention, the PDA is less costly and more effective either discounting the overall cost only or discounting both overall cost and QALYs as per the evidences suggested (172,189).

The sensitivity analysis showed that the addition of the PDA intervention is the best strategy if the minimum cost is $31.1/QALY, while become the worst if it is 36.5/QALYs gained. As we have compared with the different CEA thresholds (221) for cost/DALYs, the PDA is also cost-effective in this maternal aspect of health outcome to improve HRQoL during the first 6 months of post-partum. However, as compared to the infant health outcome, gaining one maternal QALYs is more costly than averting one DALYs related with her child. If the health system cost only the expense needed for one DALYs aversion ($14.75), at least half of the cost for QALYs gaining invested that could improve 50% of the QALYs to be gained with doubling that cost. If we think in this way, it is possible to impact both outcomes with the same cost. In the context of our randomized controlled trial, the PDA packages of services such as counseling/informational, emotional, appraisal social supports without material support was effective in reducing DALYs related with the child for 6 to 59 months, and improving the maternal QALYs only within the first 6 months. Such outcomes were significantly and positively different between the intervention and control groups, while the intervention group was benefited more. This is because of the quality of life changes are driven from social and emotional factors (188) which were seriously considered in this approach. To consider the PDA in promoting EBF for good health outcomes, the costs are mainly driven from delivery of the intervention (PDs' recruitment and PD inquiry process, training and workshop, supervision, time for PDs counseling and supporting services, time for mothers received the counseling/support cost). Such series of costed activities considered to be responsive for the trial design that has also some inseparable expenses with the research budget. However, we expect the cost of the intervention would be very minimal if it is absorbed into the routine government health system (188).

The magnitude of PDA intervention effect on maternal QALYs was 0.674 times higher among mothers in the intervention group compared to their counter parts in the first 6 months. This is explained by 45.8% controlling other confounders such as occupational status, ever breast fed and EBF practice which were significantly different between the arms. This implies that the PDA significantly and positively increased the maternal QALYs score in relation to BF practice and

associated support received from PDs. The key findings of our CEA suggest that community-based intervention was more effective and less costly than not intervening. The sub-group analysis also indicate mothers and their children would benefit more if some of their socio-demographic characteristics such as occupational status, history of ever-breastfed, and practice of EBF were considered. This is consistent with reported somewhere in Ethiopia (188). The composite mean (136.7) for those who were exclusively BF was higher as compared to their counterparts; 131.7 and respectively. This higher mean score indicates that those mothers who practiced EBF have higher HRQoL during the first 6 months of post-partum period. Therefore, promotion of EBF would benefit for both parties (mother and infant) if supported by PDA, unlike the other study which reported as practicing EBF more than a month is difficult and compromise maternal QALYs(265).

In fact, on some of the scales we analyzed, no mean score difference between the groups. For example, mean score for daily home activity and pain and discomfort scales. The mean score among intervention group rated for pain and discomfort was a little bit less than the control group, while in other all mean scores and the composite mean score is higher among those who received the intervention. This means, except for pain and discomfort scale, a higher mean score of intervention group indicates higher maternal QALYs. In line with this, the highest mean difference-incremental mean score (mean=11.9) was observed on anxiety and depression scale. Such level of score could be due to the impact of counseling and social support services through PDA that improve anxiety and depression expected to be faced by the mothers. The lowest mean difference (-0.1) was observed in relation with pain and discomfort scale that could be due to the medical and obstetric problems that every mother face during post-partum period. This type of intervention should focus on social factors to improve maternal QALYs. Overall, the intervention increased the PSMS of each mother by 25.2. This means it can increase their QALY by 18% considering as it was the same for both arms at baseline in the absence of this intervention. Hence, applying the PDA intervention to promote EBF, an incremental cost of $81.9 needed to improve maternal QALY by one during the first 6 months of post-partum.

In case the government fails to adapt this approach, the consumers' (mothers and her family) WTP could be assessed to see the possibility of receiving the service from PDs with their own payment/cost. This type of looking the other page (societal perspective) in CEA was fruitful as evidenced from Iran and other studies on WTP for hypothetical life-saving treatments (266,267).

To improve personal QALYs, other countries such as Thailand also found the WTP value of 1.42 times the GDP per capita for the additional QALY gained from life-saving interventions (268). This is due to the strong relationship of the WTP for the extra QALY gained from the social perspective that should also get attention in the future application of PDA. In fact, WTP should be assessed to each context while considering the social perspective to cover the intervention cost. In line with assessing this, we should consider the unrealistic and highest cost-effectiveness threshold reported by WHO that couldn't fit for low-income countries (222).

5.5.1. Implications for the health system

Basically this CEA was done from health system perispective weather PDA could improve the infant and maternal health outcomes with reasonable cost for the delivery of intervention activities. This study demonstrated that the new approach efficiently improved DALYs related with infants and maternal QALYs within the estimated timeframe. DALYs is only considered for the two top childhood diseases and mortality in relation with EBF (6,174). However, HRQoL is defined as mothers' perception about their position in life in the context of the culture and values in which they live, and in relation to their goals, expectations, standards and concerns about their health and general wellbeing (150). It has been used as a standard measure of maternal health outcome at individual level (156,157). Many women usually have little information about the long-lasting physical and mental health problems that may result as a consequence of pregnancy, childbirth, and puerperium; therefore, they are not ready when they face such problems. As a result, their health related quality-of-life will be compromised for a long period.

This is because of impaired mothers' health-related quality-of-life (HRQoL) after childbirth limits daily activity, decreases self-care ability, impairs child care, causes discontinuation of breastfeeding and the early introduction of solid food to an infant's diet, and increases medical care costs with poor health outcomes. The mothers' HRQoL also affects the health and well-being of the child, with long-term psychosocial and health consequences (269). Hence, counseling and social support for the first 6 months of post-partum should be a priority agenda within the maternal and child health program. Adapting such type of new approach based on this evidence to a routine setup may assist policy makers to consider its affordability, cost-effectiveness understanding that minimal level of support to the usual setup may affect the result of the intervention. In fact, the shortage of funding and budget line for such activities become a common challenge across countries in evaluations of community-based programmes (264,270).

The truth is that HEPs to population and HHs ratio are below the standard (45). Hence, such an added strategy would help them to shift some load of HEPs to PDs (volenteers).

In Ethiopia, the total health expenditure by the type of health facility is the maximum of all expenses (36% of the share) granted for health centers and clinics in 2017 (271). However, the total health expenditure by type of care shows the maximum of all expense (36%) was for curative services. This implies that the primary and secondary preventions received less attention while the huge expense went to the primary care-level. Therefore, the primary health care units received the maximum share of the anual expenses that could be a golden opportunity to consider the community based health promotion programs including EBF. This is because of multi-faceted benefit of EBF such as for the maternal, and child health as well as for the future gerenation to be healthy and productive.

If such effort implemented, infants would enjoy the benefit of EBF since pneumonia mortality was higher among not breastfed compared to exclusively breastfed infants 0-5 complete months of age by 14.97 compared to their counterparts (224). Otherwise, suboptimal breastfeeding would increase the risk of pneumonia and diarrhea morbidity and mortality outcomes (215,224). In addition, the annual burden of diarrhea related DALYs per household with one child will continue in sub-Saharan Africa including Ethiopia (225). Not only for the benefit of the baby, but also continuation of EBF till 6 months can improve quality of life of mothers that could adjust the physiologic changes and mood fluctuations (143).

5.5.2. Strengths and limitations of this study

This study had strong side in reflecting the internal and external validity of the findings to be generalizable. In economic evaluations, among the three designs (alongside a RCT, using a decision model and a mix of both), applying mixed design is the best practice and recommended that makes this study strong enough. The other strength is conducting this CEA alongside with RCT designed for its purpose, otherwise doing such costly intervention only for CEA is not recommended. This is because of since the analysis could be done from other RCT based data or decision modeling based on secondary data. To make it more comprehensive and responsive to the pair of infant-mother health issues, this CEA was done considering multiple health outcomes. In addition to these, specific strengths of the trial were discussed in the published article (93). Besides, since all costs were taken and the time-value estimated from the real project expense, the estimations might be sensitive enough to detect changes in cost per outcomes.

Beside those strengths, there are considerable limitations such as EBF practice might be considered as a behavioral outcome that may be difficult to measure in natural or monetary terms rather estimated using standard models for infants. Assessment of HRQoL of the mother would be impacted with self-report, information and social-desirability biases. To minimize these biases, the tool was free from sensitive issues and confidentiality was assured at the beginning. On top of this, we only conducted the CEA using the end-line maternal QALYs measures, rather could be measured at baseline to have true difference-in-difference besides the assumption we stated.

When we collect cost related data; we did not include design costs (proposal development, grant competition process, formative research, training materials and job aids preparation) which might be also a limitation that could challenge someone who want to reproduce this approach in the future. If these would have been included, the cost per DALY averted would have increased. In fact, such costs are one-time costs that may not highly affect the delivery of the intervention rather it could be considered as one time preparation cost. The time value estimation for supervisors was calculated based on the daily wage rate applicable for urban HEPs that might be also underestimate the supervision cost if someone wants to make supervisors out of the HEPs that have higher qualification.

The other limitation was it was difficult to clearly separate costs associated with intervention and research. Some activities such as workshop and review meetings were relevant for the intervention as well as for the research. Therefore, the cost of intervention reported in this study may be deflated. The slight limitation might be unable to capture short term infant health outcomes within 6 months and going for modeling that may not show the reality in DALYs averted in the study area. This could be considered for future study including the necessity of capturing long-term changes in morbidity, mortality, and disability terms directly from the study participants. Otherwise, it is good to acknowledge the drawback of Markov modeling method in excel-sheet which are “memory-less”–probability of progression only depends on the health state at the beginning of the previous cycle when applying half-cycle continuity correction. For instance, probability of death is constant regardless of the number of previous disease episodes and their severity level. In our case, the DALY weights were taken for moderate diarrhea and pneumonia that might underestimate the DALYs accounted for infants.

In conclusion, the CEA revealed that the added PDA as an intervention to promote EBF raised QALYs of mothers and decreased DALYs for infants with a feasible and acceptable cost. This approach is cost-effective compared to the global and national cost-effectiveness thresholds. Threfore, adding the PDA to a community-based maternal and newborn programme is cost-effective even as compared to the lower cost-effectiveness thresholds other than suggested by the WHO. For the future, we recommend to integrate with the existing urban HEP packages to make it more cost-effective or cost-free. The high workload of the HEPs would be in need of this approach that can solve the challenges of many community-based services provision. For the future, its effectivess can be studied making the input parameters free of cost, through community volunteerism and existing programs, to understand weather it will be functional at optmal state.

5.6. Summary of limitations and strengths

Although the effectiveness of PDA was analyzed and discussed, the unintended-desirable and undesirable effects were not documented and reported. Self-report bias, recalling bias, information bias and social desirability bias could be considered as limitations in measuring the primary and secondary outcome variables, satisfaction and other perception based variables in implementation outcome assessment and maternal HRQoL. How these were addressed to minimize limitations is discussed in detail in each study. Since it is randomized trial study, it might be also limited concerning internal and external validity. Internally by; experiences of subjects had between three-point measurements may be changed overtime and changes as a result of participation in a study, threats to external validity may arise from differences between target populations and our study populations. For example, interaction between selection criteria/process and intervention (participants who fulfilled the criteria for selection may be more or less likely to benefit from an intervention compared to the general population). Interaction between study setting and intervention (participants who knew that they were under study may react differently to the intervention compared to the target population). Although the intervention and control group were living in non-adjacent clusters/kebeles, still there might be information contamination since all are living in the same Town. More to add, the allocation concealment was only done for the assessors, since it was impossible to blind the participants due to the nature of the study.

In addition to the above limitation, the satisfaction measurement may also be limited by misclassification bias while dichotomizing at analysis. In fact, this is more relevant for only cluster-level analysis, unlike ours which was both at individual (satisfaction and pooled survival analysis) and clusters level (effect analysis).Moreover, multi-level factors might not be restricted only to those variables included in this study; rather other factors could be there to explain the unexplained variations in satisfaction. With regard to the implementation outcome measures, we are inconclusive to declare weather the developed measures can address a study conducted in different contexts for different behaviors as it is. This means we validated only for PDA in promoting EBF practice. Since the participants are multi-gravida, the findings which are influenced by parity may not be generalized to primi-gravida mothers.

For the cost-effectiveness evaluation, there are also considerable limitations such as EBF practice is a behavioral outcome which is impossible to measure in natural or monetary terms of health outcome, rather estimated using standard models. In addition, we conducted the CEA using the end-line maternal QALYs only, rather should be measured at baseline too. If that was done, the true difference-in-difference would have been determined, besides the assumption we stated. While estimating the costs, we did not include design costs (proposal development, grant competition process, formative research, training materials and job aids preparation). This may challenge someone who wants to reproduce this approach in the future. If these would have been included, the cost per DALY averted would have increased. In fact, such costs are one-time costs that may not highly affect the delivery of the intervention rather it could be considered as one time preparation cost.

Moreover, the time value estimation for supervisors was calculated based on the daily wage rate applicable for urban HEPs that might be also underestimate the supervision cost if someone wants to make supervisors out of the HEPs that have higher qualification. The other limitation was it is difficult to clearly separate costs associated with intervention and research. Some activities such as workshop and review meetings were relevant for the intervention as well as for the research. Therefore, the cost of intervention reported in this study may be deflated. It is also good to acknowledge the drawback of Markov modeling method in excel-sheet which are "memory-less"–probability of progression only depends on the health state at the beginning of the previous cycle when applying half-cycle continuity correction. For instance, probability of death is constant regardless of the number of previous disease episodes and their severity level.

In our case, the DALY weights were taken for moderate diarrhea and pneumonia that might underestimate the DALYs accounted for infants.

Besides these limitations, the study was strong in terms of retaining mothers throughout the study period, with a minimal lost to follow-up in both groups. Our achievement might be due to the appropriate number of subsequent doses/visits provided by the mothers (PDs) to the mothers at their home. The other strength is its rigorous scientific design using a cluster randomized control intervention which included a large sample size and the trial was integrated with the existing community health system. As far as we know, this study is the first in Ethiopia and Africa that evaluated the effect of PDA intervention on EBF practices under the age of 6 months. Hence, we can generalize this finding to urban settings. Masking subjects in such community trial is difficult, even impossible, but we blinded the data collectors. Since the outcome is sensitive to change (rate/proportion), lost to follow-up mothers were included in the subsequent analysis so that the difference between the groups might not be overestimated. The results of this study may have a meaningful contribution to the existing knowledge regarding community intervention programs and should encourage future research and policy making. In addition, this rigorously examined approach will help other researchers to learn procedural and methodological clarity to re-apply. Beside the costs incurred, measuring the outcomes at three time point enabled us to see the change over time in the study population was due to the intervention.

Among the strengths, we developed brief outcome measures that were started with developing as much as high number of items per constructs, tested through psychometric measurement ways, and developed each items as specific as possible to the approach, behavior under promotion, and context. For instance, acceptability items are specific to the purpose. The context- or treatment-specific nature of the tool will increase the chances of its use broadly in implementation research and practice. It is known that in implementation science, the majority of current measures are developed for the purpose of a generic study (usually with minimal conceptual clarity and psychometric testing) which is difficult to use again. The measurements used in our study to examine these outcomes of PDA could provide methodological solutions to the recently growing implementation sciences (260). Thus, this result contributes to fill gaps in evidence on the application of the PDA from the design to sustainability as perceived by the participants in resources limited settings.

The lesson learned from the perspectives of the key stakeholders would help to advance effective methods to use, to engage, empower and retain participants to promote EBF. Measuring the end-users satisfaction and implementation outcomes to understand the process are also strengths of this study; conducted through valid and reliable methods of analysis. This is useful to understand the relationship between the intervention and desired effects (24).To mitigate the internal and external validity problems of this trial, applying mixed design in economic evaluation is the best practice and recommended as we did. Moreover, since all costs were taken and the time-value estimated from the real project expense and experience, the estimations might not be highly sensitive to detect changes in cost per outcomes.

Chapter Six

6. General Conclusion and Recommendations

6.1. General conclusion

In conclusion, from the five studies of this dissertation, the PDA is an effective intervention to promote timely initiation within the first hour of life, and exclusive BF for the first 6 months. It was also effective in improving the secondary outcomes such as knowledge, attitude, and self-efficacy toward EBF practices and other direct and indirect indicators of EBF such as frequency and duration of BF as well as timely initiation of complementary feeding. It was also effective in shorting the time to initiate BF, median time, and the survival probability.

With the overall implementation of PDA, more than half of the end-users were satisfied, and highly rated implementation outcome measures. As an intermediate outcome, more than half of the end-users of the PDA intervention were satisfied. End-users' satisfaction with PDA as an intervention to promote EBF was predicted by multi-level factors. This study identified nine valid, reliable and well explained implementation outcomes which help to understand the success of PDA to promote EBF. The correlation and variation explained in our context support the theoretical relationship existing among these constructs. Majority of outcome measures were highly rated by intervention participants that suggest as it is a promising approach in promoting EBF by PDs. However, addressing the perception of participants about feasibility, adaptability and cost issues need great attention before and during implementation. Objectively, this approach was feasible and cost-effective compared to the recommended GDP per capita thresholds if integrated with the existing urban health system.

6.2. Recommendations and implications

PDA is an effective strategy that can satisfy end-users, acceptable/appropriate to the implementation participants and cost-effective in promoting EBF and TIBF which should be integrated with the existing urban health extension program. Therefore, we recommend the promotion and use of PDA as a new strategy to improve EBF and TIBF practice. In considering this approach as an intervention to promote EBF to the satisfaction of the end-users, future adopters should be mindful of the two-level factors identified in this study. Moreover, addressing the perception of participants about feasibility, adaptability and cost issues need great attention before and during implementation.

This study confirmed that PDs in the Ethiopia urban primary healthcare structure can be identified and qualified with training to be EBF counselor to provide lived experience sharing and support through home visits in their network. Since the intervention improved the short-term and long-term infant and maternal health outcomes, it could help decision makers to enhance the disease preventive role of primary care. The findings will be baseline information for the scientific community. We recommend integrating with the existing structure to make it more cost-effective through system absorption and promoting community volunteerism. Furthermore, based on specific and relevant findings from our studies, we are forwarding the following recommendations to contribute to the national health policy, urban health program, methodological or future scientific inquires, and for the future practice.

6.2.1. Policy/program recommendations

- ✓ Since there is no evidence in Ethiopia, and limited information globally, before applying at national level conducting pilot test would give a chance to learn more from the variabilities exist in Ethiopian urban areas. However, in Jimma town, it can be directly implemented since those stakeholders involved during intervention had experience on the process and highly rated the implementation outcomes.
- ✓ The concept of PD approach can be further popularized as it can strengthen our existing health system for better health outcomes in the future. The concept of PD provides an unconventional manner through which knowledge and skills can be transformed into practices. Mothers with positively deviated behavior can be identified from the community, by the community, and to the community who can be trained and motivated to share their lived-experience on EBF and TIBF.
- ✓ The findings from this study have community and policy-level implications for several aspects of prevention of child undernutrition, and design and development of appropriate BF intervention in Ethiopia as well as in similar settings. Future application of this research findings and evaluation procedures will help the Ethiopian government and development programs to design appropriate and contextualized strategies for scaling up BF programs.
- ✓ Prioritizing PDA intervention at urban settings could have a significant impact on overall child health outcomes in Ethiopia through improving EBF, TIBF and timely initiation of complementary feeding practices. Hence, the health system should explore the adoption of the PD approach as way of promoting optimal BF. In line with this, adopters should consider

interventions focusing on improving maternal ideation factors, which in turn might improve BF practices or the reverse, could happen. This type of intervention should consider designing and funding of community-based promotion of EBF practices to change the state of the art-subjectively and negatively prevailing that discourage these important practices.

- ✓ The future program should encourage mothers to receive support from positive deviants so that to improve TIBF and EBF. This approach may support the inadequate number of urban HEPs to implement the community-based packages in the era of rapid urbanization. Ethiopia has implemented the urban HEP at the grassroots level since 2009, through household modeling approach. Therefore, the existing health system should scale up this strategic approach as an added value to the existing fragile urban HEP. This means, FMOH as well as Jimma Town Health Office may consider this strategy in increasing coverage of home visit to promote EBF and as a mechanism of future task shifting and reducing loads from UHEPs to PDs.
- ✓ Regardless of the intervention, the TIBF practice can be also improved if the HEPs consider the predictors during intervention such as parity, sex preference, mode of delivery, the health status of mother soon after delivery, support from relevant others, knowledge, and attitude of EBF.
- ✓ However, it can be more improved by 25% if this approach be used and implemented as a new strategy. The future program should encourage mothers to receive support from positive deviants so that to improve those very important practices besides the urban living challenges in which mothers face. This approach can be implemented as an added strategy to the existing urban HEP as well as can be piloted for the other disease prevention programs.

6.2.2. Methodological/research recommendations

- ✓ In a certain community, for a certain behavior, there are always PDs with the concept that in every community there are individuals who have found uncommon practices and behaviors that enable them to achieve better solutions to problems than their neighbors who face the same challenges/barriers. Such approach aims to solve community problems by focusing on positive deviance within the community and seeks out PDs in the community and uses their existing solutions to bring about sustainable behavioral change. The PD approach is a technique developed by practitioners in the field. It does not have a specific theoretical framework in the literature and it is not a theory. This study investigated the use of PDA in

practice considering participatory approach. Hence, we recommend to study the other type of PDA called an appreciative inquiry and assets-based community development in which the problems are identified by bringing in outside solutions. We also recommend researchers to apply the same approach in different time, since subjective norms change over time. Behaviors that were considered positive initially may finally be considered negative.

- ✓ In most of the interventional studies that used the PDA were applied at individual level including our study. Hence, we recommend trying on organizational level or group intervention for group behavioral modification. Also most of the studies were pre-posttest designed, this new approach need further community or clinical trial. In line with this, it would be good to investigate whether the theory of diffusion of innovations is a useful way to think about the spread of PD through community health practice. When applying the PD approach to a new area, it might also be useful to consider the theory of diffusion of innovations that meet the requirements for quick diffusion.
- ✓ Further research is needed to determine the relationship (predictive capacity) between the multiple outcomes of a certain intervention, and needs to be assessed on a wider scale in urban communities in Ethiopia. This would enable the future researchers to develop model, beyond the conceptual framework we developed.
- ✓ Furthermore, research can be conducted using the same approach on the same behavior but in different context to capture the long-term effects of the intervention on a variety of health outcomes of mother and children as well as its impact at societal level behavior change.
- ✓ Some of the measurement biases such as recalling, response and social desirability bias should be measured alongside with such type of study to confirm the accuracy of the self-reported outcome measures. Moreover, in the present trial, although we measured breastfeeding practices using a 24 hours recall, we used the since birth data to determine TIBF and EBF. Hence, within-subject variance over the past 24 hours and a since birth measure should be studied in the future.
- ✓ Although the response biases may be equally distributed between the groups, assessing the mothers and implementers perspective through qualitative study could have informed a future scale-up. In addition, we recommend future researchers to determine the direct and indirect costs of practicing EBF verses if other products given to the child.

- ✓ Although we evaluated the performance outcomes (multiple intermediate outcomes) in parallel with effectiveness outcomes, evaluating using rigorous analysis could help to understand the predictive capacity of each constructs on the subsequent outcome and finally on the intended effectiveness outcomes. For, example, how much the acceptability will predict users' satisfaction, and then how much the satisfaction would predict the practice of EBF were unknown in this study. But using secondary data, we only modeled how much practicing EBF through the support of PDs can predict the infant and maternal health outcomes.
- ✓ We assessed perceived feasibility and adaptability scales as part of implementation outcome measures. Hence, in the future it would have been good to measure the actual feasibility of the PDA. This would enable to recommend bout the integration with the existing health system to achieve potentially desirable impacts. The psychometric measurement scales can be used in a formative evaluation (have a potential to understand the process) of pragmatic properties by adapting to the context.
- ✓ At the beginning scholars of PDA thought that the assumption of conventional learning theories doesn't work, rather this approach is deeply rooted in changing practice first, then learning may come after that. Our finding challenges this previous concept of PD approach which still needs to be tested in different settings for different behaviors. We can conclude that separately understanding behavior, knowledge, and attitude, and trying to draw linearity is not acceptable rather bi-directional (learning to practice or vis-versa) effect might be there. Therefore, the dynamic concept of the PDA is still calling researchers to generate additional evidences to confirm as practice leads to learning.
- ✓ To minimize self-report and recalling bias of the time to initiate BF, since mothers might be overwhelmed and stressed due to labor or cesarean pain in the first some hours after birth, to capture more reliable response, the future studies should consider to make the interview date near to the date of birth. In line with this, the predictive nature and direction of relationship of attitude and self-efficacy with TIBF need further study.
- ✓ In measuring end-users' satisfaction, multi-level factors might not be restricted only to those variables included/identified in our study; rather other factors could be there to explain the unexplained variations in satisfaction for which more community factors need to be considered.

- ✓ We recommend researchers who are working in the similar approach and settings to apply these pragmatic implementation outcome measures such as being useful in informing decision-making, compatible with the settings, easy to use, and acceptable, especially whether they are relevant for resource-limited settings.
- ✓ Future research would benefit from further analyzing the discriminant and predictive validity using Structural Equation Modeling (SEM) between latent constructs at different level of structure. Replication is also recommended. Sensitivity to change and specificity of those measures/scales can be tested using advanced regression model. In the process, discriminate and structural validity with test-re-test reliability and prediction modeling could be done. This would give an opportunity to see the cause-effect relationship beyond merely correlation. Causation always implies correlation but correlation does not necessarily imply causation.
- ✓ Further study can be done to examine the rate of decline or improvement in implementation outcomes over time to predict EBF practice while using PDA. We encourage researchers to replicate this methodology and suggest further refinements in different context.
- ✓ With respect to CEA, for the future, the effectiveness of PDA can be studied making the input parameters free of cost, through community volunteerism and existing programs, to understand weather it will be functional at optimal state.

6.2.3. Practical/operational recommendations

- ✓ Practically, knowledge, skill and practice of EBF would be transfered from the PDs to the mothers and relevant others. If these spread in the community, behavioral and social change will be facilitated in urban setting in which EBF practices are mostly and negatively affected. This is naturally will happen in the long run due to spill-over effect of remained information in the community through the PDA that facilitates solving the problem of EBF indigenously.
- ✓ More practically, incentives can be given to the PDs by the local governing bodies to promote discovering more positive deviants from the community who can do this job as part of their duty if delegated from their community.
- ✓ Including the details of visiting dose and activities into the urban HEPs guideline/manual (when, how, what and with whom to do each activity during prenatal and postnatal periods), then identifying PDs and training them by the respective HEPs can support the system at grassroots level.

- ✓ The positive deviants can contribute for the 6 month EBF through sharing self-confidence (self-efficacy), providing different types of support to the mother and her relevant others, engagement with and seeking support from healthcare professionals, sharing experiences related with breast milk expression, how to store and use it. Well supported, counseled and encouraged mother would have high perceived capability to prioritize BF, overcome unforeseen BF challenges.
- ✓ In the process, engaging family members and relevant others would contribute to successful practice of EBF. We recommend that the family members should be equally informed and convinced of the benefit of EBF and supported with practical skill during their visit. These interventions aim to develop mothers' self-efficacy for BF and to prepare them to manage common BF challenges. HEPs should also provide regular follow-up of the PDs, mothers and families throughout the lactating period. Enhanced societal collective actions such as BF-friendly policy in workplace can create enabling environments for those mothers who are not willing or unable to express their breast milk. During each visit, emotional support such as building trust, empathy, and understanding the family are the core to transfer other related information, skills and support.
- ✓ Moreover, addressing the perception of intervention participants about feasibility, adaptability and cost issues of PDA intervention need attention throughout the implementation period to minimize the unforeseen implementation challenges.

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Annexes

Annex-I: Consent sheet, data collection tool [with translated versions]

Data collection tool for study-I

Baseline, Midline and Endline Data Collection tool

Information sheet

Interviewer-administered questionnaire prepared for all eligible study subjects in Jimma town community living in selected kebeles, to evaluate effectiviness of positive deviance approach on exclusive BFpractice at community level using positive deviants from February 01-September 30, 2018, through the financial and technical support of **iifphc**-Ethiopia in collaboration with John Hopkins University-USA public health school.

Title of implementation study; Community based Newborn and InfantBFPractice Using Positive Deviance Approach: A Cluster Randomized Controlled Trial.

Investigators: Mr. Yibeltal Siraneh (PhD fellow) and supervisors (Dr.Zewdie B. and Prof. Mirkuzie W.)

Dear respondent,

I am inviting you to participate in an intervention study on community based newborn and infant Caring practice including EBF. Such type of implementation research has not been done in Ethiopia specifically in Jimma town. I'm inviting you to participate as you are a member of the community in Jimma town. Before you decide whether to take part, it is important for you to understand why the research is being done.

This intevention study is being conducted for the academic use, evidence generation for policy makers so as to have sustainable community based newborn and infant caring program including BFpractice. It has got ethical approval from the Institutional Review Board of the health institute, Jimma University, after all the evidence generated will be archived to **International Institute for primary health care resource centre and possible publication**. All information that is collected from you during the study will be kept confidential, and your name will never be mentioned in any analysis and dissemination of findings. Only your detail background information is needed for follow up intervention and to access you at each subsequate visit or for survey.

Taking part in this study is completely voluntary based. If you decide not to be in this study, or if you stop participating at any time, you won't be penalized or lose any benefits rather you will gain best experiences of newborn/infant caring practices. However, the honest information you give us is highly valuable to the study and it will be collected now, at third month and at the end of the intervention-sixth month. I am grateful to you for considering this research and look forward to your response!

Consent sheet

I (study participant) have heard all the information, understood the aims of the study and noted that participation in this study is completely voluntary and that I can withdraw from the study any time. I'm fully aware that the results of this study will be used for scientific purpose and may be published to desseminate the finding for end-users. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this study.

_____Yes, I want to participate in the study

_____ No, I don't want to participate in the study

Part one: Socio-demographic and obstetric related characterstics

S.No	Item/question	Response options
1.	Name of mother/House number_____Cell Phone_____	
2.	Language/ mother tongue	1. Afan Oromo 2. Amharic 3. Dawuro 4. Kaffa

		5. Other_____
3.	Name of Kebele (HP nearby)	1. GG 2. MK 3. AM 4. HM 5. Mentina 6. BK
4.	Age of Mother	_____ in completed years
5.	Religion	1.Orthodox 2.Muslim 3.Protestant 4.Catholic 5.Other_____
6.	Ethnicity	1.Oromo 2. Dawuro 3. Kaffa 4. Amhara 5.Other_____
7.	Marital status	1. Married 2. Divorced 3. Widowed 4. Single
8.	Educational status	1.Unable to read & write 2. Able to read & write (1-8, 9-10, 11-12, 12+)
9.	Occupational status	1. House wife 2.Merchant 3.Student 4.Gov't employee 5. Other ___
10.	Household monthly income	**(**ETB estimated) _____
11.	Number of live birth (Parity)	_____(in number)
12.	Preference for sex of the baby	1. Not prefer 2. Prefer-F 3. Prefer-M
13.	Previous history of receiving home visit from HEPs	1. No 2. Yes
14.	Previous history of receiving home visit from model mothers	1. No 2. Yes
15.	Received support from relevant others (partner, grandmother)	1. No 2. Yes
16.	Main source of info about EBF	1. UHEPs 2. Model mothers/peers 3. Family/relative 4. Health professionals 5. Mass media 6. Other
17.	Intention to BF for the current baby	1. No 2. Yes

Part two: Ideation factors of EBF practice related measurements

1.1. Knowledge of EBF

S.No	Item/questions	No(0)	Yes (1)
1)	Exclusive BF is cheap, available and healthy for normal baby growth		
2)	EBF is feeding breast milk only, except medicine, vaccine or supplements in the first six months.		
3)	Colostrum in the breast provides nutrients that should be fed at beginning to build immune system of the baby		
4)	Exclusive BF promotes mother-baby bonding		
5)	Exclusive BF protects the baby from diarrheal and other infection		
6)	Exclusive BF should start immediately within 1 hr after delivery		
7)	Exclusive BF serves as birth control/ spacing birth		
8)	Exclusive BF is sufficient for the baby nutrient and fluid needs during the first six months		
9)	Exclusive BF must be practiced until the infant is 6 months old		
10)	Giving water or anything except medicine to baby is not acceptable within the first 6 months		
11)	BF reduces/prevents the risk of breast cancer		
12)	Babies will gain weight if they receive effective breast feeding		
13)	Correct positioning helps to achieve effective BF		
14)	Babies sleep well after they receive adequate BF		
15)	An expressed breastmilk can stay up to 6hrs without getting spoiled.		
16)	Frequent shifting from one breast to the other before feeling empty makes the baby to feed only water (fore milk)		
17)	Belching after feeding shows that the baby is full		

1.2. Attitude and subjective norm/ social support toward EBF

Please try to assess your feeling, perception, attitude and prevailing subjective norm toward EBF practice and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
1)	It is good to feed breast milk **only** for the first 6 months					
2)	If your child is not started on bottle feeding within the first 6 months, it will be difficult to switch breast milk later on					
3)	Even if breast milk expression is a good option during busy time, it will affect the nipple sharpnes and decrease milk production					
4)	Feeding breast milk only during the first 6 months has very important health benefit					
5)	BF practice may affect my beautifulness or breast cosmetic due to engorgement					
6)	To have fattened baby we should feed formula and other products in addition to breast milk.					
7)	I believe colostrum shouldn't be given rather should be discarded					
8)	I always comply to what my referent other approved and advised me in practicing EBF					
9)	Most of mothers who are in my social network disprove EBF practice					
10)	The benefits of BFlast only as long as the baby is BF					
11)	BF is more convenient than formula feeding					
12)	Formula feeding is the better choice if the mother plans to go back to work					

1.3. Self-efficacy to practice EBF

Please try to assess your efficacy/ability to practice EBF and response of your practice on health outcome, and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
1.	I am able to practice EBF to prevent infanthood infection i.e. diarrhea					
2.	I am able to practice EBF to promote infant's normal body-brain growth					
3.	It's easy to practice EBF to prevent breast cancer					
4.	It's easy to practice EBF to prevent unintended pregnancy					
5.	It's easy to practice EBF to prevent breast engorgement and associated pain					
6.	I can do EBF to prevent immunity deterioration of the baby					
7.	I can breast feed with the correct position: siting and supportive holding					
8.	I can breast feed with the correct attachment: bulging out of baby's lips					
9.	I can breast feed frequently to satisfy the baby's need					
10.	I can express my breast milk with supportive techniques: using pump or manual means					
11.	I can breast feed with timely shifting when feeling empty					

Part Three; Measuring Practice of exclusive BF *(Adopted from WHO standard)*

1. Date of interview _____
2. Child's date of birth_____
3. Have you ever breast fed? 1. No 2. Yes
4. If Yes to Q3, Have you BF at any given day within 6 month? 1.No 2. Yes
5. If No to Q3, have received any of the following at any given day within 6 month?
   a. Vitamins, mineral supplements, medicine 1. No 2. Yes
   b. Plain water 1. No 2. Yes
   c. Sweetened or flavored water 1. No 2. Yes
   d. Fruit juice 1. No 2. Yes
   e. Tea or infusions 1. No 2. Yes
   f. Infant formula 1. No 2. Yes
   g. Tinned, powdered or fresh milk 1. No 2. Yes
   h. Any other liquids 1. No 2. Yes
   i. Mushy or solid foods 1. No 2. Yes
   j. Oral rehaydration salts (ORS)1. No 2. Yes
   k. Other,specifiy _____
6. Had your menses returned since the birth within 6 months of post delivery? 1. No 2. Yes
7. How long after birth did you put to breast? 1. Emmediately 2. _____in hours 3. _____in days ***(If less than 1 hr record minutes, If less than 24 hours record hours, otherwise record days)***
8. How many times did you breast feed between sunset and sunrise at any given day?_____
9. How many times did you breast feed during the daylight hours at any given day?_____
10. If your baby received any of the following, tell me the frequency at any given day within 6 month?
    a. Vitamins, mineral supplements, medicine_____times
    b. Plain water _____times
    c. Sweetened or flavored water _____times
    d. Fruit juice _____times
    e. Tea or infusions _____times
    f. Infant formula _____times
    g. Tinned, powdered or fresh milk _____times
    h. Any other liquids with respective frequency_____times

i. Mushy or solid foods _____times
j. Oral rehaydration salts (ORS) _____times

11. For how long did your baby breast feed/ length of suckling?_____in minutes
12. Have you ever bottle feed your baby? 1. No 2. Yes
13. In the last 24 hours, have you fed breast milk only? 1. No 2. Yes
14. In the last 6 months, have you fed breast milk only? 1. No 2. Yes
15. Have you started complementatry feeding at 6 month of post-partum period? 1. No 2. Yes

Translated Version into Amharic

ጅማ ዩኒቨርሲቲ፤ የማህበረሰብ ጤና ፋካሊቲ

የጤና ስነባህሪና ማህበረሰብ ት/ት ክፍል

የጥናቱን የአፈፃፀም ዉጤት የሚለካ መጠይቅ **(Intervention effect measuring tool)**

የጥናቱ *መመሪያ*

ጥናቱ ለሚመለከታቸው አካላት በቃለ-መጠይቅ መልክ የተዘጋጀው፤ በጅማ ከተማ ለጥናቱ ሲባል በተመረጡ ቀበሌዎች ዉስጥ ለሚኖሩ እናቶች ነው፡፡ይህም ጡትን ብቻ በማጥባት ለመልካምነት ያፈነገጡ የሚለዉን የልምድ ልዉዉጥ ዘዴ ውጤታማነትን መገምገም ሲሆን ቤት ለቤት እየሄዱ የሚያማክሩ ለመልካምነት ያፈነገጡና የሰለጠኑ እናቶችን ከ February 01-September 30, 2018 በመመደብ **iifphc**-Ethiopia የገንዘብና የቴክኒካል ድጋፉን ከ John Hopkins University-USA public health school ጋር በመተባበር አድርጎልናል፡፡

የጥናቱ ርእስ፡- ማህበረሰብ አቀፍ ለጨቅላ ህፃናት እንክብካቤ እና ጡትን ብቻ የማጥባት ልምድን ማሻሻል፡ ለጥቅም/ለመልካምነት ማፈንገጥ የሚለዉን ዘዴ በመጠቀም: Randomized Controlled Trial.

ተመራማሪ:- አቶ **ይበልጣል ስራነህ** (PhD fellow), እና አማካሪዎች (ዶ/ር ዘዉዴ ብርሃኑ እና ፕ/ር ምርኩዜ ወልዴ)

ፈቃደኝነት መጠየቂያ ቅፅ

የተከበሩ የጥናቱ ተሳታፊ፡

በዚህ ጥናት (ማህበረሰብ አቀፍ ለጨቅላ ህፃናት እንክብካቤ እና ጡትን ብቻ የማጥባት ልምድን ማሻሻል፡ ለመልካምነት ያፈነገጡ የሚለዉን ዘዴ በመጠቀም)እንዲሳተፉ እየጋበዝኩ ይህ ጥናትም ካሁን በፊት በኢትዮጵያ አልተሞከረም፡፡ ለመሳተፍ ከመወሰንዎ በፊት ግን ጥናቱ ለምን አስፈለገ የሚለዉን ማወቅዎ ጥሩ ይሆናል፡፡ ይህ ጥናት የሚደረገው ለትምህርት ሂደት ማሟያና ለጤና ፖሊሲ አውጭዎች መረጃን ለማቅረብ ሲሂሆን ለመጀመሪያዎቹ 6-ወራት ጡትን ብቻ የማጥባት ልምድ ቀጣይነት ያለውና ማህበረሰቡን ያሳተፈ እንዲሆንም ጭምር ነው፡፡ (እርስዎ የምክር አገልግሎት በሚሰጥበት ወገን ስለሆኑ የምክር አገልግሎቱ ተጠቃሚ ይሆናሉ ፡ ለ**Intervention ቀበሌዎች ብቻ**)፡ ጥናቱ ከጅ/ዩ ከሚመለከታቸው አካላት (Institutional Review Board of the health institute) ፍቃድን አግኝቶዋል፡፡ በመጨረሻም የጥናቱ ውጤት ድጋፉን በሰጡን ተቋሠማት የሚቀመጥና በአለም አቀፍ መፅሄት ላይ የሚታተም ይሆናል፡፡

የትኛዉም ከርስዎ የተወሰደ መረጃ ምስጢራዊነቱ የተጠበቀ ሲሆን በምንም አይነት መልኩ ስምዎትም አይጠቀስም፡ ፡ ነገር ግን እርስዎን የሚለይ የግላዊ መረጃ የምንወስደዉ ለክትትልና መረጃ ሰብሳቢዎች በቀላሉ እንዲያገኘዎት ሲሆን የቀበሌ ስም፤ መንደር፤ የቤትና ስልክ ቁጥር እንፈልጋለን፡፡ በዚህ አጋጣሚ በተደጋገጋሚ መረጃዎችን የምንወስድ መሆኑን ማዎቅና መስማማት ይኖርብዎታል፡፡

በጥናቱ ለመሳተፍ ቢወስኑ ምንም አይነት ቅጣት የማይጣልብዎት እና ዲሁም ምንም አይነት ጥቅም የማያጡ መሆኑን መግለፅ እንፈልጋለ ን ፡ ፡

ነገር ግን በታማኝነ ት የሚሠጡን እውነ ተኛ መረጃ ለጥናቱ ከፍተኛ ጠቀሜታ አለው፡፡ ቃለ-መጠይቁ 30 ደቂቃዎች ይፈጃል፡ ፡የጥናቱን ጠቀሜታ በማስተዋል በጥናቱ ለመሣተፍ ለሚወስኑ ምሥጋናዬ የላቀ ነው፡፡

ፈቃደኝነት መጠየቂያ ቅፅ/Consent sheet

ሁሉንም ነገር ሰምቻለሁ፤ እንዲሁም ተረድቻለሁ፡፡ በሙሉ ፈቃደኝነት ለመሳተፍ፤

1. እፈልጋለሁ/ተስማምቻለሁ_____
2. አልፈልግም_____

ክፍል አንድ:የግል መለያ እና መነሻ መረጃ ጥያቄዎች (በእናትዬዋ ጥቆማ ለሚሳተፉ ብቻ)

ተ.ቁ	መጠይቅ	መልስ
1.	እድሜ	_____(በአመት)
2.	ፆታ	1. ሴት 2. ወንድ
3.	ሀይማኖት	1. አርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ_____
4.	ብሄር	1. አሮሞ 2. ዳዉሮ 3. ካፋ 4. አማራ 5. ሌላ _____
5.	የጋብቻ ሁኔታ	1. ያገባ/ች 2. የፈታ/ች 3. የሞተበት/ባት 4. የላገባ/ች
6.	የትምህርት ደረጃ	1. ማንበብ እና መጻፍ የማይችል 2. ማንበብ እናመጻፍ የሚችልግን መደበኛ ትምህርት ያልተማረች 3. የመጀመሪያ ደረጃ ትምህረት የተማረች 4. ሁለተኛ ደረጃ ትምህረት የተማረች 5. የመሰናዶ ትምህረት የተማረች 6. የመጀመሪያ ድግሪ እና ከዚያ በላይ የተማረች 7. ሌላ_____
7.	የስራ ሁኔታ	1. የቤት እመቤት/አባወራ 2. ነጋዴ 3. ተማሪ 4. የመንግስት ሠራተኛ 5. የግል ተቋም ሠራተኛ

		6. ሌላ_____
8.	ወርሃዊ የገቢ መጠን	_____ብር

ክፍል ሁለት፡ ከጡት ማጥባት ጋር በተያያዘ የእዉቀት፤ አመለካከትና በራስ-የመተማመንን ሁኔታን ለመለካት

1.1.ጡት የማጥባት እዉቀት

የጡት ማጥባት እዉቀትን የሚለኩ መጠይቆች (አዎ ወይም አይደለም በማለት ይመልሱ)

S.No	መጠይቆች (በአረፍተ-ነገር)	አይ (0)	አዎ (1)
1)	ጡትን ብቻ ማጥባት ለጤናማ የህፃን እድገት እርካሽ፣ በቀላሉ የሚገኝና ጤናም ነገር ነዉ		
2)	ጡትን ብቻ ማጥባት ማለት የናት ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት መመገብ ሲሆን መድሃኒትና ክትባትን አይጨምርም		
3)	የህፃኑን የበሽታ የመከላከል አቅም ለማዳበር ለመጀመሪያ ጊዜ እንገርን መመገብ ያስፈልጋል		
4)	ጡትን ብቻ ማጥባት እናትን ከልጅ ጋር ያለዉን ትምረት ይጨምራል		
5)	ጡትን ብቻ ማጥባት ህፃኑን ከተቅማጥና ሌሎች ተላላፊ በሽታዎች ይጠብቃል		
6)	ጡትን ብቻ ማጥባት በመጀመሪያዉ 1 ሰዓት ዉስጥ ሊጀመር ይገባል		
7)	ጡትን ብቻ ማጥባት እንደ እርግዝና መከላከያ ዘዴ ይጠቅማል		
8)	ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት ማጥባት የህፃኑን የምግብና ፈሻሽ ፍለጎት ያማላል		
9)	ጡትን ብቻ ማጥባት ለመጀመሪያዎቹ 6 ወራት ሊተበር ይገባል		
10)	ለህፃኑ ለመጀመሪያዎቹ 6 ወራት ዉሃም ቢሆን መስጠት ከመድሃኒት በቀር ተቀባይነት የለዉም		
11)	ጡትን ብቻ ማጥባት የጡትን ካንሰር ይከላከላል		
12)	ህፃን ልጅ ባግባቡ ጡትን ብቻ ካጠቡት ግብቱ ይጨምራል		
13)	ህፃን ሲያጠቡ ባግባቡ ማቀፍ ዉጠታማ አመጋገብን ይፈጥራል		
14)	ህፃናት በቂ ጡት ከጠቡ በጥሩ ሁኔታ ይተኛሉ		
15)	የታለበ የጡት ወተት ሳይበላሽ ለ6 ሰዓታት ይቆያል		
16)	በማጥባት ወቅት የወተቱን ማለቅ ሳይረዱ በፍጥነት መቀያዬር ህፃኑ ዉሃዉን ብቻ እንዲያገኝ ያደርጋል		
17)	ህፃኑ ከጠባ በኋላ ካገሳ የመጥገቡ ምልክት ነው		

1.2. ጡት ብቻ የማጥባት አመለካከት

የጡት ማጥባት አመለካከትን የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
1.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት መልካም ነዉ					
2.	ህፃኑ በመጀመሪያዎቹ 6 ወራት ዉስጥ ጡቶ ካልጠባ በኋላ ጡትን ማስቆም ከባድ ነው					
3.	ለስራ ሲዎጡ ጡትን አልቦ ማስቀመጥ/መስጠት ጥሩ ቢሆንም እንኩዋን የጡት ጫፍን ይጎዳል፤ የወተት ምርት ይቀንሳል					
4.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት በጣም ጥሩ የጤና ጥቅም አለዉ					
5.	ጡትን ብቻ ማጥባት ሰለሚያገዘፈዉ ዉበቴን ያበላሻል ወይም የቱቴን ዉበት ያጠፋል					
6.	ወፍራም ልጅ እንዲኖረኝ ከጡት በተጨማሪ የጣሳ ወተት መመገብ ያስፈልጋል					
7.	እንደኔ እምነት እንገር ወተት መጣል እንጅ መስጠት የለበትም					
8.	አኔ ሁሌም ጡት ከማጣባት ጋር በተያያዘ በቅርበት የምወዳቸዉ/አሉኝ የምላቸው ሰዎች ያሉኝን ነገር ነው ማደርገው					
9.	በማህበራዊ ግንኙነቴ ውስጥ ያሉ በርካታ እናቶች ጡትን ብቻ ማጥባትን አይደግፉም					
10.	ጡት ብቻን የማጥባት እቅም የሚቆዬው እስካጠባን ድረስ ብቻ ነው					
11.	ጡት ብቻ ማጥባት የጣሳ ወተት ከማጥባት በላያ ምቹ ነው					
12.	እናት ወደስራ ለመመለስ የጣሳ ወተት ማጥባት ጥሩ አማራጭ ነው					

1.3. ጡት ብቻ ማጥባት በራስ የመተማመን/የመተግበርን

ስለጡት ብቻ የማጥባት በራስ የመተማመን/የመተግበርን አቅም የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
1)	የህፃናት ተቅማጥን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
2)	የህፃናት ሰውነትና አእምሮ እድገት ለማቀላጠፍ ጡትን ብቻ ማጥባት እችላለሁ					
3)	የጡት ካንሰርን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
4)	ያልተፈለገ እርግዝናን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
5)	የጡት መግዘፍንና ጠያያዥ ህመምን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
6)	የህፃኑ በሽታን የመከላከል አቅሙ እንዳይዳከም ጡትን ብቻ ማጥባት እችላለሁ					
7)	በትክክል በመደገፍና በመቀመጥ ጡት ማጥባትን እችላለሁ					
8)	በትክክል ጡቴን ማስያዝና ጡት ማጥባት እችላለሁ					
9)	የልጀን/የህፃኑን ፍላጎት ለማሙዋላት ደጋግሜ ጡቴን ማጥባት እችላለሁ					
10)	ደጋፊ ነገሮችን በመጠቀም ለምሳሌ በማለቢይ ወይም በእጇ ጡቴን ማለብ እችላለሁ					
11)	ባዶነት ሲሰማኝ ቶሎ በመቀዬር ጡቴን ማጥባት እችላለሁ					

ክፍል ሶስት፡ ጡትን ብቻ የማጥባት ልምድን/ባህሪን ለመለካት ከ-*WHO standard* *የተወሰደ መጠይቅ (ከጥናቱ በፊትና በሁዋላ የሚያገለግል)*

1. የተጠየቀበት ቀን፡_____
2. ህፃኑ የተወለደበት ቀን_____
3. ጡት አጥብተሽ ታዉቂያለሽ? 1. አዎ 2. አይ
4. ከሆነ, በ6 ወር ዉስጥ በአንዱ ቀን አጥብተሻል? 1. አዎ 2. አይ
5. ካልሆነስ, በ6 ወር ዉስጥ በአንዱ ቀን ከሚከተሉት የቱን ዎስዶ ያዉቃል?
   a. ቫይታሚን፤ ሚኒራል ሳፕሊመንት፤ የህክምና መድሃኒት 1. አዎ 2. አይ
   b. ዉሃ ብቻ 1. አዎ 2. አይ
   c. የሚጣፍጥ ወይም ከጣፋጭ ጋር የተቀላቀለ ዉሃ 1. አዎ 2. አይ
   d. የፍራፍሬ ጁስ 1. አዎ 2. አይ
   e. ሻይ ወይም ፈሳሽ 1. አዎ 2. አይ
   f. የህፃን ፎርሙላ 1. አዎ 2. አይ
   g. የጣሳ/የዱቄት/ትኩስ የላም ወተት 1. አዎ 2. አይ
   h. የትኛውም አይነት ፈሳሽ1. አዎ 2. አይ
   i. መካከለኛ ወይም ጠጠር ያለ ምግብ 1. አዎ 2. አይ
   j. ኦአረስ (ORS) በአፍ የሚሰጥ ጨዋማ ዉሃ 1. አዎ 2. አይ
   k. ሌላ ካለ ጥቀስ _____
6. ከወለድሽ በኃላ በ6 ወር ዉስጥ የወር አበባሽ ተመልሷል? 1. አዎ 2. አይ
7. ከወለድሽ በኃላ በምን ሰአት ጡት ጀመርሽለት/ላት? 1. ወዲያዉኑ 2. _____ሰኣት 3. _____ቀናት ***(If less than 1 hr record 00 hr, If less than 24 hours record hours, otherwise record days)***
8. በ6 ወር ዉስጥ በየትኛዉም ቀን ከማታ እስከ ጡዋት (ሌሊት) ምን ያክል ጊዜ ታጠቢያለሽ ?_____
9. በ6 ወር ዉስጥ በየትኛዉም ቀን ከጡዋት እስከ-ማታ (ቀን ሙሉ) ምን ያክል ጊዜ ታጠቢያለሽ ?_____
10. በ6 ወር ዉስጥ ልጅሽ ከሚከተሉት ዉስጥ ከወሰደ፣ የወሰደዉን ብዛት ንገሪኝ?
    a) ቫይታሚን፤ ሚኒራል ሳፕሊመንት፤ የህክምና መድሃሊት _____ጊዜ
    b) ዉሃ ብቻ _____ጊዜ
    c) የሚጣፍጥ ወይም ከጣፋጭ ጋር የተቀላቀለ ዉሃ _____ጊዜ
    d) የፍራፍሬ ጁስ _____ጊዜ
    e) ሻይ ወይም ፈሳሽ _____ጊዜ
    f) የህፃን ፎርሙላ _____ጊዜ
    g) የጣሳ/የዱቄት/ትኩስ የላም ወተት _____ጊዜ
    h) የትኛውም አይነት ፈሳሽ _____ጊዜ
    i) መካከለኛ ወይም ጠጠር ያለ ምግብ _____ጊዜ

j) ኦአረስ (ORS) በአፍ የሚሰጥ ጨዋማ ውሃ _____ጊዜ

11. ለምን ያክል ጊዜ ነው ልጅሽ የሚጠባዉ (የሚመጠምጥበት/የሚስብበት ጊዜ)?_____ (በደቂቃ)

12. ጡጦ አጥብተሽዉ ታዉቂያለሽ ማለቴ በ6 ወር ዉስጥ? 1. አዎ 2. አይ

Translated Version into Afan Oromo

Yuunbarsiitii Jimmaa Muummee Fayyaa Hawaasaatti Kutaa Barnoota Xiin-amalaa

Qajeelfama nama qorannichaaf odeeffannoo Funaanuu

Miiltoo-I: Meeshaa funaansa odeeffannoo fi Cheeklistii

Bocni gaaffii gaafataadhaan gaafatamu qophaahuudhaan namoota ulaagaa qorannnoo sanaa guutaniin gandoota magaalaa Jimmaa keessaa filataman irratti gamaaggamni bu'a qabeessummaa tarsiimoo diddaa gaarummaatiif hoosisa harmaa qofa hanga ji'a ja'aatti yoo tahu manaa mana deemuudhaan haadholee gaarummaaf diddaa argisiisanii fi leenji'an ji'a February 01-September 30, 2018 ramaduudhaan **iifphc-** Itoophiyaatiin gargaarsa maallaqaa fi teknikaa waltahiinsa Yunbarsitii Joon Hoopkiins- mana barnoota Fayyaa Hawaasaa USA waliin tahuudhaan nuuf godheera.

Mata-Duree Qorannichaa: Gochaa kunuunsa daa'imman kichuu fi harma qofa hoosisuu hawaasa bu'uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan. Nom-Randomized Controlled Trial

Qorataa: Obbo Yibalxaal Siraaneeh (Kaadhimamaa PhD), Gorsitootni (Dr. Zewdie B. and Prof. Mirkuzie W).

Kabajamoo Hirmaattota Qorannichaa

Qorannoo kanaan (Bartee gochaa kunuunsa daa'imman kichuu fi harma qofa hoosisuu hawaasa bu'uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan fooyyessuuf) akka hirmaattaniif isin affeeraa qorannoon kun Itoophiyaa keessatti hin yaalamne. Murteessuu keessaniin dura garuu qorannoon kun maaliif barbaachise isa jedhu beekuun murteessaa dha. Qorannoon kun kan gaggeeffamuuf adeemsa barnootaa guutuu taasisuu fi namoota poolisii fayyaa baasaniif ragaa dhiheessuuf yommuu tahu ji'oota jalqabaa ja'an waa'ee harma qofa hoosisuu itti fufiinsa kan qabuufi dabalataanis hawaasakan hirmaachise akka tahuufi dha. (Isin warra tajaajilli gorsaa kennamuuf waan taataniif fayyadamoo taatu.)

Gandoota tajaajilli irratti kennamu qofaaf. Qorannoon kun Jimmaa Yunbarsiitii irraa qaama dhimmi ilaallatu irraa (Institutional Review Board of the health Institute) eeyyama argateera. Maayyiirratti firiin qorannoo kanaa dhaabbailee gargaarsa nuuf godhan bira kan taa'uufi barruulee idila addunyaa irratti kan maxxanfamu ta'a.

Odeefannoon isinirraa fudhatamu kamiyyuu iccitiin kan qabamu yoo tahu karaa kamiinuu maqaan keessan hin caqasamu: haa tahu malee, odeeffannoo dhuunfaa isin ibsu kan fudhannuuf hordoffiidhaafi jarri odeeffannoo funaanan akka salphaatti akka isin argataniif yaadamee yommuu tahu maqaan gandaa, mandaraa, lakkoofsa manaafi bilbilaa ni barbaadna. Hiree kanatti fayyadamuun irra deddeebi'uun odeeffannoo keessan kan fudhannu tahuu beekuufi itti walii galuutu isinirra jiraata.

Qorannicharratti hirmaachuuf yoo murteessitan adabbiin kamiyyuu kan isinirra hin geenyee fi faayidaa kamiyyuu kan hin dhabne tahuu isin beeksisuu barbaanna. Haatahu malee amanumummaadhaan odeeffannoon dhugaa nuuf kennitan qorinnichaaf faayidaa olaanaa qaba. Qorannoon kun daqiiqaa 30 fudhata. Faayidaa qorannichaa hubachuudhaan qorannicharratti hirmaachuuf warra murteeffataniif galatnikoo daangaa kan darbe dha.

Waan hunda dhagaheera; akkasumas, hubadheeras. Eeyyama guutuudhaan hirmaachuudhaaf:

1. Nan barbaada/waliigaleera
2. Hin barbaadu

Kutaa tokko. Addaan baastuu matayyaa fi Gaaffilee raga bu'uuraa (Eeruu haadhattiin qofa kanniin hirmaatan qofaaf: For relevant others only since we already have record of the mother)

T.L	Gaaffii	Deebii
1	Umurii	Waggaa_____
2	Amantaa	1. Ortodooksii 2. Musiliima 3. Pirootestaantii 4. Kaatolikii 5. Kan biroo
3	Qomoo	1. Oromoo 2. Daawuroo 3. Kafaa 4. Amaara 5. Kan biroo
4	Gaa'ila	1. Kan fuudhe/heerumte 2. Kan hike/hiikte 3. Kan jalaa du'e/duute 4. Qeerroo/qarree
6	Sadarkaa Barnootaa	1. Dubbisuu fi barreessuu kan hin dandeenye 2. Dubbisuu fi barreessuu kan dandahu/dandeessu garuu barnoota idilee kan hin baratin 3. Sadarkaa tokkoffaa kan baratte 4. Sadarkaa lammaffaa kan baratte 5. Hamma qophaa'inaatti kan baratte 6. Digrii jalqabaa fi sanaa ol kan qabdu 7. Kan biroo
7	Hojii	1. Haadha warraa 2. Daldaltuu 3. Barattuu 4. Hojjettuu mootummaa 5. Hojjettuu mit-mootummaa 6. Kan niroo_____
8	Galii ji'aa	Qarshii_____

Kutaa Laama: Beekumsa

1.1 Beekumsa ,Harma Haadha Qofa Hoosisuu (Tokko tokkoon deebii Eyyeen ykn lakki jechuun deebisaa)

T.l	**Gaafii**	**Lakki (0)**	**Eyyeen (1)**
1)	Harma Haadha Qofa Hoosisuun rakasa,saphumatti kan argamu fi guddina daa'imaaf fayyalessa		
2)	Harma Haadha Qofa Hoosisuun Harma Haadha Qofa Hoosisuu,Qorsa,Talaallii ykn waan dabalataan yeroo jalqaba ji'oottan jaha malee		
3)	Silgi harmaa keessa jiru nyaata jalqaba kennamu qabu dandandamanna qaama daa'imaa ijaaraa		
4)	Harma Haadha Qofa Hoosisuun walitti dhufeenya haadhaa fi daa'imaa dagaagsa		
5)	Harma Haadha Qofa Hoosisuun daa'ima garaa kaasaa fi faalama biro ni ittisa		
6)	Harma Haadha Qofa Hoosisuun akkuma dhalateen sa'a tokko keessatti jalqabuu qaba		
7)	Harma Haadha Qofa Hoosisuun akka karoora maatitti ykn dhala addaan fageessutti ni		

	gargaara		
8)	Harma Haadha Qofa Hoosisuun ji'oottan jahan jalqabaaf nyaata fi dhangala'a barbaachisuuf gahaadha		
9)	Harma Haadha Qofa Hoosisuun hanga daa'imni ji'a jaha guututti shaakalamuuu qaba		
10)	Bishaan ykn wantoota biro dawaan ala ji'oottan jaha duraa keessatti daa'imaaf kennuun fudhatama hin qabu		
11)	Harma hoosisuun carraa kaansarii harmaan qabamuu ni hir'isa ykn ni ittisa		
12)	Da'imman harma hodhuu bu'aa qabeessa yoo argatan ulfaatiin isaanii ni dabala		
13)	Qabanna sirriin Harma hoosisuun Bu'a qabeessii akka argamuuf ni gargaara		
14)	Daa'imni Harmaa gahaa yoo hodhaan sirritti rafu		
15)	Aannan Harma elmame osoo hin badiin hanga sa'a jahaa turuu ni danda'a		
16)	Ammuma amma harmaa osoo keessa hin dhumin jijjiiruun daa'imni akka bishaan (aanan duraa)qofa akka sooratu godha		
17)	Erga hodhaan Booda Deeffachuun Daa'imni quufuu agarsiisa		

1.2 Ilaalcha fi duudha dhunfaa /deeggarsa hawaasa Harma haadhaa qofa hoosisuu irratti

Maaloo miira,yaada,Ilaalcha fi yaada duudhaa fi duudha sirrii shaakaii Harma haadha qofa hoosisuu irratti adda baasuuf yaalaa fi tokko tokkoo gaafannoof deebii keessan akkas jechuun kennaa
1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	**Gaafii**	**1**	**2**	**3**	**4**	**5**
1)	Harma hoosisuun hanga ji'oottan jahan jaqabaa qofaaf gaaridha					
2)	Yoo daa'imni xuuxxoo ji'oottan jahaan jalqabaa keessatti jalqabuu baate booda harma dhaabsiisuun ni rakkisa					
3)	Yeroo hojiin baay'atu Aannan harmaa elmuun filannoo gaarii ta'us qara fiixee harmaa miidha akkasumas oomisha aannanii hir'isa					
4)	Ji'oottan jahan duraa qofaaf Harma Hoosisuun Faayida fayyaa barbaachisaa qaba					
5)	Gochi harma Hoosisuu Midhaagnna koo ykn argaa harmaa sababa harkifamuuf miidhuu danda'a					
6)	Daa'ima furdate qabaachuuf annaan qophaa'aa annan harmaa irratti dabalatan kennuu qabna					
7)	Silgi harmaa gatamuu qaba malee kennamuu hin qabu jedheen amana					
8)	Yeroo hundaa Harma haadha qofa hoosisuu irratti wanta namootni biro mirkaneessanii fi na gorsan nan fudhadha					
9)	Haadhooliin naannoo kiyyaa baay'een gocha harma haadha qofa hoosisuun akka hin barbaachifne mirkaneessu					
10)	Faayidaan harmaa hoosisuu kan jiraatu hanga daa'imni harma hodhe qofaadha					
11)	Harma Hoosisuun Aanaan qophaa'aa irra filatamaadha					
12)	Aanaan qophaa'aa obaasuun yoo haatii gara hojiitti deebi'uuf yaaddee filannoo gaarii dha					

1.3 Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa

Maaloo **Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa fi deebii shaakala keessanii bu'aa fayyaa irratti adda baasuuf yaalaa,gaafilee hundaaf deebii keessan akkas jechuun deebisaa**

1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	Gaafii	1	2	3	4	5
1)	Faalama yeroo daa'imummaa jechuunis garaa kaasa ittisuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a.					
2)	Guddina qaamaa fi sammuu daa'imaa sirrii jajjabeessuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a					
3)	Kaansarii harmaa ittisuuf harmaa haadhaa qofa hoosisuu shaakaluun salphaadha					
4)	Ulfa hin barbaachifne ittisuuf gocha Harma haadhaa qofa Hoosisuu rawwachuun salphaadha					
5)	Harkifamuu ykn Guddachuu harmaa akkasumas dhukkubbii wal fakkaatu Ittisuuf Harma Haadhaa qofa hoosisuu shaakaluun salphaadha					
6)	Hir'achuu dandamannaa qaama daa'imaa ittisuuf Harma haadha qofa hoosisuu rawwachuu nan danda'a					
7)	Kallattii,ta'umsaa fi qabannaa sirriidhaan hoosisuu nan danda'a					
8)	Qabannaa sirridhaan hoosisuu nan danda'a : hidhiin daa'imaa gara alatti harkifamuun					
9)	Fedhii daa'imaa guutuuf irra deddeebi'ee hoosisuu nan danda'a					
10)	Aanaan harmaa koo mala afuuftuu ykn harkaan fayyadamuun elmuu nan danda'a					
11)	Harmi koo yeroo duwwaa ta'u u natti dhagahame jijjiraa hoosisuu nan danda'a					

Kutaa Seedi: Boca waaltawaa Muuxannoo/amala harma ofa hoosisuun kan walqabateen WHO irraa fudhatame (Qorannicha duraa fi booda kan barbaachisu)

1. Guyyaa itti gaafatame_____
2. Daa'imni guyyaa itti dhalate_____
3. Harma hoosiftee beektaa? 1. Lakkii 2. Eeyyee
4. Yoo gaaffii G3 eeyyee jette, ji'a ja'a keessatti altokko hoosifteettaa? 1. Lakkii 2.Eeyyee
5. Yoo lakkii tahe, ji'oota ja'an darban kanneen armaan gadii keessaa kam fudhatteetti?
   a) Vitaaminii, albuuda dabalataa, qoricha 1. Lakkii 2. Eeyyee
   b) Bishaan qofa 1. Lakkii 2. Eeyyee
   c) Bishaan mi'eeffame ykn waan mi'aawaa waliin makame? 1. Lakkii 2. Eeeyyee
   d) Juusii kuduraa fi muduraa 1. Lakkii. 2. Eeyyee
   e) Shaayii ykn dhangala'oo 1. Lakkii 2. Eeyyee
   f) Foormulaa daa'immanii 1. Lakkii 2. Eeyyee
   g) Aannan sa'aa Qaruuraadhaan/daakuudhaan/ho'aa 1. Lakki 2. Eeyyee
   h) Dhangala'oo gosa kamiiyyuu 1. Lakkii 2. Eeyyee
   i) Nyaata waan jajjabaa qabuykn giddugaleessa 1. Lakkii 2. Eeyyee
   j) ORS, bishaan ashabaawaa afaaniin kennamu 1. Lakkii 2. Eeyyee
   k) Kan biro yoo jiraate caqasi_____
6. Erga deessee booda laguunkee ji'a ja'a keessatti argitteettaa? 1. Lakkii 2. Eeyyee
7. Erga deessee booda sa'atii kamitti harma jalqabsiiste? 1. Battaluma sana 2. Sa'atii_____3. Guyyoota_____(Yoo sa'atiin tokkoo gadi 00 galmeessi, sa'atii 24 gadi yoo tahe, tahuu baannaan guyyaan galmeessi)
8. Baatii ja'a keessatti guyyaa kamiyyuu galgalaa hanga ganamaatti (halkan) si'a meeqa hoosifte?_____
9. Baatii ja'a keessatti guyyaa kamiyyuu ganamaa hanga galgalaatti (guyyaa) si'a meeqa hoosifte?_____
10. Baatii ja'a keessatti daa'imtikee kan itti aananii jiran keessaa yoo fudhate, baayinni inni fudhate naaf eeri?
    a) Vitaaminii, albuuda dabalataa, qoricha: Si'a_____
    b) Bishaan qofa Si'a_____
    c) Bishaan mi'eeffame ykn waan mi'aawaa waliin makame? Si'a_____

d) Juusii kuduraa fi muduraa Si'a_____
e) Shaayii ykn dhangala'oo Si'a_____
f) Foormulaa daa'immanii Si'a_____
g) Aannan sa'aa Qaruuraadhaan/daakuudhaan/ho'aa Si'a_____
h) Dhangala'oo gosa kamiiyyuu Si'a_____
i) Nyaata waan jajjabaa qabuykn giddugaleessa Si'a_____
j) ORS, bishaan ashabaawaa afaaniin kennamu Si'a_____

11. Yeroo meeqaafidha mucaan kee kan hodhu (yeroo itti xuxxuuxudaqiiqaa_____
12. Harma hoosiftee beektaa? Jechuunkoo ji'a ja'a keessatti 1. Lakkii 2. Eeyyee

Data collection tool for study-II

Baseline and Midline Data Collection tool

Information sheet

Interviewer-administered questionnaire prepared for all eligible study subjects in Jimma town community living in selected kebeles, to evaluate effectiviness of positive deviance approach on exclusive BFpractice at community level using positive deviants from February 01-September 30, 2018, through the financial and technical support of **iifphc**-Ethiopia in collaboration with John Hopkins University-USA public health school.

Title of implementation study; Community based Newborn and InfantBFPractice Using Positive Deviance Approach: A Cluster Randomized Controlled Trial.

Investigators: Mr. Yibeltal Siraneh (PhD fellow) and supervisors (Dr.Zewdie B. And Prof. Mirkuzie W.)

Dear respondent,

I am inviting you to participate in an intervention study on community based newborn and infant Caring practice including EBF. Such type of implementation research has not been done in Ethiopia specifically in Jimma town. I'm inviting you to participate as you are a member of the community in Jimma town. Before you decide whether to take part, it is important for you to understand why the research is being done.

This intevention study is being conducted for the academic use, evidence generation for policy makers so as to have sustainable community based newborn and infant caring program including BFpractice. It has got ethical approval from the Institutional Review Board of the health institute, Jimma University, after all the evidence generated will be archived to **International Institute for primary health care resource centre and possible publication**. All information that is collected from you during the study will be kept confidential, and your name will never be mentioned in any analysis and dissemination of findings. Only your detail background information is needed for follow up intervention and to access you at each subsequate visit or for survey.

Taking part in this study is completely voluntary based. If you decide not to be in this study, or if you stop participating at any time, you won't be penalized or lose any benefits rather you will gain best experiences of newborn/infant caring practices. However, the honest information you give us is highly valuable to the study and it will be collected now, at third month and at the end of the intervention-sixth month. I am grateful to you for considering this research and look forward to your response!

Consent sheet

I (study participant) have heard all the information, understood the aims of the study and noted that participation in this study is completely voluntary and that I can withdraw from the study any time. I'm fully aware that the results of this study will be used for scientific purpose and may be published to desseminate the finding for end-users. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this study.

_____Yes, I want to participate in the study

_____ No, I don't want to participate in the study

Part one: Socio-demographic and obstetric related characterstics

Item/question	**Response options**
Name of mother/House number_____Cell Phone_____	
Language/ mother tongue	1. Afan Oromo 2. Amharic 3. Dawuro 4. Kaffa 5. Other_____
Name of Kebele (HP nearby)	1. GG 2. MK 3. AM

	4. HM 5. Mentina 6. BK
Age (in years)	_____
Religion followed	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other
Ethinic group	1) Oromo 2) Dawuro 3) Kaffa 4) Amhara 5) Yem 6) Other
Marital status	1) Single 2) Widowed 3) Divorced 4) Married
Educational status	1. Able to read and write (grade…….) 2. Unable
Occupation	1) Housewife 2) Merchant 3) Student 4) Gov't employe 5) Other
Parity	_____
Sex preference	1) Not prefer 2) Prefer
ANC follow-up	1. Yes 2. No
Source of info about EBF	1. House wife 1) Merchant 2) Student 3) Gov't employee 4) Other ___
Experience of BF	1) Yes 2) No
Intention to BF	1. Yes 2. No
Place of delivery	1) HI 2) Home
Mode of delivery	1. SVD 2. C/S
Health status of baby soon birth	1) Good 2) Poor

Health status of mother soon delivery	1. Good 2. Poor
Support from relevant others	1) Yes 2) No

Part two: Ideation factors of EBF practice related measurements

1) Knowledge of EBF

S.No	Item/questions	No(0)	Yes (1)
18)	Exclusive BF is cheap, available and healthy for normal baby growth		
19)	EBF is feeding breast milk only, except medicine, vaccine or supplements in the first six months.		
20)	Colostrum in the breast provides nutrients that should be fed at beginning to build immune system of the baby		
21)	Exclusive BF promotes mother-baby bonding		
22)	Exclusive BF protects the baby from diarrheal and other infection		
23)	Exclusive BF should start immediately within 1 hr after delivery		
24)	Exclusive BF serves as birth control/ spacing birth		
25)	Exclusive BF is sufficient for the baby nutrient and fluid needs during the first six months		
26)	Exclusive BF must be practiced until the infant is 6 months old		
27)	Giving water or anything except medicine to baby is not acceptable within the first 6 months		
28)	BF reduces/prevents the risk of breast cancer		
29)	Babies will gain weight if they receive effective breast feeding		
30)	Correct positioning helps to achieve effective BF		
31)	Babies sleep well after they receive adequate BF		
32)	An expressed breastmilk can stay up to 6hrs without getting spoiled.		
33)	Frequent shifting from one breast to the other before feeling empty makes the baby to feed only water (fore milk)		
34)	Belching after feeding shows that the baby is full		

2) Attitude and subjective norm toward EBF

Please try to assess your feeling, perception, attitude and prevailing subjective norm toward EBF practice and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
13)	It is good to feed breast milk **only** for the first 6 months					
14)	If your child is not started on bottle feeding within the first 6 months, it will be difficult to switch breast milk later on					
15)	Even if breast milk expression is a good option during busy time, it will affect the nipple sharpnes and decrease milk production					
16)	Feeding breast milk only during the first 6 months has very important health benefit					
17)	BF practice may affect my beautifulness or breast cosmetic due to engorgement					
18)	To have fattened baby we should feed formula and other products in addition to breast milk.					
19)	I believe colostrum shouldn't be given rather should be discarded					
20)	I always comply to what my referent other approved and advised me in practicing EBF					

21)	Most of mothers who are in my social network disprove EBF practice					
22)	The benefits of BFlast only as long as the baby is BF					
23)	BF is more convenient than formula feeding					
24)	Formula feeding is the better choice if the mother plans to go back to work					

3) Self-efficacy to practice EBF

Please try to assess your efficacy/ability to practice EBF and response of your practice on health outcome, and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
12.	I am able to practice EBF to prevent infanthood infection i.e. diarrhea					
13.	I am able to practice EBF to promote infant's normal body-brain growth					
14.	It's easy to practice EBF to prevent breast cancer					
15.	It's easy to practice EBF to prevent unintended pregnancy					
16.	It's easy to practice EBF to prevent breast engorgement and associated pain					
17.	I can do EBF to prevent immunity deterioration of the baby					
18.	I can breast feed with the correct position: siting and supportive holding					
19.	I can breast feed with the correct attachment: bulging out of baby's lips					
20.	I can breast feed frequently to satisfy the baby's need					
21.	I can express my breast milk with supportive techniques: using pump or manual means					
22.	I can breast feed with timely shifting when feeling empty					

Part Three; Measuring Practice of exclusive BF ***(Adopted from WHO standard)***

13. Date of interview _____
14. Child's date of birth_____
15. Have you ever breast fed? 1. No 2. Yes
16. If Yes to Q3, Have you BF at any given day within 6 month? 1.No 2. Yes
17. If No to Q3, have received any of the following at any given day within 6 month?
    l. Vitamins, mineral supplements, medicine 1. No 2. Yes
    m. Plain water 1. No 2. Yes
    n. Sweetened or flavored water 1. No 2. Yes
    o. Fruit juice 1. No 2. Yes
    p. Tea or infusions 1. No 2. Yes
    q. Infant formula 1. No 2. Yes
    r. Tinned, powdered or fresh milk 1. No 2. Yes
    s. Any other liquids 1. No 2. Yes
    t. Mushy or solid foods 1. No 2. Yes
    u. Oral rehaydration salts (ORS)1. No 2. Yes
    v. Other,specifiy _____
18. Had your menses returned since the birth within 6 months of post delivery? 1. No 2. Yes
19. How long after birth did you put to breast? 1. Emmediately 2. _____in hours 3. _____in days ***(If less than 1 hr record minutes, If less than 24 hours record hours, otherwise record days)***
20. How many times did you breast feed between sunset and sunrise at any given day?_____
21. How many times did you breast feed during the daylight hours at any given day?_____
22. If your baby received any of the following, tell me the frequency at any given day within 6 month?
    k. Vitamins, mineral supplements, medicine_____times
    l. Plain water _____times

m. Sweetened or flavored water _____times
n. Fruit juice _____times
o. Tea or infusions _____times
p. Infant formula _____times
q. Tinned, powdered or fresh milk _____times
r. Any other liquids with respective frequency_____times
s. Mushy or solid foods _____times
t. Oral rehaydration salts (ORS) _____times

23. For how long did your baby breast feed/ length of suckling?_____in minutes
24. Have you ever bottle feed your baby? 1. No 2. Yes
25. In the last 24 hours, have you fed breast milk only? 1. No 2. Yes
26. In the last 6 months, have you fed breast milk only? 1. No 2. Yes
27. Have you started complementatry feeding at 6 month of post-partum period? 1. No 2. Yes

Translated Version into Amharic

ጅማ ዩኒቨርሲቲ፤ የማህበረሰብ ጤና ፋካሊቲ

የጤና ስነባህሪና ማህበረሰብ ት/ት ክፍል

Annex I: የጥናቱን የአፈፃፀም ዉጤት የሚለካ መጠይቅ (Intervention effect measuring tool)

የጥናቱ መመሪያ

ጥናቱ ለሚመለከታቸው አካላት በቃለ-መጠይቅ መልክ የተዘጋጀው፤ በጅማ ከተማ ለጥናቱ ሲባል በተመረጡ ቀበሌዎች ዉስጥ ለሚኖሩ እናቶች ነው፡፡ይህም ጡትን ብቻ በማጥባት ለመልካምነት ያፈነገጡ የሚለዉን የልምድ ልዉዉጥ ዘዴ ውጤታማነትን መገምገም ሲሆን ቤት ለቤት እየሄዱ የሚያማክሩ ለመልካምነት ያፈነገጡና የሰለጠኑ እናቶችን ከ February 01-September 30, 2018 በመመደብ **iifphc**-Ethiopia የገንዘብና የቴክኒካል ድጋፉን ከ John Hopkins University-USA public health school ጋር በመተባበር አድርጎልናል፡፡

የጥናቱ ርእስ፡- ማህበረሰብ አቀፍ ለጨቅላ ህፃናት እንክብካቤ እና ጡትን ብቻ የማጥባት ልምድን ማሻሻል፡ ለጥቅም/ለመልካምነት ማፈንገጥ የሚለዉን ዘዴ በመጠቀም: Randomized Controlled Trial.

ተመራማሪ:- አቶ **ይበልጣል ስራህ** (PhD fellow), እና አማካሪዎች (ዶ/ር ዘዉዴ ብርሃኑ እና ፕ/ር ምርኩዜ ወልዴ)

ፈቃደኝነት መጠየቂያ ቅፅ

የተከበሩ የጥናቱ ተሳታፊ፡

በዚህ ጥናት (ማህበረሰብ አቀፍ ለጨቅላ ህፃናት እንክብካቤ እና ጡትን ብቻ የማጥባት ልምድን ማሻሻል፡ ለመልካምነት ያፈነገጡ የሚለዉን ዘዴ በመጠቀም)እንዲሳተፉ እየጋበዝኩ ይህ ጥናትም ካሁን በፊት በኢትዮጵያ አልተሞከረም፡፡ ለመሳተፍ ከመወሰንዎ በፊት ግን ጥናቱ ለምን አስፈለገ የሚለዉን ማወቅዎ ጥሩ ይሆናል፡፡ ይህ ጥናት የሚደረገው ለትምህርት ሂደት ማሟያና ለጤና ፖሊሲ አውጭዎች መረጃን ለማቅረብ ሲሂሆን ለመጀመሪያዎቹ 6-ወራት ጡትን ብቻ የማጥባት ልምድ ቀጣይነት ያለውና ማህበረሰቡን ያሳተፈ እንዲሆንም ጭምር

ነው፡፡ (እርስዎ የምክር አገልግሎት በሚሰጥበት ወገን ስለሆኑ የምክር አገልግሎቱ ተጠቃሚ ይሆናሉ ፡ ለ**Intervention ቀበሌዎች ብቻ**)፡ ጥናቱ ከጅ/ዩ ከሚመለከታቸው አካላት (Institutional Review Board of the health institute) ፍቃድን አግኝቶዋል፡፡ በመጨረሻም የጥናቱ ውጤት ድጋፉን በሰጡን ተቋሠማት የሚቀመጥና በአለም አቀፍ መፅሄት ላይ የሚታተም ይሆናል፡፡

የትኛዉም ከርስዎ የተወሰደ መረጃ ምስጢራዊነቱ የተጠበቀ ሲሆን በምንም አይነት መልኩ ስምዎትም አይጠቀስም፡ ፡ ነገር ግን እርስዎን የሚለይ የግላዊ መረጃ የምንወስደዉ ለክትትልና መረጃ ሰብሳቢዎች በቀላሉ እንዲያገኝዎት ሲሆን የቀበሌ ስም፤ መንደር፤ የቤትና ስልክ ቁጥር እንፈልጋለን፡፡ በዚህ ኢጋጣሚ በተደጋገጋሚ መረጃዎችን የምንወስድ መሆኑን ማዎቅና መስማማት ይኖርብዎታል፡፡

በጥናቱ ለመሳተፍ ቢወስኑ ምንም አይነት ቅጣት የማይጣልብዎት እና ዲሁም ምንም አይነት ጥቅም የማያጡ መሆኑን መግለፅ እንፈልጋለ ን ፡ ፡

ነገር ግን በታማኝነ ት የሚሠጡን እውነ ተኛ መረጃ ለጥናቱ ከፍተኛ ጠቀሜታ አለው፡፡ ቃለ-መጠይቁ 30 ደቂቃዎች ይፈጃል፡ ፡የጥናቱን ጠቀሜታ በማስተዋል በጥናቱ ለመሣተፍ ለሚወስኑ ምሥጋናዬ የላቀ ነው፡፡

ፈቃደኝነት መጠየቂያ ቅፅ/Consent sheet

ሁሉንም ነገር ሰምቻለሁ፤ እንዲሁም ተረድቻለሁ፡፡ በሙሉ ፈቃደኝነት ለመሳተፍ፤

3. እፈልጋለሁ/ተስማምቻለሁ_____
4. አልፈልግም_____

ክፍል አንድ:የግል መለያ እና መነሻ መረጃ ጥያቄዎች (በእናትዬዋ ጥቆማ ለሚሳተፉ ብቻ)

ተ.ቁ	መጠይቅ	መልስ
9.	እድሜ	_____(በአመት)
10.	ፆታ	3. ሴት 4. ወንድ
11.	ሀይማኖት	6. አርቶዶክስ 7. ሙስሊም 8. ፕሮቴስታንት 9. ካቶሊክ 10. ሌላ_____
12.	ብሄር	6. አሮሞ 7. ዳዉሮ 8. ካፋ 9. አማራ 10. ሌላ _____
13.	የጋብቻ ሁኔታ	5. ያገባ/ች 6. የፈታ/ች 7. የሞተበት/ባት 8. የላገባ/ች
14.	የትምህርት ደረጃ	8. ማንበብ እና መጻፍ የማይችል 9. ማንበብ እናመጻፍ የሚችልግን መደበኛ ትምህርት ያልተማረች 10. የመጀመሪያ ደረጃ ትምህረት የተማረች 11. ሁለተኛ ደረጃ ትምህረት የተማረች 12. የመሰናዶ ትምህረት የተማረች

		13. የመጀመሪያ ድግሪ እና ከዚያ በላይ የተማረች 14. ሌላ_____
15.	የስራ ሁኔታ	7. የቤት እመቤት/አባወራ 8. ነጋዴ 9. ተማሪ 10. የመንግስት ሠራተኛ 11. የግል ተቋም ሠራተኛ 12. ሌላ_____
16.	ወርሃዊ የገቢ መጠን	_____ብር

ክፍል ሁለት፡ ከጡት ማጥባት ጋር በተያያዘ የእዉቀት፤ አመለካከትና በራስ-የመተማመንን ሁኔታን ለመለካት

1.2.ጡት የማጥባት እዉቀት

የጡት ማጥባት እዉቀትን የሚለኩ መጠይቆች (አዎ ወይም አይደለም በማለት ይመልሱ)

S.No	መጠይቆች (በአረፍተ-ነገር)	አይ (0)	አዎ (1)
35)	ጡትን ብቻ ማጥባት ለጤናማ የህፃን እድገት እርካሽ፣ በቀላሉ የሚገኝና ጤናም ነገር ነዉ		
36)	ጡትን ብቻ ማጥባት ማለት የናት ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት መመገብ ሲሆን መድሃኒትና ክትባትን አይጨምርም		
37)	የህፃኑን የበሽታ የመከላከል አቅም ለማዳበር ለመጀመሪያ ጊዜ እንገርን መመገብ ያስፈልጋል		
38)	ጡትን ብቻ ማጥባት እናትን ከልጅ ጋር ያለዉን ትምረት ይጨምራል		
39)	ጡትን ብቻ ማጥባት ህፃኑን ከተቅማጥና ሌሎች ተላላፊ በሽታዎች ይጠብቃል		
40)	ጡትን ብቻ ማጥባት በመጀመሪያዉ 1 ሰዓት ዉስጥ ሊጀመር ይገባል		
41)	ጡትን ብቻ ማጥባት እንደ እርግዝና መከላከያ ዘዴ ይጠቅማል		
42)	ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት ማጥባት የህፃኑን የምግብና ፈሻሽ ፍለጎት ያማላል		
43)	ጡትን ብቻ ማጥባት ለመጀመሪያዎቹ 6 ወራት ሊተበር ይገባል		
44)	ለህፃኑ ለመጀመሪያዎቹ 6 ወራት ዉሃም ቢሆን መስጠት ከመድሃኒት በቀር ተቀባይነት የለዉም		
45)	ጡትን ብቻ ማጥባት የጡትን ካንሰር ይከላከላል		
46)	ህፃን ልጅ ባማባቡ ጡትን ብቻ ካጠቡት ግብቱ ይጨምራል		
47)	ህፃን ሲያጠቡ ባማባቡ ማቀፍ ዉጠታማ አመጋገብን ይፈጥራል		
48)	ህፃናት በቂ ጡት ከጠቡ በጥሩ ሁኔታ ይተኛሉ		
49)	የታለበ የጡት ወተት ሳይበላሽ ለ6 ሰዓታት ይቆያል		
50)	በማጥባት ወቅት የወተቱን ማለቅ ሳይረዱ በፍጥነት መቀያዬር ህፃኑ ዉሃዉን ብቻ እንዲያገኝ ያደርጋል		
51)	ህፃኑ ከጠባ በኻላ ካገሳ የመጥገቡ ምልክት ነው		

1.2. ጡት ብቻ የማጥባት አመለካከት

የጡት ማጥባት አመለካከትን የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
13.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት መልካም ነዉ					
14.	ህፃኑ በመጀመሪያዎቹ 6 ወራት ዉስጥ ጡቶ ካልጠባ በኻላ ጡትን ማስቆም ከባድ ነው					
15.	ለስራ ሲዎጡ ጡትን አልቦ ማስቀመጥ/መስጠት ጥሩ ቢሆንም እንኩዋን የጡት ጫፍን ይጎዳል፤ የወተት ምርት ይቀንሳል					
16.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት በጣም ጥሩ የጤና ጥቅም አለዉ					
17.	ጡትን ብቻ ማጥባት ለለሚያገዘፈዉ ዉቡቴን ያበላሻል ወይም የቱቴን ዉበት ያጠፋል					
18.	ወፍራም ልጅ እንዲኖረኝ ከጡት በተጨማሪ የጣሳ ወተት መመገብ ያስፈልጋል					
19.	እንደኔ እምነት እንገር ወተት መጣል እንጅ መስጠት የለበትም					
20.	አኔ ሁሌም ጡት ከማጣባት ጋር በተያያዘ በቅርበት የምወዳቸዉ/አሉኝ የምላቸው ሰዎች ያሉኝን ነገር ነው ማደርገው					
21.	በማህበራዊ ግንኙነቴ ውስጥ ያሉ በርካታ እናቶች ጡትን ብቻ ማጥባትን አይደግፉም					

22.	ጡት ብቻን የማጥባት እቅም የሚቆዬው እስካጠባን ድረስ ብቻ ነው					
23.	ጡት ብቻ ማጥባት የጣሳ ወተት ከማጥባት በላያ ምቹ ነው					
24.	እናት ወደስራ ለመመለስ የጣሳ ወተት ማጥባት ጥሩ አማራጭ ነው					

1.3. ጡት ብቻ ማጥባት በራስ የመተማመን/የመተግበርን

ስለጡት ብቻ የማጥባት በራስ የመተማመን/የመተግበርን አቅም የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
12)	የህፃናት ተቅማጥን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
13)	የህፃናት ሰውነትና አእምሮ እድገት ለማቀላጠፍ ጡትን ብቻ ማጥባት እችላለሁ					
14)	የጡት ካንሰርን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
15)	ያልተፈለገ እርግዝናን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
16)	የጡት መግዘፍንና ጠያያቹ ህመምን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
17)	የህፃኑ በሽታን የመከላከል አቅሙ እንዳይዳከም ጡትን ብቻ ማጥባት እችላለሁ					
18)	በትክክል በመደገፍና በመቀመጥ ጡት ማጥባትን እችላለሁ					
19)	በትክክል ጡቴን ማስያዝና ጡት ማጥባት እችላለሁ					
20)	የልጀን/የህፃኑን ፍላጎት ለማሙዋላት ደጋግሜ ጡቴን ማጥባት እችላለሁ					
21)	ደጋፊ ነገሮችን በመጠቀም ለምሳሌ በማለቢይ ወይም በእጄ ጡቴን ማለብ እችላለሁ					
22)	ባዶነት ሲሰማኝ ቶሎ በመቀዬር ጡቴን ማጥባት እችላለሁ					

ክፍል ሶስት፡ ጡትን ብቻ የማጥባት ልምድን/ባህሪን ለመለካት ከ-*WHO standard የተወሰደ መጠይቅ (ከጥናቱ በፊትና በሁዋላ የሚያገለግል)*

28. የተጠየቀበት ቀን፡_____
29. ህፃኑ የተወለደበት ቀን_____
30. ጡት አጥብተሽ ታዉቂያለሽ? 1. አዎ 2. አይ
31. ከሆነ, በ6 ወር ዉስጥ በአንዱ ቀን አጥብተሻል? 1. አዎ 2. አይ
32. ካልሆነስ, በ6 ወር ዉስጥ በአንዱ ቀን ከሚከተሉት የቱን ዎስዶ ያዉቃል?
    l. ቫይታሚን፤ ሚኒራል ሳፕሊመንት፤ የህክምና መድሃኒት 1. አዎ 2. አይ
    m. ዉሃ ብቻ 1. አዎ 2. አይ
    n. የሚጣፍጥ ወይም ከጣፋጭ ጋር የተቀላቀለ ዉሃ 1. አዎ 2. አይ
    o. የፍራፍሬ ጁስ 1. አዎ 2. አይ
    p. ሻይ ወይም ፈሳሽ 1. አዎ 2. አይ
    q. የህፃን ፎርሙላ 1. አዎ 2. አይ
    r. የጣሳ/የዱቄት/ትኩስ የላም ወተት 1. አዎ 2. አይ
    s. የትኛውም አይነት ፈሳሽ1. አዎ 2. አይ
    t. መካከለኛ ወይም ጠጠር ያለ ምግብ 1. አዎ 2. አይ
    u. ኦአረስ (ORS) በአፍ የሚሰጥ ጨዋማ ዉሃ 1. አዎ 2. አይ
    v. ሌላ ካለ ጥቀስ _____
33. ከወለድሽ በኃላ በ6 ወር ዉስጥ የወር አበባሽ ተመልሷል? 1. አዎ 2. አይ
34. ከወለድሽ በኃላ በምን ሰአት ጡት ጀመርሽለት/ላት? 1. ወዲያዉኑ 2. _____ሰኣት 3. _____ቀናት ***(If less than 1 hr record 00 hr, If less than 24 hours record hours, otherwise record days)***
35. በ6 ወር ዉስጥ በየትኛዉም ቀን ከማታ እስከ ጡዋት (ሌሊት) ምን ያክል ጊዜ ታጠቢያለሽ ?_____
36. በ6 ወር ዉስጥ በየትኛዉም ቀን ከጡዋት እስከ-ማታ (ቀን ሙሉ) ምን ያክል ጊዜ ታጠቢያለሽ ?_____
37. በ6 ወር ዉስጥ ልጅሽ ከሚከተሉት ዉስጥ ከወሰደ፣ የወሰደዉን ብዛት ንገሪኝ?
    k) ቫይታሚን፤ ሚኒራል ሳፕሊመንት፤ የህክምና መድሃሊት _____ጊዜ

l) ዉሃ ብቻ _____ጊዜ
m) የሚጣፍጥ ወይም ከጣፋጭ ጋር የተቀላቀለ ዉሃ _____ጊዜ
n) የፍራፍሬ ጁስ _____ጊዜ
o) ሻይ ወይም ፈሳሽ _____ጊዜ
p) የህፃን ፎርሙላ _____ጊዜ
q) የጣሳ/የዱቄት/ትኩስ የላም ወተት _____ጊዜ
r) የትኛውም አይነት ፈሳሽ _____ጊዜ
s) መካከለኛ ወይም ጠጠር ያለ ምግብ _____ጊዜ
t) ኦአረስ (ORS) በአፍ የሚሰጥ ጨዋማ ዉሃ _____ጊዜ

38. ለምን ያክል ጊዜ ነው ልጅሽ የሚጠባዉ (የሚመጠምጥበት/የሚስብበት ጊዜ)?_____ (በደቂቃ)
39. ጡጦ አጥብተሽዉ ታዉቂያለሽ ማለቴ በ6 ወር ዉስጥ? 1. አዎ 2. አይ

Translated Version into Afan Oromo

Yuunbarsiitii Jimmaa Muummee Fayyaa Hawaasaatti Kutaa Barnoota Xiin-amalaa

Qajeelfama nama qorannichaaf odeeffannoo Funaanuu

Miiltoo-I: Meeshaa funaansa odeeffannoo fi Cheeklistii

Bocni gaaffii gaafataadhaan gaafatamu qophaahuudhaan namoota ulaagaa qorannnoo sanaa guutaniin gandoota magaalaa Jimmaa keessaa filataman irratti gamaaggamni bu'a qabeessummaa tarsiimoo diddaa gaarummaatiif hoosisa harmaa qofa hanga ji'a ja'aatti yoo tahu manaa mana deemuudhaan haadholee gaarummaaf diddaa argisiisanii fi leenji'an ji'a February 01-September 30, 2018 ramaduudhaan **iifphc-** Itoophiyaatiin gargaarsa maallaqaa fi teknikaa waltahiinsa Yunbarsitii Joon Hoopkiins- mana barnoota Fayyaa Hawaasaa USA waliin tahuudhaan nuuf godheera.

Mata-Duree Qorannichaa: Gochaa kunuunsa daa'imman kichuu fi harma qofa hoosisuu hawaasa bu'uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan. Nom-Randomized Controlled Trial

Qorataa: Obbo Yibalxaal Siraaneeh (Kaadhimamaa PhD), Gorsitootni (Dr. Zewdie B. and Prof. Mirkuzie W).

Kabajamoo Hirmaattota Qorannichaa

Qorannoo kanaan (Bartee gochaa kunuunsa daa'imman kichuu fi harma qofa hoosisuu hawaasa bu'uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan fooyyessuuf) akka hirmaattaniif isin affeeraa qorannoon kun Itoophiyaa keessatti hin yaalamne. Murteessuu keessaniin dura garuu qorannoon kun maaliif barbaachise isa jedhu beekuun murteessaa dha. Qorannoon kun kan gaggeeffamuuf adeemsa barnootaa guutuu taasisuu fi namoota poolisii fayyaa baasaniif ragaa dhiheessuuf yommuu tahu ji'oota jalqabaa ja'an waa'ee harma qofa hoosisuu itti fufiinsa kan qabuufi dabalataanis hawaasakan hirmaachise akka tahuufi dha. (Isin warra tajaajilli gorsaa kennamuuf waan taataniif fayyadamoo taatu.)

Gandoota tajaajilli irratti kennamu qofaaf. Qorannoon kun Jimmaa Yunbarsiitii irraa qaama dhimmi ilaallatu irraa (Institutional Review Board of the health Institute) eeyyama argateera. Maayyiirratti firiin qorannoo kanaa dhaabbailee gargaarsa nuuf godhan bira kan taa'uufi barruulee idila addunyaa irratti kan maxxanfamu ta'a.

Odeefannoon isinirraa fudhatamu kamiyyuu iccitiin kan qabamu yoo tahu karaa kamiinuu maqaan keessan hin caqasamu: haa tahu malee, odeeffannoo dhuunfaa isin ibsu kan fudhannuuf hordoffiidhaafi jarri odeeffannoo funaanan akka salphaatti akka isin argataniif yaadamee yommuu tahu maqaan gandaa, mandaraa, lakkoofsa manaafi bilbilaa ni barbaadna. Hiree kanatti fayyadamuun irra deddeebi'uun odeeffannoo keessan kan fudhannu tahuu beekuufi itti walii galuutu isinirra jiraata.

Qorannicharratti hirmaachuuf yoo murteessitan adabbiin kamiyyuu kan isinirra hin geenyee fi faayidaa kamiyyuu kan hin dhabne tahuu isin beeksisuu barbaanna. Haatahu malee amanumummaadhaan

odeeffannoon dhugaa nuuf kennitan qorinnichaaf faayidaa olaanaa qaba. Qorannoon kun daqiiqaa 30 fudhata. Faayidaa qorannichaa hubachuudhaan qorannicharratti hirmaachuuf warra murteeffataniif galatnikoo daangaa kan darbe dha.
Waan hunda dhagaheera; akkasumas, hubadheeras. Eeyyama guutuudhaan hirmaachuudhaaf:

3. Nan barbaada/waliigaleera
4. Hin barbaadu

Kutaa tokko. Addaan baastuu matayyaa fi Gaaffilee raga bu'uuraa (Eeruu haadhattiin qofa kanniin hirmaatan qofaaf: For relevant others only since we already have record of the mother)

T.L	Gaaffii	Deebii
1	Umurii	Waggaa_____
2	Amantaa	6. Ortodooksii 7. Musiliima 8. Pirootestaantii 9. Kaatolikii 10. Kan biroo
3	Qomoo	6. Oromoo 7. Daawuroo 8. Kafaa 9. Amaara 10. Kan biroo
4	Gaa'ila	5. Kan fuudhe/heerumte 6. Kan hike/hiikte 7. Kan jalaa du'e/duute 8. Qeerroo/qarree
6	Sadarkaa Barnootaa	8. Dubbisuu fi barreessuu kan hin dandeenye 9. Dubbisuu fi barreessuu kan dandahu/dandeessu garuu barnoota idilee kan hin baratin 10. Sadarkaa tokkoffaa kan baratte 11. Sadarkaa lammaffaa kan baratte 12. Hamma qophaa'inaatti kan baratte 13. Digrii jalqabaa fi sanaa ol kan qabdu 14. Kan biroo
7	Hojii	7. Haadha warraa 8. Daldaltuu 9. Barattuu 10. Hojjettuu mootummaa 11. Hojjettuu mit-mootummaa 12. Kan niroo_____
8	Galii ji'aa	Qarshii_____

Kutaa Laama: Beekumsa

1.1 Beekumsa ,Harma Haadha Qofa Hoosisuu (Tokko tokkoon deebii Eyyeen ykn lakki jechuun deebisaa)

T.l	**Gaafii**	**Lakki(0)**	**Eyyeen(1)**
1)	Harma Haadha Qofa Hoosisuun rakasa,saphumatti kan argamu fi guddina daa'imaaf fayyalessa		
2)	Harma Haadha Qofa Hoosisuun Harma Haadha Qofa Hoosisuu,Qorsa,Talaallii ykn waan		

	dabalataan yeroo jalqaba ji'oottan jaha malee		
3)	Silgi harmaa keessa jiru nyaata jalqaba kennamu qabu dandandamanna qaama daa'imaa ijaaraa		
4)	Harma Haadha Qofa Hoosisuun walitti dhufeenya haadhaa fi daa'imaa dagaagsa		
5)	Harma Haadha Qofa Hoosisuun daa'ima garaa kaasaa fi faalama biro ni ittisa		
6)	Harma Haadha Qofa Hoosisuun akkuma dhalateen sa'a tokko keessatti jalqabuu qaba		
7)	Harma Haadha Qofa Hoosisuun akka karoora maatitti ykn dhala addaan fageessutti ni gargaara		
8)	Harma Haadha Qofa Hoosisuun ji'oottan jahan jalqabaaf nyaata fi dhangala'a barbaachisuuf gahaadha		
9)	Harma Haadha Qofa Hoosisuun hanga daa'imni ji'a jaha guututti shaakalamuuu qaba		
10)	Bishaan ykn wantoota biro dawaan ala ji'oottan jaha duraa keessatti daa'imaaf kennuun fudhatama hin qabu		
11)	Harma hoosisuun carraa kaansarii harmaan qabamuu ni hir'isa ykn ni ittisa		
12)	Da'imman harma hodhuu bu'aa qabeessa yoo argatan ulfaatiin isaanii ni dabala		
13)	Qabanna sirriin Harma hoosisuun Bu'a qabeessii akka argamuuf ni gargaara		
14)	Daa'imni Harmaa gahaa yoo hodhaan sirritti rafu		
15)	Aannan Harma elmame osoo hin badiin hanga sa'a jahaa turuu ni danda'a		
16)	Ammuma amma harmaa osoo keessa hin dhumin jijjiiruun daa'imni akka bishaan (aanan duraa)qofa akka sooratu godha		
17)	Erga hodhaan Booda Deeffachuun Daa'imni quufuu agarsiisa		

1.2 Ilaalcha fi duudha dhunfaa /deeggarsa hawaasa Harma haadhaa qofa hoosisuu irratti

Maaloo miira,yaada,Ilaalcha fi yaada duudhaa fi duudha sirrii shaakaii Harma haadha qofa hoosisuu irratti adda baasuuf yaalaa fi tokko tokkoo gaafannoof deebii keessan akkas jechuun kennaa
1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	Gaafii	1	2	3	4	5
1)	Harma hoosisuun hanga ji'oottan jahan jaqabaa qofaaf gaaridha					
2)	Yoo daa'imni xuuxxoo ji'oottan jahaan jalqabaa keessatti jalqabuu baate booda harma dhaabsiisuun ni rakkisa					
3)	Yeroo hojiin baay'atu Aannan harmaa elmuun filannoo gaarii ta'us qara fiixee harmaa miidha akkasumas oomisha aannanii hir'isa					
4)	Ji'oottan jahan duraa qofaaf Harma Hoosisuun Faayida fayyaa barbaachisaa qaba					
5)	Gochi harma Hoosisuu Midhaagnna koo ykn argaa harmaa sababa harkifamuuf miidhuu danda'a					
6)	Daa'ima furdate qabaachuuf annaan qophaa'aa annan harmaa irratti dabalatan kennuu qabna					
7)	Silgi harmaa gatamuu qaba malee kennamuu hin qabu jedheen amana					
8)	Yeroo hundaa Harma haadha qofa hoosisuu irratti wanta namootni biro mirkaneessanii fi na gorsan nan fudhadha					
9)	Haadhooliin naannoo kiyyaa baay'een gocha harma haadha qofa hoosisuun akka hin barbaachifne mirkaneessu					
10)	Faayidaan harmaa hoosisuu kan jiraatu hanga daa'imni harma hodhe qofaadha					
11)	Harma Hoosisuun Aanaan qophaa'aa irra filatamaadha					
12)	Aanaan qophaa'aa obaasuun yoo haatii gara hojiitti deebi'uuf yaaddee filannoo gaarii dha					

1.3 Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa

Maaloo **Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa fi deebii shaakala keessanii bu'aa fayyaa irratti adda baasuuf yaalaa,gaafilee hundaaf deebii keessan akkas jechuun deebisaa**

1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	Gaafii	1	2	3	4	5
1)	Faalama yeroo daa'imummaa jechuunis garaa kaasa ittisuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a.					
2)	Guddina qaamaa fi sammuu daa'imaa sirrii jajjabeessuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a					
3)	Kaansarii harmaa ittisuuf harmaa haadhaa qofa hoosisuu shaakaluun salphaadha					
4)	Ulfa hin barbaachifne ittisuuf gocha Harma haadhaa qofa Hoosisuu rawwachuun salphaadha					
5)	Harkifamuu ykn Guddachuu harmaa akkasumas dhukkubbii wal fakkaatu Ittisuuf Harma Haadhaa qofa hoosisuu shaakaluun salphaadha					
6)	Hir'achuu dandamannaa qaama daa'imaa ittisuuf Harma haadha qofa hoosisuu rawwachuu nan danda'a					
7)	Kallattii,ta'umsaa fi qabannaa sirriidhaan hoosisuu nan danda'a					
8)	Qabannaa sirridhaan hoosisuu nan danda'a : hidhiin daa'imaa gara alatti harkifamuun					
9)	Fedhii daa'imaa guutuuf irra deddeebi'ee hoosisuu nan danda'a					
10)	Aanaan harmaa koo mala afuuftuu ykn harkaan fayyadamuun elmuu nan danda'a					
11)	Harmi koo yeroo duwwaa ta'u u natti dhagahame jijjiraa hoosisuu nan danda'a					

Kutaa Seedi: Boca waaltawaa Muuxannoo/amala harma ofa hoosisuun kan walqabateen WHO irraa fudhatame (Qorannicha duraa fi booda kan barbaachisu)

13. Guyyaa itti gaafatame_____
14. Daa'imni guyyaa itti dhalate_____
15. Harma hoosiftee beektaa? 1. Lakkii 2. Eeyyee
16. Yoo gaaffii G3 eeyyee jette, ji'a ja'a keessatti altokko hoosifteettaa? 1. Lakkii 2.Eeyyee
17. Yoo lakkii tahe, ji'oota ja'an darban kanneen armaan gadii keessaa kam fudhatteetti?
    l) Vitaaminii, albuuda dabalataa, qoricha 1. Lakkii 2. Eeyyee
    m) Bishaan qofa 1. Lakkii 2. Eeyyee
    n) Bishaan mi'eeffame ykn waan mi'aawaa waliin makame? 1. Lakkii 2. Eeeyyee
    o) Juusii kuduraa fi muduraa 1. Lakkii. 2. Eeyyee
    p) Shaayii ykn dhangala'oo 1. Lakkii 2. Eeyyee
    q) Foormulaa daa'immanii 1. Lakkii 2. Eeyyee
    r) Aannan sa'aa Qaruuraadhaan/daakuudhaan/ho'aa 1. Lakki 2. Eeyyee
    s) Dhangala'oo gosa kamiiyyuu 1. Lakkii 2. Eeyyee
    t) Nyaata waan jajjabaa qabuykn giddugaleessa 1. Lakkii 2. Eeyyee
    u) ORS, bishaan ashabaawaa afaaniin kennamu 1. Lakkii 2. Eeyyee
    v) Kan biro yoo jiraate caqasi_____
18. Erga deessee booda laguunkee ji'a ja'a keessatti argitteettaa? 1. Lakkii 2. Eeyyee
19. Erga deessee booda sa'atii kamitti harma jalqabsiiste? 1. Battaluma sana 2. Sa'atii_____3. Guyyoota_____(Yoo sa'atiin tokkoo gadi 00 galmeessi, sa'atii 24 gadi yoo tahe, tahuu baannaan guyyaan galmeessi)
20. Baatii ja'a keessatti guyyaa kamiyyuu galgalaa hanga ganamaatti (halkan) si'a meeqa hoosifte?_____

21. Baatii ja'a keessatti guyyaa kamiyyuu ganamaa hanga galgalaatti (guyyaa) si'a meeqa hoosifte?_____
22. Baatii ja'a keessatti daa'imtikee kan itti aananii jiran keessaa yoo fudhate, baayinni inni fudhate naaf eeri?
    k) Vitaaminii, albuuda dabalataa, qoricha: Si'a_____
    l) Bishaan qofa Si'a_____
    m) Bishaan mi'eeffame ykn waan mi'aawaa waliin makame? Si'a_____
    n) Juusii kuduraa fi muduraa Si'a_____
    o) Shaayii ykn dhangala'oo Si'a_____
    p) Foormulaa daa'immanii Si'a_____
    q) Aannan sa'aa Qaruuraadhaan/daakuudhaan/ho'aa Si'a_____
    r) Dhangala'oo gosa kamiiyyuu Si'a_____
    s) Nyaata waan jajjabaa qabuykn giddugaleessa Si'a_____
    t) ORS, bishaan ashabaawaa afaaniin kennamu Si'a_____
23. Yeroo meeqaafidha mucaan kee kan hodhu (yeroo itti xuxxuuxudaqiiqaa_____
24. Harma hoosiftee beektaa? Jechuunkoo ji'a ja'a keessatti 1. Lakkii 2. Eeyyee

Data collection tool for study-III

Code No:_____

Instruction/Information sheet

The respondents for this satisfaction survey will be all mothers who were enrolled to the intervention group and their one nominee of relevant others involved during home visit counseling and social support intervention by supporting the mother with regard to newborn caring or breast feeding practice. At the beginning, all mothers enrolled to the study were agreed to be study participant and to respond for the requested information with regard to this research project. Therefore, for this survey, the time suitability and comfort should be asked and reminding and updating the previous consent taken before asking for interview is needed. However, consent from relevant others, who nominated by the mother, should be taken now.

My name is _____, and is one of the data collectors for PDA project that was promoting EBF practice at community level. Based on the project record you were one of the mothers who got counseling and social support by trained deviant mother through the support of this project. Therefore, as part the final assessment, today I will have an interview with regard to your satisfaction about the intervention approach (counseling and social support) and other expected outcomes.

Consent sheet

Information was already explained and consent was taken during enrollment and baseline data collection. Hence, this phase of data collection is continuation of that and participants' background information were already recorded at the beginning and coded.

Just to update your adgreement? are you willing to participate; 1. Yes_____2. No_____

Part one: Socio demographic characteristics (*this part is for relevant others only-we already have record of mother)*

1)	Residency cluster/Kebele	1. Ginjo-Gudiru 2. Mendera-Kochi

		3. Awetu-Mendera
2)	Age in Years	_____
3)	Sex	5. Female 6. Male
4)	Religion	1.Orthodox 2.Muslim 3.Protestant 4.Catholic 5.Other_____
5)	Ethnicity	1.Oromo 2. Dawuro 3. Kaffa 4. Amhara 5.Other_____
6)	Marital status	1. Married 2. Divorced 3. Widowed 4. Single
7)	Educational status	1.unable to read & write 2. Able to read & write without formal education 3. primary school level 4. secondary and preparatory school level 5. tertiary level 6. other_____
8)	Occupational status	1. House head 2.Merchant 3.Student 4.Gov't employee 5. private employee 6. Other ___
9)	Monthly income(ETB estimated)	_____
10)	Previous experience of BF/support	0. No 1. Yes
11)	Intention to BF /support for the current baby	0. No 1. Yes
12)	Community level source of info about BF	1. HPs 2. Mass-medias 3. Family/relative 4. Others
13)	Previously received home-based visit/support from HEPs	0. No 1. Yes
14)	Existence of functional HDA network	0. No 1. Yes
15)	Participation in any social support network	0. No/limited 1. Yes
16)	The village/zone where the assigned PD living	1. The same with the mother 2. Different from the mother
17)	Educational status of the assigned PD	1. Able to read and write 2. Unable to read and write

18)	Are the people in your network (community) in support of BF?	0. Not supportive 1. Yes, supportive

Part two: Ideation factors of EBF practice related measurements (Post-implementation)

4) Knowledge of EBF

S.No	Item/questions	No(0)	Yes (1)
52)	Exclusive BF is cheap, available and healthy for normal baby growth		
53)	EBF is feeding breast milk only, except medicine, vaccine or supplements in the first six months.		
54)	Colostrum in the breast provides nutrients that should be fed at beginning to build immune system of the baby		
55)	Exclusive BF promotes mother-baby bonding		
56)	Exclusive BF protects the baby from diarrheal and other infection		
57)	Exclusive BF should start immediately within 1 hr after delivery		
58)	Exclusive BF serves as birth control/ spacing birth		
59)	Exclusive BF is sufficient for the baby nutrient and fluid needs during the first six months		
60)	Exclusive BF must be practiced until the infant is 6 months old		
61)	Giving water or anything except medicine to baby is not acceptable within the first 6 months		
62)	BF reduces/prevents the risk of breast cancer		
63)	Babies will gain weight if they receive effective breast feeding		
64)	Correct positioning helps to achieve effective BF		
65)	Babies sleep well after they receive adequate BF		
66)	An expressed breastmilk can stay up to 6hrs without getting spoiled.		
67)	Frequent shifting from one breast to the other before feeling empty makes the baby to feed only water (fore milk)		
68)	Belching after feeding shows that the baby is full		

5) Attitude and subjective norm toward EBF

Please try to assess your feeling, perception, attitude and prevailing subjective norm toward EBF practice and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
25)	It is good to feed breast milk **only** for the first 6 months					
26)	If your child is not started on bottle feeding within the first 6 months, it will be difficult to switch breast milk later on					
27)	Even if breast milk expression is a good option during busy time, it will affect the nipple sharpnes and decrease milk production					
28)	Feeding breast milk only during the first 6 months has very important health benefit					
29)	BF practice may affect my beautifulness or breast cosmetic due to engorgement					
30)	To have fattened baby we should feed formula and other products in addition to breast milk.					
31)	I believe colostrum shouldn't be given rather should be discarded					
32)	I always comply to what my referent other approved and advised me in practicing EBF					
33)	Most of mothers who are in my social network disprove EBF practice					

34)	The benefits of BF last only as long as the baby is BF					
35)	BF is more convenient than formula feeding					
36)	Formula feeding is the better choice if the mother plans to go back to work					

6) Self-efficacy to practice EBF

Please try to assess your efficacy/ability to practice EBF and response of your practice on health outcome, and give your response to each items as 1=Strongly Disagree, 2=D, 3=N, 4=A, 5=Strongly Agree.

S.No	Item/questions	1	2	3	4	5
23.	I am able to practice/support EBF to prevent infanthood infection i.e. diarrhea					
24.	I am able to practice/support EBF to promote infant's normal body-brain growth					
25.	It's easy to practice/support EBF to prevent breast cancer					
26.	It's easy to practice/support EBF to prevent unintended pregnancy					
27.	It's easy to practice/support EBF to prevent breast engorgement and associated pain					
28.	I can do/support EBF to prevent immunity deterioration of the baby					
29.	I can breastfeed (support to BF) with the correct position: siting and supportive holding					
30.	I can breastfeed (support to BF) with the correct attachment: bulging out of baby's lips					
31.	I can breastfeed (support to BF) frequently to satisfy the baby's need					
32.	I can express(support to express) my breast milk with supportive techniques: using pump and/or manual means					
33.	I can breastfeed (support to BF) with timely shifting when feeling empty					

Part Three: User satisfaction (Service Outcome) measuring items

Please rate your level of satisfaction for each item listed below (5=strongly satisfied, 4=satisfied, 3=neutral, 2=dissatisfied, 1=strongly dissatisfied) to complete the table .mark "X" in the appropriate box)

S.N	Dimension and Item	Satisfaction scale				
		1	2	3	4	5
1.	1-With the comfortability of the approach					
2.	2-With the lived experience sharing approach					
3.	3-With the positive deviant (counselor) assigned to you					
4.	4-With community based/home based ways of promoting EBF					
5.	5-With the promoted component of newborn care that is EBF practice					
6.	6-With the health outcome of EBF practice as you observed on your infant					
7.	7-With the appearance of PD/counselor					
8.	8-With the communication skill of PD/counselor					
9.	9-With the emphatic nature of PD/counselor					
10.	10-With the emotional supporting ability of PD/counselor					
11.	11-With the practical information (skill shared) provided to you					
12.	12-With the relevancy of experience shared by PD/counselor					
13.	13-With the convenience and long-term value of social support given					
14.	14-With the timing selection and convenience with caring newborn					

15.	15-With the length of consultation/counseling time					
16.	16-With the knowledge of counselor on EBF					
17.	17-With the content of counseling and experience shared at each visit					
18.	18-With the understandablity(non-complexity) of information provided					
19.	19-With the understandablity of appraisal support provided					
20.	20-With the ways of information delivery at each visit					
21.	21-With adequacy of number of visit					
22.	22-With the credibility of information provided					
23.	23-With the transferable skill you got					
24.	24-With the confidence built to be a potential counselor in your community network					
25.	25-With the experience of EBF you got					
26.	26-With the skill of breast milk expression					
27.	27-With the shared information about EBF					
28.	28-With your active involvement during each counseling sessions					
29.	29-With the support provided considering your interest (user centeredness)					
30.	30-With the practical/participatory aspect of BF experience sharing					

Translated Version into Amharic

ጅማ ዩኒቨርሲቲ፤ የማህበረሰብ ጤና ፋካሊቲ
የጤና ስነባህሪና ማህበረሰብ ት/ት ክፍል
የጥናቱን የአፈፃፀም ዉጤት የሚለካ መጠይቅ (end-users' satisfaction tool)

የጥናቱ መመሪያ

ጥናቱ ለሚመለከታቸው አካላት በቃለ-መጠይቅ መልክ የተዘጋጀው፤ በጅማ ከተማ ለጥናቱ ሲባል በተመረጡ ቀበሌዎች ዉስጥ ለሚኖሩ እናቶች ነው፡፡ይህም ጡትን ብቻ በማጥባት ለመልካምነት ያፈነገጡ የሚለዉን የልምድ ልዉዉጥ ዘዴ ውጤታማነትን መገምገም ሲሆን ቤት ለቤት እየሄዱ የሚያማክሩ ለመልካምነት ያፈነገጡና የሰለጠኑ እናቶችን ከ February 01-September 30, 2018 በመመደብ **iifphc**-Ethiopia የገንዘብና የቴክኒካል ድጋፉን ከ John Hopkins University-USA public health school ጋር በመተባበር አድርጎልናል፡፡

የጥናቱ ርእስ፡- ማህበረሰብ አቀፍ ለጨቅላ ህፃናት እንክብካቤ እና ጡትን ብቻ የማጥባት ልምድን ማሻሻል፡ ለጥቅም/ለመልካምነት ማፈንገጥ የሚለዉን ዘዴ በመጠቀም: Randomized Controlled Trial.

ተመራማሪ:- አቶ **ይበልጣል ስራነህ** (PhD fellow), እና አማካሪዎች (ዶ/ር ዘዉዴ ብርሃኑ እና ፕ/ር ምርኩዜ ወልዴ)

***መመሪያና ፈቃደኝነት መጠዬቂያ ቅፅ* (የጥናቱ ተጠቃሚዎችን እርካታ ለመገምገም የተዘጋጀ መጠይቅ)**

የዚህ የእርካታ ጥናት ተሳታፊ የሚሆኑት ከዚህ ቀደም የምክር አገልግሎት በተሰጠበት ቡድን ውስጥ ተሳታፊ የሆኑ እና አነሱ የሚመርጡት/ዋት የቅርብ እረዳታቸውና አማካሪያቸው የነበሩ ማለትም ጡትን ብቻ የማጥባት ልምድ አንዲናራቸው ያስቻሉ/ያገዙዋቸው እና ማህበራዊ ድጋፍ የሰጡ መሆን አለባቸው፡፡

ገና ከመጀመሪያው ጥናቱ ሲጀምር እናቶችን ወደ ጥናቱ ስንጋብዝ ሙሉ ፍቃደኝነታቸውን አረጋግጠን በመሆኑ ለዚህ መጠይቅ የተለዬ የፈቃደኝነት መጠዬቂያ ቅፅ አያስፈልግም፡፡ ነግር ግን የሰአቱና የሁኔታው ምቹነትን ጠይቆ ማረጋገጥና ቀድሞ የተስማሙ መሆናቸውን ማሰታዎስ አስፈላጊ ነው፡፡ ነገር ግን የቅርብ እረዳታቸውና አማካሪያቸው/ማህበራዊ ድጋፍ ሲሰጡ የነበሩትን ሙሉ ፈቃደኝነታቸውን መረጋገጥ የግድ ነው፡፡

ስሜ_____ ይባላል፡፡ የዚህ ጥናት (ማለትም ጡትን ብቻ የማጥባት ልምምድ እንዲኖር የሚያስችል አዲስ ዘዴን ውጤታማነት የሚገመግም) መረጃ ሰብሳቢ ነኝ፡፡ ያለፈዉ የፕሮጀክቱ መረጃ እንደሚያሳዬው እርስዎ ከተሳታፊ እናቶች አንዱዋ ሲሆኑ ከወሊድ በፊት ለ-1 ወርና ከወሊደ በኃላ ለ-6 ወር ከናንተው ቀበሌ ተመርጠው በሰለጠኑ ለመልካምነት ያፈነገጡ (positive deviants) እናቶች አማካኝነት ስለተሰጠዎ የምክርና ማህበራዊ ድጋፍ እንድሁም የአቀራረብ ዘዴ ላይ እርካታዎትን ለማወቅ ነው፡፡ ስለዚህ የመጨረሻ የፕሮጀክቱ አካል ለሆነው ለዚህ ጥናት ለ30 ደቂቃ የሚሆን ቃለ-መጠይቅ አደርጋለሁ፡፡ ይህ መጠይቅ ከእርካታ በተጨማሪ የሚጠበቁ የአፈፃፀም ዉጤቶችንም ይጨምራል፡፡

ፍቃደኝነትዎን ለማደስ ያክል፤ ለመሳተፍ ፈቃደኛ ነዎት? 1. አዎ_____2. አይ_____

ክፍል አንድ:የግል መለያ እና መነሻ መረጃ ጥያቄዎች (በእናትዬዋ ጥቆማ ለሚሳተፉ ብቻ)

ተ.ቁ	መጠይቅ	መልስ
17.	እድሜ	_____(በአመት)
18.	ፆታ	7. ሴት 8. ወንድ
19.	ሀይማኖት	11. አርቶዶክስ 12. ሙስሊም 13. ፕሮቴስታንት 14. ካቶሊክ 15. ሌላ_____
20.	ብሄር	11. አሮሞ 12. ዳዉሮ 13. ካፋ 14. አማራ 15. ሌላ _____
21.	የጋብቻ ሁኔታ	9. ያገባ/ች 10. የፈታ/ች 11. የሞተበት/ባት 12. የላገባ/ች
22.	የትምህርት ደረጃ	15. ማንበብ እና መጻፍ የማይችል 16. ማንበብ እናመጻፍ የሚችልግን መደበኛ ትምህርት ያልተማረች 17. የመጀመሪያ ደረጃ ትምህረት የተማረች 18. ሁለተኛ ደረጃ ትምህረት የተማረች 19. የመሰናዶ ትምህረት የተማረች 20. የመጀመሪያ ድግሪ እና ከዚያ በላይ የተማረች 21. ሌላ_____
23.	የስራ ሁኔታ	13. የቤት እመቤት/አባወራ

		14. ነጋዴ 15. ተማሪ 16. የመንግስት ሠራተኛ 17. የግል ተቋም ሠራተኛ 18. ሌላ_____
24.	ወርሃዊ የገቢ መጠን	_____ብር
25.	የጥናቱ የቀጥታ ተሳታፊ ከሆነችው እናት ጋረ ያለዎት ግንኙነት	1. ባል/ባለቤት 2. እናት 3. የሴት አያት 4. የስጋ ዘመድ 5. የቅርብ ጉዋደኛ 6. ሌላ_____

ክፍል ሁለት፡ ከጡት ማጥባት ጋር በተያያዘ የእዉቀት፤ አመለካከትና በራስ-የመተማመንን ሁኔታን ለመለካት

1.3.ጡት የማጥባት እዉቀት

የጡት ማጥባት እዉቀትን የሚለኩ መጠይቆች (አዎ ወይም አይደለም በማለት ይመልሱ)

S.No	መጠይቆች (በአረፍተ-ነገር)	አይ (0)	አዎ (1)
69)	ጡትን ብቻ ማጥባት ለጤናማ የህፃን እድገት እርካሽ፣ በቀላሉ የሚገኝና ጤናም ነገር ነዉ		
70)	ጡትን ብቻ ማጥባት ማለት የናት ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት መመገብ ሲሆን መድሃኒትና ክትባትን አይጨምርም		
71)	የህፃኑን የበሽታ የመከላከል አቅም ለማዳበር ለመጀመሪያ ጊዜ እንገርን መመገብ ያስፈልጋል		
72)	ጡትን ብቻ ማጥባት እናትን ከልጅ ጋር ያለዉን ትምረት ይጨምራል		
73)	ጡትን ብቻ ማጥባት ህፃኑን ከተቅማጥና ሌሎች ተላላፊ በሽታዎች ይጠብቃል		
74)	ጡትን ብቻ ማጥባት በመጀመሪያዉ 1 ሰዓት ዉስጥ ሊጀመር ይገባል		
75)	ጡትን ብቻ ማጥባት እንደ እርግዝና መከላከያ ዘዴ ይጠቅማል		
76)	ጡትን ብቻ ለመጀመሪያዎቹ 6 ወራት ማጥባት የህፃኑን የምግብና ፈሻሽ ፍለጎት ያማላል		
77)	ጡትን ብቻ ማጥባት ለመጀመሪያዎቹ 6 ወራት ሊተበር ይገባል		
78)	ለህፃኑ ለመጀመሪያዎቹ 6 ወራት ዉሃም ቢሆን መስጠት ከመድሃኒት በቀር ተቀባይነት የለዉም		
79)	ጡትን ብቻ ማጥባት የጡትን ካንሰር ይከላከላል		
80)	ህፃን ልጅ ባግባቡ ጡትን ብቻ ካጠቡት ግብቱ ይጨምራል		
81)	ህፃን ሲያጠቡ ባግባቡ ማቀፍ ዉጠታማ አመጋገብን ይፈጥራል		
82)	ህፃናት በቂ ጡት ከጠቡ በጥሩ ሁኔታ ይተኛሉ		
83)	የታለበ የጡት ወተት ሳይበላሽ ለ6 ሰዓታት ይቆያል		
84)	በማጥባት ወቅት የወተቱን ማለቅ ሳይረዱ በፍጥነት መቀያዬር ህፃኑ ዉሃዉን ብቻ እንዲያገኝ ያደርጋል		
85)	ህፃኑ ከጠባ በኻላ ካገሳ የመጥገቡ ምልክት ነው		

1.2. ጡት ብቻ የማጥባት አመለካከት

የጡት ማጥባት አመለካከትን የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
25.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት መልካም ነዉ					
26.	ህፃኑ በመጀመሪያዎቹ 6 ወራት ዉስጥ ጡቶ ካልጠባ በኻላ ጡትን ማስቆም ከባድ ነው					
27.	ለስራ ሲዎጡ ጡትን አልቦ ማስቀመጥ/መስጠት ጥሩ ቢሆንም እንኩዋን የጡት ጫፍን ይጎዳል፤ የወተት ምርት ይቀንሳል					
28.	ለመጀመሪያዎቹ 6 ወራት ጡትን ብቻ ማጥባት በጣም ጥሩ የጤና ጥቅም አለዉ					
29.	ጡትን ብቻ ማጥባት ሰለሚያገዘፈዉ ዉበቴን ያበላሻል ወይም የቱቴን ዉበት ያጠፋል					
30.	ወፍራም ልጅ እንዲኖረኝ ከጡት በተጨማሪ የጣሳ ወተት መመገብ ያስፈልጋል					

31.	እንደኔ እምነት እንገር ወተት መጣል እንጅ መሰጠት የለበትም					
32.	አኔ ሁሌም ጡት ከማጣባት ጋር በተያያዘ በቅርበት የምወዳቸዉ/አሉኝ የምላቸው ሰዎች ያሉኝን ነገር ነው ማደርገው					
33.	በማህበራዊ ግንኙነቴ ውስጥ ያሉ በርካታ እናቶች ጡትን ብቻ ማጥባትን አይደግፉም					
34.	ጡት ብቻን የማጥባት እቅም የሚቆዬው እስካጠባን ድረስ ብቻ ነው					
35.	ጡት ብቻ ማጥባት የጣሳ ወተት ከማጥባት በላያ ምቹ ነው					
36.	እናት ወደስራ ለመመለስ የጣሳ ወተት ማጥባት ጥሩ አማራጭ ነው					

1.3. ጡት ብቻ ማጥባት በራስ የመተማመን/የመተግበርን

ስለጡት ብቻ የማጥባት በራስ የመተማመን/የመተግበርን አቅም የሚለኩ መጠይቆች (ለያንዳንዱ አረፍተ-ነገር ከ1-በጣም አልስማማም እስከ 5-በጣም እስማማለሁ ድረስ ሃሳብዎትን የሚወክለዉን ይምረጡን ምልክ ይደረግ)

S.No	መጠይቆች (በአረፍተ-ነገር)	1	2	3	4	5
23)	የህፃናት ተቅማጥን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
24)	የህፃናት ሰውነትና አእምሮ እድገት ለማቀላጠፍ ጡትን ብቻ ማጥባት እችላለሁ					
25)	የጡት ካንሰርን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
26)	ያልተፈለገ እርግዝናን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
27)	የጡት መግዘፍንና ጠያዮዥ ህመምን ለመከላከል ጡትን ብቻ ማጥባት እችላለሁ					
28)	የህፃኑ በሽታን የመከላከል አቅሙ እንዳይዳከም ጡትን ብቻ ማጥባት እችላለሁ					
29)	በትክክል በመደገፍና በመቀመጥ ጡት ማጥባትን እችላለሁ					
30)	በትክክል ጡቴን ማስያዝና ጡት ማጥባት እችላለሁ					
31)	የልጀን/የህፃኑን ፍላጎት ለማሙዋላት ደጋግሜ ጡቴን ማጥባት እችላለሁ					
32)	ደጋፊ ነገሮችን በመጠቀም ለምሳሌ በማለቢይ ወይም በእጄ ጡቴን ማለብ እችላለሁ					
33)	ባዶነት ሲሰማኝ ቶሎ በመቀዬር ጡቴን ማጥባት እችላለሁ					

ክፍል-III: እርካታን የሚለኩ መጠይቆች (for mother and her relevant other nominee)

እባክዎት የእርካታ መጠንዎትን ለያንዳንዱ አረፍተ-ነገር እንደሚከተለዉ ያስቀምጡ (5= በጣም እረክቻለሁ, 4=እረክቻለሁ, 3=ገለልተኛ/አሻሚ ነው, 2= አልረካሁም, 1=በጣም አልረካሁም)፡፡ በቁጥሩ ስር የ "X" ምልክት ያስቀምጡ፡፡

ተ.ቁ	መርህና አረፍተ-ነገር	የእርካታ መጠን				
		1	2	3	4	5
1.	በዘዴው/approach ምቹነት					
2.	የግል ተሞክሮን በማካፈል ረገድ ዘዴው/approach					
3.	እንድታማክርዎ በተመደቦችው በመልካምነት ያፈነገጠች (positive deviant) እናት					
4.	ቤት ለቤትን መሰረት ያደረገ ጡት ብቻ የማጥባት ልምድን የማበረታታት ዘዴ					
5.	ከህፃናት እንክብካቤ መካከል ጡት ብቻ የማጥባት ልምድን በተለዬ መንገደ መበረታታቱ					
6.	ጡት ብቻ ማጥባት በልጁ ጤና ላይ በሚያሳዬው ውጤት					
7.	በአማካሪዋ (PD) አቀራረብና አለባበስ					
8.	በአማካሪዋ የተግባቦት ክህሎት					
9.	አማካሪዋ አንቺ/አንተ ያለሽበትን ሁኔታ የመረዳት አቅም					
10.	አማካሪዋ በጥልቅ ስሜት የማገዝ አቅምን በተመለከተ (emotional supporting ability)					
11.	ተግባራዊ የሚሆን የማጥባት ልምድ ክህሎትን ከማካፈል አንፃር					
12.	የምታካፍለው/ያካፈለችሽ ልምድና ክህሎት እርባናዊነት/relevancy					
13.	በተደረገልሽ ማህበራዊ ድጋፍ ምቾትና ለረጅም ጊዜ የሚኖረው ዋጋ					
14.	ለጉብኝቱ በተመረጠው ሰአትና ካንቺ የልጅ እንክብካቤ ጊዜ ጋር ያለው ምቹነት					
15.	ለምክክር በሚወስደብሽ ሰአት እርዝማኔን በተመለከተ					
16.	በአማካሪዋ ጡትን ብቻ በማጥባት ዙሪያ ያላት እዉቀት					
17.	በያንዳንዱ ጉብኝት በሚደረገዉ ምክክርና ልምድ ልዉዉጥ ይዘት					

18.	በቀላሉ መረጃዉን የመረዳትና አማካሪዋ እዬጠየቀች መልሶ የመርዳት ሁኔታ					
19.	የዘዬዉ/ approach ምቹነት					
20.	በያንዳንዱ ጉብኝት መረጃዉ የሚቀርብበትና የሚተላለፍበት መንገድ					
21.	አጠቃላይ የጉብኝቱ ቁጥር/ብዛት በቂነት ላይ					
22.	የተሰጠዉ መረጃ ታማኒነት ላይ					
23.	አጠቃላይ የጉብኝቱ ቁጥር/ብዛት በቂነት ላይ					
24.	ለሌላዉ የሚተርፍ ክህሎት ባገኘሽዉ/ሽዉ ላይ					
25.	ያዳበርሽዉ/ከዉ እዉቀትን በመጠቀም በሚኖርሽ/ህ ማህበራዊ ግንኙነት አማካሪ የመሆን ልበ-ሙሉነት					
26.	በያንዳንዱ ጉብኝትና ምክክር ወቅት ያንቺ/ተ ንቁ ተሳታፊነት					
27.	በያንዳንዱ ጉብኝት በሚደረገዉ ምክክርና ልምድ ልዉዉጥ ይዘት					
28.	በቀላሉ መረጃዉን የመረዳትና አማካሪዋ እዬጠየቀች መልሶ የመርዳት ሁኔታ					
29.	የተሰጠዉ ድጋፍ ያንችን ፍላጎት ያማከለ ስለመሆኑ (user centeredness)					
30.	የልምድ ልዉዉጥ አሳታፊነት/ተጉበራዊነት					

Haala itti-quufinsa fayyadamtoota qorannichaa fi bu’aa raawwii gamaaggamuuf boca gaaffi qophaa’e (Tool for measuring user satisfaction)

Boca Qajeelfamaa fi Eeyyamamtummaa ittiin gaafatan

Hirmaataa qorannnoo itti-quufinsaa kan taatan kanaan dura tajaajilli gorsaa garee kannameef keessatti hirmaattuu isaan kan filaniifi gaargaarsa isaanii dhiyoo goorsituu keessankan turan jechuun harma qofa waa’ee hoosisuu muuxannoo akka qabaataniif warra isin dandeessisan/gargaaraniifi tajaajila hawaasummaa kan kennan tahuu qabu.

Jalqabumarraa qabee qorannichi yommuu jalqabu haadholii gara qorannichaatti yommuuu affeerru, eeyyamamummaa isaanii guutuu erga mirkaneeffannee booda gaaffii kanaaf boca eeyamamummaa addaa kan biro hin barbaachisu. Haa tahu malee mijatiinsa sa’atii fi haalaa gaafatanii mirkaneeffachuufi dursanii kan itti waliif galan tahuu isaanii yaadachuun barbaachisaa dha. Haa tahu malee gargaartuu keessan dhiyoo fi gorsituu /tajaajila hawaasa bu’uureffate yoo kennan kan turan eeyyamamummaa isaanii guutuu mirkaneessuun fardiidha.

Maqaankoo_____jedhama. Nama qorannoo kanaaf (Bartee gochaa kunuunsa daa’imman kichuu fi harma qofa hoosisuu hawaasa bu’uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan fooyyessuuf) odeeffannoo funaanuudha. Odeeffannoon Piroojectii kanaa darban akka agarsiisutti isin haadholii hirmaattuu kessaa tokko yoo taatan dahumsa dura baatii-1 fi dahumsa booda baatii-26 ganda keessanii filatamanii kan leenji’an gaarummaaf haadhota fincilan (Positive deviants) keessaa waa’ee gorsaa fi deeggarsa hawaasummaa akkasumas mala walitti siqeenyaa irratti ittti-quufinsa keessan beekuuf taha. Kanaafuu qorannoo dhumaa qaama Piroojectii kanaa taheef afgaaffii daqiiqaa 30 hin caalleef eeyyamamtummaa keessan haaressuuf, hirmaachuuf ni eeyyamtuu? 1. Lakkii 2. Eeyyee

Kutaa tokko. Addaan baastuu matayyaa fi Gaaffilee raga bu’uuraa (Eeruu haadhattiin qofa kanniin hirmaatan qofaaf: For relevant others only since we already have record of the mother)

T.L	Gaaffii	Deebii
1	Umurii	Waggaa_____
2	Amantaa	11. Ortodooksii 12. Musiliima 13. Pirootestaantii 14. Kaatolikii 15. Kan biroo
3	Qomoo	11. Oromoo 12. Daawuroo 13. Kafaa

		14. Amaara 15. Kan biroo
4	Gaa'ila	9. Kan fuudhe/heerumte 10. Kan hike/hiikte 11. Kan jalaa du'e/duute 12. Qeerroo/qarree
6	Sadarkaa Barnootaa	15. Dubbisuu fi barreessuu kan hin dandeenye 16. Dubbisuu fi barreessuu kan dandahu/dandeessu garuu barnoota idilee kan hin baratin 17. Sadarkaa tokkoffaa kan baratte 18. Sadarkaa lammaffaa kan baratte 19. Hamma qophaa'inaatti kan baratte 20. Digrii jalqabaa fi sanaa ol kan qabdu 21. Kan biroo
7	Hojii	13. Haadha warraa 14. Daldaltuu 15. Barattuu 16. Hojjettuu mootummaa 17. Hojjettuu mit-mootummaa 18. Kan niroo_____
8	Galii ji'aa	Qarshii_____
9	Hariiroo hirmaattuu kallattii qorannichaa waliin qabdu	1. Abbaa warraa/haadha warraa 2. Haadha 3. Akkoo 4. Fira dhiigaa 5. Hiriyaa 6. Kan biro_____

Kutaa Laama: Beekumsa

1.1 Beekumsa ,Harma Haadha Qofa Hoosisuu (Tokko tokkoon deebii Eyyeen ykn lakki jechuun deebisaa)

T.l	Gaafii	Lakki(0)	Eyyeen(1)
1)	Harma Haadha Qofa Hoosisuun rakasa,saphumatti kan argamu fi guddina daa'imaaf fayyalessa		
2)	Harma Haadha Qofa Hoosisuun Harma Haadha Qofa Hoosisuu,Qorsa,Talaallii ykn waan dabalataan yeroo jalqaba ji'oottan jaha malee		
3)	Silgi harmaa keessa jiru nyaata jalqaba kennamu qabu dandandamanna qaama daa'imaa ijaaraa		
4)	Harma Haadha Qofa Hoosisuun walitti dhufeenya haadhaa fi daa'imaa dagaagsa		
5)	Harma Haadha Qofa Hoosisuun daa'ima garaa kaasaa fi faalama biro ni ittisa		
6)	Harma Haadha Qofa Hoosisuun akkuma dhalateen sa'a tokko keessatti jalqabuu qaba		
7)	Harma Haadha Qofa Hoosisuun akka karoora maatitti ykn dhala addaan fageessutti ni gargaara		
8)	Harma Haadha Qofa Hoosisuun ji'oottan jahan jalqabaaf nyaata fi dhangala'a barbaachisuuf gahaadha		
9)	Harma Haadha Qofa Hoosisuun hanga daa'imni ji'a jaha guututti shaakalamuuu qaba		
10)	Bishaan ykn wantoota biro dawaan ala ji'oottan jaha duraa keessatti daa'imaaf kennuun fudhatama hin qabu		

11)	Harma hoosisuun carraa kaansarii harmaan qabamuu ni hir'isa ykn ni ittisa		
12)	Da'imman harma hodhuu bu'aa qabeessa yoo argatan ulfaatiin isaanii ni dabala		
13)	Qabanna sirriin Harma hoosisuun Bu'a qabeessii akka argamuuf ni gargaara		
14)	Daa'imni Harmaa gahaa yoo hodhaan sirritti rafu		
15)	Aannan Harma elmame osoo hin badiin hanga sa'a jahaa turuu ni danda'a		
16)	Ammuma amma harmaa osoo keessa hin dhumin jijjiiruun daa'imni akka bishaan (aanan duraa)qofa akka sooratu godha		
17)	Erga hodhaan Booda Deeffachuun Daa'imni quufuu agarsiisa		

1.2 Ilaalcha fi duudha dhunfaa /deeggarsa hawaasa Harma haadhaa qofa hoosisuu irratti

Maaloo miira,yaada,Ilaalcha fi yaada duudhaa fi duudha sirrii shaakaii Harma haadha qofa hoosisuu irratti adda baasuuf yaalaa fi tokko tokkoo gaafannoof deebii keessan akkas jechuun kennaa
1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	Gaafii	1	2	3	4	5
1)	Harma hoosisuun hanga ji'oottan jahan jaqabaa qofaaf gaaridha					
2)	Yoo daa'imni xuuxxoo ji'oottan jahaan jalqabaa keessatti jalqabuu baate booda harma dhaabsiisuun ni rakkisa					
3)	Yeroo hojiin baay'atu Aannan harmaa elmuun filannoo gaarii ta'us qara fiixee harmaa miidha akkasumas oomisha aannanii hir'isa					
4)	Ji'oottan jahan duraa qofaaf Harma Hoosisuun Faayida fayyaa barbaachisaa qaba					
5)	Gochi harma Hoosisuu Midhaagnna koo ykn argaa harmaa sababa harkifamuuf miidhuu danda'a					
6)	Daa'ima furdate qabaachuuf annaan qophaa'aa annan harmaa irratti dabalatan kennuu qabna					
7)	Silgi harmaa gatamuu qaba malee kennamuu hin qabu jedheen amana					
8)	Yeroo hundaa Harma haadha qofa hoosisuu irratti wanta namootni biro mirkaneessanii fi na gorsan nan fudhadha					
9)	Haadhooliin naannoo kiyyaa baay'een gocha harma haadha qofa hoosisuun akka hin barbaachifne mirkaneessu					
10)	Faayidaan harmaa hoosisuu kan jiraatu hanga daa'imni harma hodhe qofaadha					
11)	Harma Hoosisuun Aanaan qophaa'aa irra filatamaadha					
12)	Aanaan qophaa'aa obaasuun yoo haatii gara hojiitti deebi'uuf yaaddee filannoo gaarii dha					

1.3 Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa

Maaloo **Harma Haadha Qofa Hoosisuu Shaakaluuf ofitti amanamummaa fi deebii shaakala keessanii bu'aa fayyaa irratti adda baasuuf yaalaa,gaafilee hundaaf deebii keessan akkas jechuun deebisaa**

1=Baay'ee itti walii hin galu, 2=Itti walii hin galu, 3=Yaada hin qabu, 4=Ittin walii gala, 5=Baay'een itti walii gala.

T.l	Gaafii	1	2	3	4	5
1)	Faalama yeroo daa'imummaa jechuunis garaa kaasa ittisuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a.					
2)	Guddina qaamaa fi sammuu daa'imaa sirrii jajjabeessuuf gocha harmaa haadhaa qofa hoosisuu raawwachuu nan danda'a					

3)	Kaansarii harmaa ittisuuf harmaa haadhaa qofa hoosisuu shaakaluun salphaadha					
4)	Ulfa hin barbaachifne ittisuuf gocha Harma haadhaa qofa Hoosisuu rawwachuun salphaadha					
5)	Harkifamuu ykn Guddachuu harmaa akkasumas dhukkubbii wal fakkaatu Ittisuuf Harma Haadhaa qofa hoosisuu shaakaluun salphaadha					
6)	Hir'achuu dandamannaa qaama daa'imaa ittisuuf Harma haadha qofa hoosisuu rawwachuu nan danda'a					
7)	Kallattii,ta'umsaa fi qabannaa sirriidhaan hoosisuu nan danda'a					
8)	Qabannaa sirridhaan hoosisuu nan danda'a : hidhiin daa'imaa gara alatti harkifamuun					
9)	Fedhii daa'imaa guutuuf irra deddeebi'ee hoosisuu nan danda'a					
10)	Aanaan harmaa koo mala afuuftuu ykn harkaan fayyadamuun elmuu nan danda'a					
11)	Harmi koo yeroo duwwaa ta'u u natti dhagahame jijjiraa hoosisuu nan danda'a					

Kutaa Seedi: Safartuu itti-quufinsa (For mother and her relevant others nominee)

Adaraa sadarkaa itti quufinsa keessanii akka itti aanee jiruutti guutaa (5=baayyee itti quufeera 4=Itti quufeera 3=garhingorree 2=Itti hin quufne 1= baayyee itti hin quufne). Lakkoofsota sanniin jalatti mallattoo 'X' kaa'i.

T.L	**Sirnaa fi himoota**	Hamma Itti-Quufinsaa				
		1	2	3	4	5
1	Mala muuxannoo dhuunfaa waljijjiirraa/Approach					
2	Haadha gaarummaaf finciltee kka isin gorsituuf ramadamte					
3	Tooftaa harma qofa hoosisuu manaa mana bu'uureffate jajjabeessuu					
4	Kunuunsa daa'immaniif godhamu keessaa muuxannoo harma qofa hoosisuu bifa adda taheen jajjabeessuu isaa					
5	Harma qofa hoosisuun fayyaa daa'imaa irratti bu'aa inni argisiise					
6	Haala uffataa fi dhiheenyaa gorsituttii(PD)					
7	Gorsituttiin gahumsa ittin waliif galtan					
8	Dandeettii Gorsituttiin (PD) haala ati keessa jirtu hubachuu					
9	Gorsituttiin miira gad-fagoodhaan gargaaruun walqabatee					
10	Muuxannoo hoosisuu hojiitti hiikamuu dandahu qooduun walqabatee					
11	Walitti dhiheenya muuxannoo isheen qoodduu fi gahumsaa ishee/relevancy					
12	Mijatiinsa deggersa hawaasummaa siif godhamee fi bu'aa inni yeroo dheeraa keessatti qabu					
13	Mijaa'ummaa sa'atii daawwannaa sanaaf filatamaniifi kunuunsa daa'ima keetii waliin					
14	Dheerina yeroo gorsaa sitti fudhateen walqabatee					
15	Gorsituttiin harma qofa hoosisuun walqabatee beekumsa gahaa qabaachuu					
16	Tokkoo tokkoo daawwannaa irratti gorsaa fi muuxannoo waljijjiirraa taasifamu					
17	Haala salphaa taheen ragicha hubachuuniifi gorsituttii gaafachuudhaan deebisanii hubachuun walqabatee					
18	Mijaa'ummaa tooftichaa/approach					
19	Tokkoo tokkoo daawwannaa irratti ragaan akki itti dhiyaatuufi itti darbu					
20	Gahummaa baayyina daawwannichaa irratti					
21	Amansiistummaa raga kennamee irratti					
22	Gahumsa nama biroof irraa hafu argachuu irratti					
23	Beekumsa kuuffate fayyadamtee gorsituu walitti dhufeemya hawaasummaa tahuu onnee guutuudhaan					
24	Tokkoo tokkoo daawwannaafi marii irratti dammaqinaan hirmaachuu					

25	Gargaarsi godhame fedhii ke giddugaleessa kan godhate tahuu irratti/ user centeredness					
26	With the skill of breast milk expression					
27	With the shared information about EBF					
28	With your active involvement during each counseling sessions					
29	With the support provided considering your interest (user centeredness)					
30	With the practical/participatory aspect of BF experience sharing					

Data collection tool for study-IV

Tool for measuring implementation outcomes

Instruction/Information sheet

Interviewer and self-administered questionnaire prepared for all eligible intervention participants living in intervention clusters/Kebeles of Jimma town.

Title of the study; assessement of implementation outcome measures for positive deviance approach as an intervention to promote EBF practice: A follow-up study after the intervention being conducted.

Investigators: Mr.Yibeltal Siraneh (PhD fellow) and supervisors (Dr.Zewdie B. and Prof. Mirkuzie W.)

Dear respondent,

I am inviting you to participate in this study b/c of such type of implementation research has not been done in Ethiopia specifically in Jimma town. So that assessing its implemntation outcomes from the intervention participants (stakeholders') perispective is relevant. Before you decide whether to take part, it is important for you to understand why the research is being done. This intevention study is being conducted for the academic use, evidence generation for policy makers so as to have sustainable community based newborn and infant caring program including EBF practice. It has got ethical approval from the Institutional Review Board of the health institute, Jimma University. All information that is collected from you during the study will be kept confidential, and your name will never be mentioned in any analysis and dissemination of findings.

Taking part in this study is completely voluntary based. If you decide not to be in this study, or if you stop participating at any time, you won't be penalized or lose any benefits. However, the honest information you give us is highly valuable to the study and future program. I am grateful to you for considering this research and look forward to your response!

The respondents for this implementation outcome measures will be all intervention participants (implemntors/facillitators and end-users) who are living in the intervention group and involved during home visit counseling and social support intervention with different role. At the beginning, all mothers enrolled to the study were agreed to be study participant and to respond for the requested information with regard to this research project. Therefore, for this survey, only the time suitability and comfort should be asked and reminding and updating the previous consent taken before asking for interview is needed. However, consent from relevant others who nominated by the mother, should be taken now. All other study participants should be notified about the study objectives/purpose and the importance of their volenteer participation. They should be informed in detail before taking the informed consent.

Consent sheet for end-users

Mothers and thier relevant other (end-users) would be approached as; my name is _____, and is one of the data collectors for this study. Based on the project record you were one of the mothers who got counseling and social support by trained positive deviant mother. Therefore, as part the follow-up assessment, today I will have an interview with regard to your perceiption on different implemntation outcome of the intervention. To take consent from mothers/end-user of the intervention, information was already explained and consent was taken during enrollment and baseline data collection. Hence, this

phase of data collection is continuation of that and participants' background information were already recorded at the beginning and coded.

Just to update your adgreement? are you willing to participate; 1. Yes_____2. No_____

Consent sheet for all other participants

I (study participant) have heard all the information, understood the aims of the study and noted that participation in this study is completely voluntary and that I can withdraw from the study any time. I'm fully aware that the results of this study will be used for scientific purpose and may be published to desseminate the finding for end-users and programmers including policy makers. I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this study.

_____Yes, I want to participate in the study

_____ No, I don't want to participate in the study

Part one: Background characteristics

1.	Age (in completed years)	_____
2.	Sex	9. Female 10. Male
3.	Religion	1.Orthodox 2.Muslim 3.Protestant 4.Catholic 5.Other_____
4.	Ethnicity	1.Oromo 2. Dawuro 3. Kaffa 4. Amhara 5.Other_____
5.	Marital status	1. Married 2. Divorced 3. Widowed 4. Single
6.	Educational status	1. Can't read & write at all 2. Can read & write without formal education 3. Can read & write with formal education 4. Other
7.	Occupational status	1. Housewife 2. Merchant 3. Gov't employee 4. Private employee (employeed at private and NG organizations) 5. Other ___
8.	Monthly income(ETB estimated)	_____
9.	Role in the implementation?	1. Facilitator

		2. Counsellors/change agent 3. End-user
10.	Perceived level of engagement during PDA intervention process	1. Highly/actively engaged 2. Medium 3. Lowly engaged
11.	Perceived level of confidence to promote EBF through PDA	1. Highly confident enough 2. Medium 3. Lowly confident 4. Uncertain
12.	Perceived level of competency to implement or run the PDA to promote EBF?	1. Highly competent enough 2. Medium 3. Lowly competent 4. Uncertain
13.	Is this intervention could be an added value for the home visit program expected to be implemented by HEPs? (PDA's perceived benefit)	1. Yes 2. No 3. I am not sure
14.	Is the support given to mothers by relevant others important to practice EBF?	1. Yes 2. No 3. I am not sure
15.	Rate your level of understanding about the PDA implemented to promote EBF?	1. Poor 2. Medium 3. Good

Part two: Items used to measure implementation outcomes

Please rate your level of agreement for each statement/item listed below (5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree), to complete the table; mark "X" in the appropriate box)

S.N	**Pre-assumed constructs and respective items-developed**	**Agreement scale**				
	Acceptability	1	2	3	4	5
1.	Ac1-Promoting EBF through the PDA seems good enough (palatable)					
2.	Ac2-Promoting EBF practice using the PDA seems relevant					
3.	Ac3-Promoting EBF practice using the PDA is compatible with mother's interest/need					
4.	Ac4-Promoting EBF practice using the PDA is suitable/fine					
5.	Ac5-PDA with informational and social support will enable mothers to practice EBF					
6.	Ac6-Using the PDA can improve practice of EBF					
7.	Ac7-The PDA is useful in promoting EBF					

8.	Ac8-PDA is pretty good to have skillful promotors of EBF					
9.	Ac9-This PDA is Okay					
10.	Ac10-This PDA is appealing/interesting					
	Fidelity					
11.	Fi11-There was a shared plan at the beginning of this intervention					
12.	Fi12-The intervention was implemented as it was prescribed in the original protocol					
13.	Fi13-Every activities were performed as per the standard/expected					
14.	Fi14-The PD approach would maintains its intended effects					
15.	Fi15-Program participants complied to the program protocol					
16.	Fi16-Dose or number of home visit for counseling was enough to initiate and sustain EBF practice					
17.	Fi17-There was information redundancy at different visit ®					
18.	Fi18-Home based counseling and support would face discontinuity while relative/visitors coming to the mother ®					
19.	Fi19-Collecting signature of PD by the end-user/mother was a well performed technique to follow performance					
20.	Fi20-Emotional responsiveness (ability to respond empathically) during informational counseling was well considered as hall mark of this approach					
	Appropriateness					
21.	Ap21-The PDA with informational counseling and social support service seems right at home level					
22.	Ap22-The PDA with informational counseling and social support service was useful/relevant					
23.	Ap23-The PD approach was fit for the purpose in promoting EBF					
24.	Ap24-This PDA seems proper /applicable to promote EBF					
25.	Ap25-This PDA seems well aligned/ a good match with the objective					
26.	Ap26-PDA seems suitable/compatible with the providers and client need					
27.	Ap27-The criteria used to select PDs are reasonable to work with PDA					
	Feasibility					
28.	Fe28-The PDA seems practical at urban setting/Jimma Town					
29.	Fe29-Poor recruitment or participation rates were the major gaps in implementing the PDA ®					
30.	Fe30-This PDA seems realistic/doable					
31.	Fe31-This PDA seems workable/implementable					
32.	Fe32-Number of visit is adequate but need to re-adjust date of each visit ®					
33.	Fe33-This PDA seems easy to promote EBF					
34.	Fe34-This approach of promoting EBF is challenging ®					
35.	Fe35-The PDA seems viable/possible to promote EBF					
	Penetration					

36.	P36-The approach is well integrated with the existing practice of urban HEP.					
37.	P37-The approach may not go with the existing community structure®					
38.	P38-The approach may not be successful through home to home visit ®					
39.	P39-Every eligible mother could be reached-out with such approach in urban setting					
40.	P40-All mothers enrolled to this program got valuable support					
41.	P41-Full engagement of participants is done to ensure reachability of the intervention					
42.	P42-The spillover effect will increase the intervention's coverage in the community					
	Sustainability					
43.	S43-PDA is maintained within a community					
44.	S44-PDA is institutionalized within a community structure					
45.	S45-The extent to which PD approach integrated into subsystems of community network matters its durability					
46.	S46-Higher penetration may contribute to long-term sustainability					
47.	S47-Community members are passionately committed to the program that ensure continuety					
48.	S48-Volinteerism is a centeral aspect of this approach that would support maintenance of the intervention					
49.	S49-There is full community/ stakeholders support that are capable to run the program					
50.	S50-Participatory nature of the approach leads to empowerment that gurantee continuety of the PDA					
	Adoption/adaptability					
51.	Ad51-Intention to practice EBF would be a fertile ground to inherit the PDA					
52.	Ad52-The PDA would improve the uptake of EBF information					
53.	Ad53-Mother involved in the process can be a counselor in the future					
54.	Ad54-The PD approach need major modification to promote EBF ®					
55.	Ad55-The PD approach need additions of new components/services ®					
	Organizational/community readiness					
56.	Or56-Existing community structures, routines, and resources can create a receptive context to promote EBF					
57.	Or57-There is cooperation among implementers in operating the new approach and ready for change					
58.	Or58-Intervention participants (we) feel committed to implement PDA and confident in collective abilities					
59.	Or59-We program implementers/participants value the social					

	support given to mothers					
60.	Or60-Resource availability matters as part of readiness for this new approach					
61.	Or61-There is supportive community structure to use PDA					
62.	Or62-There is high health system support of promoting EBF by the PDs					
	Implementation cost					
63.	Ic63-Implementing this approach is less costly in terms of cash					
64.	Ic64-Implementing this approach is less costly in terms of time					
65.	Ic65-The cost of implementing this approach is less as compared to the social/health value to be promoted					
66.	Ic66-Pocket money incentives would motivate implementers to do what expected ®					
67.	Ic67-All stakeholders are motivated to engage in this intervention as a priority task					
68.	Ic68-The cost (time and/or cash) that expended is more than the benefit got from this intervention ®					
69.	Ic69-Refreshment cost/incentive is enough to refresh during intervention activities					
70.	Ic70-Intervention cost was not needed to promote EBF practice					

Annex-II: የጥናቱ የአፈፃፀም ዉጤትን ለመገምገም የተዘጋጀ መጠይቅ (Amharic version)

መመሪያና ፈቃደኝነት መጠዬቂያ ቅፅ

የዚህ የእርካታ ጥናት ተሳታፊ የሚሆኑት ከዚህ ቀደም የምክር አገልግሎት በተሰጠበት ቡድን ውስጥ ተሳታፊ የሆኑ እና አነሱ የሚመርጡት/ዋት የቅርብ እረዳታቸውና አማካሪያቸው የነበሩ ማለትም ጡትን ብቻ የማጥባት ልምድ አንዲናራቸው ያስቻሉ/ያገዙዋቸው እና ማህበራዊ ድጋፍ የሰጡ መሆን አለባቸው፡፡

ገና ከመጀመሪያው ጥናቱ ሲጀምር እናቶችን ወደ ጥናቱ ስንጋብዝ ሙሉ ፍቃደኝነታቸውን አረጋግጠን በመሆኑ ለዚህ መጠይቅ የተለዬ የፈቃደኝነት መጠዬቂያ ቅፅ አያስፈልግም፡፡ ነግር ግን የሰአቱና የሁኔታው ምቹነትን ጠይቆ ማረጋገጥና ቀድሞ የተስማሙ መሆናቸውን ማሰታዎስ አስፈላጊ ነው፡፡ ነገር ግን የቅርብ እረዳታቸውና አማካሪያቸው/ማህበራዊ ድጋፍ ሲሰጡ የነበሩትን ሙሉ ፈቃደኝነታቸውን መረጋገጥ የግድ ነው፡፡

ስሜ_____ ይባላል፡፡ የዚህ ጥናት (ማለትም ጡትን ብቻ የማጥባት ልምምድ እንዲኖር የሚያስችል አዲስ ዘዴን ውጤታማነት የሚገመግም) መረጃ ሰብሳቢ ነኝ፡፡ ያለፈዉ የፕሮጀክቱ መረጃ እንደሚያሳዬው እርስዎ ከተሳታፊ እናቶች አንዱዋ ሲሆኑ ከወሊድ በፊት ለ-1 ወርና ከወሊደ በኃላ ለ-6 ወር ከናንተው ቀበሌ ተመርጠው በሰለጠኑ ለመልካምነት ያፈነገጡ (positive deviants) እናቶች አማካኝነት ስለተሰጠዎ የምክርና ማህበራዊ ድጋፍ እንድሁም የአቀራረብ ዘዴ ላይ እርካታዎትን ለማወቅ ነው፡፡ ስለዚህ የመጨረሻ የፕሮጀክቱ አካል ለሆነው ለዚህ ጥናት ለ30 ደቂቃ የሚሆን ቃለ-መጠይቅ አደርጋለሁ፡፡ ይህ መጠይቅ ከእርካታ በተጨማሪ የሚጠበቁ የአፈፃፀም ዉጤቶችንም ይጨምራል፡፡

ፍቃደኝነትዎን ለማደስ ያክል፤ ለመሳተፍ ፈቃደኛ ነዎት? 1. አዎ_____2. አይ_____

ክፍል አንድ:የግል መለያ እና መነሻ መረጃ ጥያቄዎች

ተ.ቁ	መጠይቅ	መልስ
26.	እድሜ	_____(በአመት)
27.	ፆታ	11. ሴት 12. ወንድ
28.	ሀይማኖት	16. አርቶዶክስ 17. ሙስሊም 18. ፕሮቴስታንት 19. ካቶሊክ 20. ሌላ_____
29.	ብሄር	16. አሮሞ 17. ዳዉሮ 18. ካፋ 19. አማራ 20. ሌላ _____
30.	የጋብቻ ሁኔታ	13. ያገባ/ች 14. የፈታ/ች 15. የሞተበት/ባት 16. የላገባ/ች
31.	የትምህርት ደረጃ	22. ማንበብ እና መጻፍ የማይችል 23. ማንበብ እናመጻፍ የሚችልግን መደበኛ ትምህርት ያልተማረች 24. የመጀመሪያ ደረጃ ትምህረት የተማረች 25. ሁለተኛ ደረጃ ትምህረት የተማረች 26. የመሰናዶ ትምህረት የተማረች 27. የመጀመሪያ ድግሪ እና ከዚያ በላይ የተማረች 28. ሌላ_____
32.	የስራ ሁኔታ	19. የቤት እመቤት/አባወራ 20. ነጋዴ 21. የመንግስት ሠራተኛ 22. የግል ተቋም ሠራተኛ 23. ሌላ_____
33.	ወርሃዊ የገቢ መጠን	_____ብር
34.	በትግበራ ወቅት የነበረዎት ሚና	1) አስተባባሪ/አስፈፃሚ 2) የምክር አገልግሎት ሰጭ/ለመልካም ስራ ያፈነገጡ 3) ዋና ተጠቃሚ
35.	የተሳትፎ ደረጃዎን እንዴት ይገልፁታል ለመልካምነት የማፈነገጥ ዘዴን ተጠቅመን ስንተገብር	1) በከፍተኛ ደረጃ 2) በመካከለኛ 3) በዝቅተኛ
36.	ምን ያክል ልበ-ሙሉ ነዎት ለመልካምነት የማፈነገጥ ዘዴን ተጠቅሞ ጡት ብቻ ማጣባትን ለማስተዋወቅ	1) በከፍተኛ ደረጃ 2) በመካከለኛ 3) በዝቅተኛ 4) አይታዎቅም
37.	ምን ያክል ብቃት አለዎት ለመልካምነት የማፈነገጥ ዘዴን ተጠቅሞ ጡት ብቻ ማጣባትን ለማስተዋወቅ	1) በከፍተኛ ደረጃ 2) በመካከለኛ 3) በዝቅተኛ 4) አይታዎቅም/ለመገመት ያስቸግረኛል
38.	ይህ ለመልካምነት የማፈነገጥ ዘዴን ተጠቅሞ ጡት ብቻ ማጣባትን	1) አዎ

	ማስተዋወቅ ተጨማር ጥቅም አለው	2) አይ 3) እርግጠኛ አይደለሁም
39.	በሌሎች ጠቃሚ ሰዎች ዘንድ መደገፋቸው ጡት ብቻ ለማጣባት ይረዳል	1) አዎ 2) አይ 3) እርግጠኛ አይደለሁም
40.	ለመልካምነት የማፈነገጥ ዘዴን ተጠቅሞ ጡት ብቻ ማጣባትን ለማስተዋወቅ የግንዛቤ መጠንዎን ይግለፁ	1) ደካማ 2) መካከለኛ 3) ዝቅተኛ

ክፍል ሁለት: የጥናቱ አፈፃፀም ዉጤቶችን የሚለካ መጠይቅ

እባክዎት የመስማማት መጠንዎን ለያንዳንዱ አረፍተ-ነገር እንደሚከተለዉ ያስቀምጡ (5= በጣም እስማማለሁ 4=እስማማለሁ, 3=ገለልተኛ አቋም, 2= አልስማማም, 1= በፍጹም አልስማማም)፡፡ በቁጥሩ ስር የ "X" ምልክት ያስቀምጡ፡፡

ተ.ቁ	ዉጤትና እሱን የሚለካ አረፍተ-ነገር	የመስማማት ደረጃ				
	ተቀባይነት/Acceptability	1	2	3	4	5
1.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ ተቀባይነት ያለዉ ነው					
2.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ ለምታጠባ እናት አግባብነት ያለዉ ነው					
3.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ ለምታጠባ እናት ተስማሚ ነዉ					
4.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ፤ ለምታጠባ እናት በቤቱዋ ምቹ ነው					
5.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም የተሰጠዉ መረጃና ማህበራዊ ድጋፍ ጡት ብቻ የማጥባት ልምድን ያስችላል					
6.	ለመልካምነት አፈንጋጭ ዘዴ ጡት ብቻ የማጥባት ልምድን ያሻሽላል					
7.	ለመልካምነት አፈንጋጭ ዘዴን መጠቀም፤ ጡት ብቻ የማጥባት ልምድን ለማበረታታት ጠቃሚ ነዉ					
8.	ለመልካምነት አፈንጋጭ ዘዴ ጡት ብቻ ማጥባትን የማበረታታት ክህሎት ለማስገኘት ድንቅ ነገር ነው					
9.	ለመልካምነት አፈንጋጭ ዘዴ ጥሩ/መልካም ነው					
10.	ለመልካምነት አፈንጋጭ ዘዴ ሳቢ/መሳጭ ነው (በጣም ደስ የሚል ነው)					
	ተፈፃሚነት/Fidelity					
11.	በዚህ ጥናት ከጅምሩ የጋራ እቅድ ነበረን					
12.	የጥናቱ አገልግሎት ፕሮቶኮሉ ላይ በታዘዘዉ መሰረት ተከናዉኗል					
13.	እያንዳንዱ ተግባር በጥራት እንደታሰበዉ ተፈፅሟል					
14.	ለመልካምነት አፈንጋጭ ዘዴ የታለመለትን ዉጤት ያመጣል					
15.	የፕሮግራሙ ፈፃሚና አስፈፃሚዎች ያተገባበር መመሪያዉን ይጠብቃሉ					
16.	የጉብኝት መጠኑ/ብዛቱ ጡት ብቻ የማጥባት ልምድን ለማነሳሳትና ለማስቀጠል በቂ ነዉ					
17.	በተለያዩ የጉብኝት ወቅት የመረጃ ድግግሞሽ ነበረ					
18.	በምክክር ጊዜ ሌላ ዘመድ ወይም ጠያቂ ከመጣ አቋርጬ እነሳለሁ					
19.	የምክር አገልግሎት የሚሰጡኝን በጉብኝት ወቅት እንዲፈርሙ ማድረጌ አፈፃፀማቸዉን ለመከታተል ጥሩ ዘዴ ነዉ					
20.	በምክክር ወቅት ከልብ የመረዳትና የማገዝ ሂደት የዚህ ዘዴ ዋና መገለጫ ነው					
	ተገቢነት (Appropriateness)					
21.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ በቤት ዉስጥ ተስማሚ ነበረ					
22.	መረጃን መሰረት ያደረገ ምክክርና ማህበራዊ ድጋፍ ጠቃሚ ነበረ					

23.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ ካላማዉ ጋር የተጣጣመ ነበረ					
24.	ጡት ብቻ ያለማጥባት ችግርን ለመፍታት የተሰጠዉ መፍትሄ በኛ ዘንድ በጣም ጠቃሚ ነበረ					
25.	እንደሚመስለኝ ለመልካምነት አፈንጋጭ ዘዴ በኛ ሁኔታ ተገቢ ቢሆንም ተቀባይነት የለዉም					
26.	ለመልካምነት አፈንጋጭ ዘዴን በመጠቀም ጡት ብቻ የማጥባት ልምድን የማበረታታት/የማስተዋወቅ ስራ ባገልግሎት ሰጪና ተቀባይ ዘንድ ተልኮዉን ያሳካል					
27.	ማህበረሰብ አቀፋዊ ለመልካምነት አፈንጋጭ ዘዴን መጠቀም እናቶች ጡት ብቻ የማጥባት ልምድ ጠቀሜታዉን በተግባር እንዲረዱ ያስችላል					
	ተግባራዊነት/ሊሳካ የሚችል (Feasibility)					
28.	ለመልካምነት አፈንጋጭ ዘዴን በጅማ ነባራዊ ሁኔታ መተግባርና ስኬታማ መሆን ይቻላል					
29.	በጅማ ነባራዊ ሁኔታ ለመልካምነት አፈንጋጭ ዘዴን ለመተግበር የመመልመልና የማቆዬት ችግር ዋናዎቹ ነበሩ					
30.	ይህ ዘዴ ተገቢነት ያለዉ ቢሆንም ተግባራዊ ማድረግ ግን ይከብዳል					
31.	ጡት ብቻ የማጥባት ልምድን የማበረታታት ስራ የገንዘብ ፍጆታ አያስፈልገዉም					
32.	የጉብኝቱ ብዛት በቂ ቢሆንም የጉብኝቱ ቀን ግን እንደገና መስተካከል ይፈልጋል					
33.	ቤት ለቤት የምክር አገልግሎቱ ለመልካምነት አፈንጋጭ በሆኑ እናቶቸ ሊቀጥል ይገባል					
34.	በዚህ የምክርና ማህበራዊ ድጋፍ ደስተኛ አይደለሁም					
35.	ለመልካምነት አፈንጋጭ ዘዴ፤ ጡት ብቻ የማጥባት ልምድን ለማበረታታት ሊተገበር የሚችል ነዉ					
	ጠልቆ የመግባት/የመሰራጨት ሁኔታ/Penetration					
36.	ለመልካምነት አፈንጋጭ ዘዴ ካለዉ የጤና ኤክስቴንሽን ፕሮግራም ጋር ሊቀናጅ ይችላል					
37.	ይህ ዘዴ ካለዉ የማህበራዊ መዋቅር ጋር አብሮ አይሄድም					
38.	ይህ ዘዴ ቤት ለቤት በሚባለዉ ስልት ተደራሽ/ዉጤታማ አይሆንም					
39.	የሚመለከታት እናት በከተማ ዉስጥ ከሆነች በዚህ ዘዴ ተደራሽ ማድረግ ይቻላል					
40.	በዚህ ፕሮግራም ዉስጥ ያለፉ እናቶች ጠቃሚ ድጋፍ አግኝተዋል					
41.	አካታችነትና አሳታፊነት ግዴታ ነው የጣልቃ ገብነቱን ስራ ተደራሽ ለማድረግ					
42.	በማህበረሰቡ ዉስጥ የፍሰት ዉጤቱ ያገልግሎቱን ሽፋን ይጨምረዋል					
	ቀጣይነት/ዘላቂነት (Sustainability)					
43.	ለመልካምነት አፈንጋጭ ዘዴ በማህበረሰቡ ዉስጥ ቀጣይነት ይኖረዋል					
44.	ለመልካምነት አፈንጋጭ ዘዴ በማህበረሰቡ ዉስጥ በመስረፅ ተቋማዊ ይሆናል					
45.	ከጊዜያዊ የገንዘብ ድጋፍ ወደ ቋሚ ካልተሸጋገረ የፕሮግራሙ ቀጣይነት ያሰጋል					
46.	ለመልካምነት አፈንጋጭ ዘዴ በማህበረሰቡ ዉስጥ ባሉ መዋቅሮች የተቀናጀበት ሁኔታ የቆይታ ዘመኑን ዘላቂ ያደርገዋል					
47.	በከፍተኛ ሀኔታ የተሰራጨው መረጃ ለረጅም ጊዜ ቀጣይነቱ አስተዋፅኦ አለዉ					
48.	ይህ ዘዴ በማህበረሰቡ ዉስጥ ቀጣይነት እንዲኖረዉ በጎ-ፈቃደኝነት ዋነኛዉ መሰሶ ነዉ					
49.	የማህበረሰቡ አካላት ከልብ ቁርጠኛ ሰለነበሩ፤ የፕሮግራሙን ዘላቂነት ካሁኑ እርግጠኛ መሆን ይቻላል					
50.	የዙህ ዘዴ አሳታፊነት ባህሪው ተሳታፊዎችን ብቁ በማድረግ ቀጣይነቱን ያረጋግጣል					
	ሊለመድ የሚቸል/ተለማጅነት (Adaptability)					
51.	ጡትን ብቻ የማጥባት ዝንባሌ መኖር ይህን ዘዴ ለመቀበል ምቹ ሁኔታ ነው					
52.	ጡትን ብቻ ስለማጥባት የሚሰጠዉን መረጃ ለመጠቀም መሰረቱ ለመልካምነት አፈንጋጭ ዘዴ መተግበሩ ነው					
53.	ለወደፊት የጎረቤቴ አማካሪ እሆናለሁ					
54.	ይህ ዘዴ ከፍተኛ ለዉጥ ያስፈልገዋል ስለጡትን ብቻ የማጥባት ልምድን ለማበረታታት					
55.	ይህ ዘዴ ተጨማሪ አዳድስ ይዘቶችን ማካተት ይፈልጋል					
	ተቋማዊ ዝግጁነት/Organizational readiness					
56.	የማህበረሰቡ ነባራዊ ሁኔታና ያለዉ መዋቅር ተቋማዊ ለዉጡን ለመቀበል ዝግጁ ነው					
57.	ያለን የጋራ የሆነ የስነ-ልቦና ትስስር ይህን አድስ ዘዴ ተግባራዊ ለማድረግ ዝግጁ መሆናችንን ያሳያል					
58.	በጋራ አቅማችንና ትብብራችን እርግጠኛ በመሆናችን ተቋማዊ ለዉጡን ለመተግበር ቁርጠኛ					

	ነን					
59.	እኛ የፕሮግራሙ ፈፃሚዎች/ተሳታፊዎች ማህበራዊ ዱጋፍ ዋጋ እንዳለዉ እናምናለን					
60.	ዝግጁነታችንን የሚያስፈልጉ የግብአት አቅርቦት ይወስኑታል					
61.	ጡት ብቻ የማጥባት ልምድ ከተማ ላያ ተግባራዊነቱ ያን ያክል ነዉ (እምብዛም አይደለም)					
62.	ለመልካምነት ያፈነገጠች እናት ስለ ጡት ማጥባት ሰርቶ ማሳዬትን እንደአንድ ዉጤታማ ስልት ትጠቀማለች					
	ያፈፃፀም ፍጆታ/ለስራዉ የወጣ ወጭ (Implementation cost)					
63.	ይህን ዘዴ ተግባራዊ ለማድረግ እምብዛም አያስወጣም					
64.	የሚጠበቅብኝን ለመስራት የተሰጠዉ የኪስ ገንዘብ አነሳስቶኛል (ተገልጋይን አይመለከትም)					
65.	በዚህ ፕሮገራም ያገለገልኩት በራሴ ተነሳሽነት እንጅ ማትጊያ ገንዘቡን ብዬ አይደለም					
66.	ለዚህ ስራ የከፈልኩት ዋጋ ካገኘሁት ጥቅም የበለጠ ነው					
67.	ለዚህ ስራ የተመደበዉ ግብአትና ገንዘብ ለሂደቱ ስኬት ዋስትና ነበረ					
68.	በድካም ወቅት እራሴን ለማነቃቃት የተሰጠዉ ማካካሻ በቂ ነበረ					
69.	ጡት ብቻ የማጥባት ልምድን ለማበረታታት መማር ለኔ ቀላል ነው					
70.	ለመልካምነት አፈንጋጭ እናት ጋር መነጋገር ቀላልና የማይረሳ ነው					

Haala itti-quufinsa fayyadamtoota qorannichaa fi bu’aa raawwii gamaaggamuuf boca gaaffi qophaa’e (implementation outcomes-Afan Oromo version)

Boca Qajeelfamaa fi Eeyyamamtummaa ittiin gaafatan

Hirmaataa qorannnoo itti-quufinsaa kan taatan kanaan dura tajaajilli gorsaa garee kannameef keessatti hirmaattuu isaan kan filaniifi gaargaarsa isaanii dhiyoo goorsituu keessankan turan jechuun harma qofa waa’ee hoosisuu muuxannoo akka qabaataniif warra isin dandeessisan/gargaaraniifi tajaajila hawaasummaa kan kennan tahuu qabu.

Jalqabumarraa qabee qorannichi yommuu jalqabu haadholii gara qorannichaatti yommuuu affeerru, eeyyamamummaa isaanii guutuu erga mirkaneeffannee booda gaaffii kanaaf boca eeyamamummaa addaa kan biro hin barbaachisu. Haa tahu malee mijatiinsa sa’atii fi haalaa gaafatanii mirkaneeffachuufi dursanii kan itti waliif galan tahuu isaanii yaadachuun barbaachisaa dha. Haa tahu malee gargaartuu keessan dhiyoo fi gorsituu /tajaajila hawaasa bu’uureffate yoo kennan kan turan eeyyamamummaa isaanii guutuu mirkaneessuun fardiidha.

Maqaankoo_____jedhama. Nama qorannoo kanaaf (Bartee gochaa kunuunsa daa’imman kichuu fi harma qofa hoosisuu hawaasa bu’uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan fooyyessuuf) odeeffannoo funaanuudha. Odeeffannoon Piroojectii kanaa darban akka agarsiisutti isin haadholii hirmaattuu kessaa tokko yoo taatan dahumsa dura baatii-1 fi dahumsa booda baatii-26 ganda keessanii filatamanii kan leenji’an gaarummaaf haadhota fincilan (Positive deviants) keessaa waa’ee gorsaa fi deeggarsa hawaasummaa akkasumas mala walitti siqeenyaa irratti ittti-quufinsa keessan beekuuf taha. Kanaafuu qorannoo dhumaa qaama Piroojectii kanaa taheef afgaaffii daqiiqaa 30 hin caalleef eeyyamamtummaa keessan haaressuuf, hirmaachuuf ni eeyyamtuu?

1. Lakkii_____2. Eeyyee_____

Kutaa-I. Addaan baastuu matayyaa fi Gaaffilee raga bu’uuraa

T.L	Gaaffii	Deebii
1	Umurii	Waggaa_____
2	Amantaa	16. Ortodooksii 17. Musiliima 18. Pirootestaantii 19. Kaatolikii 20. Kan biroo
3	Qomoo	16. Oromoo 17. Daawuroo 18. Kafaa 19. Amaara

		20. Kan biroo
4	Gaa'ila	13. Kan fuudhe/heerumte 14. Kan hike/hiikte 15. Kan jalaa du'e/duute 16. Qeerroo/qarree
6	Sadarkaa Barnootaa	22. Dubbisuu fi barreessuu kan hin dandeenye 23. Dubbisuu fi barreessuu kan dandahu/dandeessu garuu barnoota idilee kan hin baratin 24. Sadarkaa tokkoffaa kan baratte 25. Sadarkaa lammaffaa kan baratte 26. Hamma qophaa'inaatti kan baratte 27. Digrii jalqabaa fi sanaa ol kan qabdu 28. Kan biroo
7	Hojii	19. Haadha warraa 20. Daldaltuu 21. Hojjettuu mootummaa 22. Hojjettuu mit-mootummaa 23. Kan niroo_____
8	Galii ji'aa	Qarshii_____
9	Role in the implementation	1) Facilitator 2) Counsellors/change agent 3) End-user
10	Perceived level of engagement during PDA intervention process	1) Highly/actively engaged 2) Medium 3) Lowly engaged
11	Perceived level of confidence to promote EBF through PDA	1) Highly confident enough 2) Medium 3) Lowly confident 4) Uncertain
12	Perceived level of competency to implement or run the PDA to promote EBF?	1) Highly competent enough 2) Medium 3) Lowly competent 4) Uncertain
13	Is this intervention could be an added value for the home visit program expected to be implemented by HEPs? (PDA's perceived benefit)	1) Eeyyee 2) Lakki 3) I am not sure
14	Is the support given to mothers by relevant others important to practice EBF?	1) Eeyyee 2) Lakki 3) I am not sure
15	Rate your level of understanding about the PDA implemented to promote EBF?	1) Poor 2) Medium 3) Good

Kutaa-II: Boca safartuu raawwii qorannichaa

Adaraa hamma itti-waliigaluu keessanii tokkoon tokkoo hima armaan gadiif guutaa (5=Baayyeen waliifgala, 4=Waliingala 3=Garingorree 2=Itti walii hin galu 1= Tasa waliif hin galu)

T.L	Firii fi hima isa safari	Sadarkaa itti-waliigaliinsaa				
	Fudhatamtummaa/Acceptability	**1**	**2**	**3**	**4**	**5**
1	Tarsiimoo gaarummaaf finciluu fayyadamuudhaan hojiin muuxannoo harma qofa hoosisuu jajjabeeessuu/beeksisuun fudhatama kan qabuu dha					
2	Tarsiimoo gaarummaaf finciluu fayyadamuudhaan hojiin muuxannoo harma qofa hoosisuu jajjabeeessuu/beeksisuun haadha hoosiftuudhaaf kan maluu dha					
3	Tarsiimoo gaarummaaf finciluu fayyadamuudhaan hojiin muuxannoo harma qofa hoosisuu jajjabeeessuu/beeksisuun haadha hoosiftuuf mijataadha					
4	Tarsiimoo gaarummaaf finciluu fayyadamuudhaan hojiin muuxannoo harma qofa hoosisuu jajjabeeessuu/beeksisuun haadha hoosiftuudhaaf mana isheetti mijataa dha					
5	Tarsiimoo gaarummaaf finciluu fayyadamuudhaan odeeffnnoo fi deeggersi hawaasummaa godhame harma qofa hoosisuu ni dandeessisa					
6	Hawaasa hunda kan bu'uureffate Tarsiimoo gaarummaaf finciluu fayyadamuudhaan haadholiin muuxannoo harma qofa hoosisuu faayidaasaa qabatamaatti akka hubatan dandeessisa					
7	Tarsiimoon gaarummaaf finciluu muxannoo harma qofa hoosisuu ni foyyessa					
8	Tarsiimoon gaarummaaf finciluu fayyadamuun muuxannoo harma qofa hoosisuu jajjabeessuuf ni fayyada					
9	MalaHarma qofa hoosisuu barachuun anaaf salphaa dha					
10	Haadha gaarummaf fincilte waliin dubbachuun salphaa fi kan hin dagatamne dha					
	Raawwatamummaa/Fidelity					
11	Qorannoon 247anaan jalqabumarraa karooraa waliinii qabna turre					
12	Tajaajilli qorannichaa akkaatuma pirootookoolicha irratti ajajameen raawatameera					
13	Tokkoo tokkoon hojii qulqullinaan akka yaadametti raawwateera					
14	Tarsiimoon gaarummaaf finciluu firii alaammateef ni fida					
15	Raawwattoonni fi raawwachiistonni sagantichaa qajeelfama hojiirra oolmaa ni hordofu					
16	Hammi/baayyinni daawwii muuxannoo harma qofa hoosisuu kakaasuudhaan itti fufsiisuuf gahaadha					
17	Tibba daawwii garaagaraatti irra deddeebi'iinsi odeeffannoo tureera					
18	Yeroo marii firri kan biroon yookiin gaafataan yoo dhufe gidduunin ka'a					
19	Tajiijila gorsaa kan naaf kennan yeroo daawwii akka mallatteessan gochuunkoo raawwiii isaanii hodofuudhaaf mala gaarii dha					
20	Yeroo marii onneerraa hubachuufi adeemsi gargaaruu ibsituu ijoo mala kanaati					
	Sirrummaa/Appropriateness					
21	Tarsiimoo gaarummaaf finciluu fayyadamuun hojii muuxannoo harma qofa hoosisuu jajjabeessuu/beeksisuu mana keessatti mijataa ture					
22	Ragaan bkan bu'uureffate marii fi deeggarsi hawaasummaa faayida qabeessa dha					
23	Tarsiimoo gaarummaaf finciluu fayyadamuun hojii muuxannoo harma qofa hoosisuu jajjabeessuu/beeksisuu kaayoo isaa wajjin kan wal simmuu dha					
24	Rakkoo harma qofa hoosisuu dhabuu furuudhaaf furmaanni kenname nu biratti baayyee fayida qabeessa					
25	Akka natti fakkaatutti Tarsiimoo gaarummaaf finciluu haala keenyaan gaarii tahus fudhatama hin qabu					
26	Tarsiimoo gaarummaaf finciluu fayyadamuun muuxannoo hojii harma qofa hoosisuu hoosisuu jajjabeessuu/beeksisuu tajaajila isa kennuu fi fudhatu gidduutti ergama isaa galmaan ni gaha					
27	Gaarummaadhaaf haati fincilte waa'ee harma hoosisuu hojjettee argisiisuu tooftaa bu'aqabeetyyii tokko tokko ni fayyadamti					
	Hojiirra ooliinsa(feasiability)					

28	Tarsiimoo gaarummaaf finciluu haala qabatamaa Jimmaa hojiirra oolchuu fi milkaahuun ni dandahama					
29	Haala qabatamaa Jimmaatiin Tarsiimoo gaarummaaf finciluu hojiirra oolchuudhaaf rakkoon filachuu fi trsiisuu ijoo turan					
30	Tarsiimoon kun kan malu yoo tahes garuu hojiirra oolchuun ni ulfaata					
31	Muuxannoo hojii harma qofa hoosisuu jajjabeessuu baayyina maallaqaa hin barbaachisu					
32	Baayyiini daawii gahaa tahus guyyaan daawwii garuu iraa deebi'amee sirrachuu qaba					
33	Tajaajilli marii manaa gara manaa haadholii gaarummaaf fincilaniif itti fufuu qaba					
34	Mariifi deeggarsa hawaasummaa kanatti ani hin gammadne					
35	Tarsiimoo gaarummaaf finciluu muuxannoo harma qofa hoosisuu hoosisuu jajjabeessuudhaaf hojiirra oolchuun kan dandahamudha					
	Itti-seentummaa/Penetration					
36	Tarsiimoo gaarummaaf finciluu sagantaa exteenshinii fayyaa duraan ture waliin qindaahuu qaba					
37	Malli kun caasaa hawaasumma jiru waliin hin deemu					
38	Malli kun tooftaa manaa gara manaatti jedhu wageessisuun hin dandahamu					
39	Haati ishee ilaallatu magaalaa keessa yoo jiraatte mala 248anaan bira gahuun ni dandahama					
40	Sagantaa kana keessa haadholiin darban deggarsa faayida qabeessa argataniiru					
41	Hammattummaa fi hirmaachisummaan dirqamadha hojii itti seentummaa qaqqabamaa taasisuudhaaf					
42	Hawaasa keessatti bu'aan argame baballina isaa ni dabala					
	Itti-fuftummaa/Sustainability					
43	Tarsiimoo gaarummaaf finciluu hawaasa keessatti itti fufiinsa ni qabaata					
44	Tarsiimoo gaarummaaf finciluu hawaasa keessatti ni caaseffama					
45	Deeggarsa maallaqaa yeroo gabaabduu irraa gara dhaabbataattii yo hin cehin itti fuftummaan sagantaa kanaa ni gufata					
46	Tarsiimoo gaarummaaf finciluu caasaa hawaasa keessa haalli itti qindaahe bara turtii isaa cehaa taasisa					
47	Odeeffannoon akkaataa olaanaadhaan raabsame itti fuftummaa yeroo dheeraaf shoora ni qabaata					
48	Qaamoleen hawaasaa onneerraa murataa waan turaniif itti fuftummaa sagantichaa garanumaan beekuun ni dandahama					
49	Malli kun hawaasa keessatti akka itti fufu taasisuuf tola ooltummaan utubaa dha					
50	Muuxannoon harma qofa hoosisuu magaalaa keessatti hojiirra oolmaan isaa gadi-aanaa dha					
	Madaqfamummaa/Adaptability					
51	Yaadni harma qofa hoosisuu jiraachuun tarsiimoo kana fudhachuudhaaf haala mijataa uuma					
52	Waa'ee odeeffannoo Harma qofa hoosisuun fayyadamuudhaaf hundeen isaa Tarsiimoo fincila gaarummaati					
53	Gara fuulduraattii ollakootiif gorsituun ta'a					
54	Malli kun jijjiirama olaanaa isa barbaachisa waa'ee harma qofaa hoosisuu jajjabeessuudhaaf					
55	Malli kun qabiyyee haaraa of keessaa qabaachuutu irra jiraata					
	Qophaa'ummaa Dhaabbataa/Organizational Readiness					
56	Haala qabatamaa hawaasichaa fi caasaa akka dhaabbataatti jiijjiirama fudhachuu qophiidha					
57	Xiinsammuun waloonfi walitti hidhamiinsi qabnu mala haaraa hojiirra oolchuudhaaf					

	qophii tahuu keenya argisiisa					
58	Humni waloon qabnuufi waltahiinsa keenya mirkaneeffatoo tahuu keenyaan jijjiirama akka dhaabbataatti hojiira oolchuudhaaf mratoo dha					
59`	Nuti raawwattootni/hirmaattotni sagantichaa deeggarsa hawaasummaa akka inni qabu ni amanna					
60	Jiraachuun ciicataa qophaa'ummaa keenya ni murteessa					
61	Tarsiimoon gaarummaaf finciluu dandeettii harmaa qofaa hoosisuu haala salphaa taheen akkan jabeeffadhu na gargaareera					
62	Haadhooliin muuxannoonharma qofaa haaosisuu akka qabaataniif haadha muuxannoo qabdu irraa odeeffannoo fi deggersa hawaasummaa argachuutu irra jiraata					
	Baasii raawwii hojichaaf barbaachisu/Implementation cost					
63	Tarsiimoo ksns hojiirra oolchuun baasii baayyee hin gaafatu					
64	Onnachiistuun boorsaatti naaf kenname dirqama koo bahuuf ana kakkaaseera					
65	Sagantaa kana kanin tajaajile kakka'umsa mataa kootiin malee namaan dirqamee miti					
66	Hojii kanaaf aarsaan kaffale bu'aan argadherra kan caaleedha					
67	Ciicatni maallaqaa sagantaa kanaaf ramadame milkaa'insa aseemsichaaf wabii ture					
68	Waktii dadhabinaa ofiikoo dadammaksuudhaaf beenyaan kenname gahaa ture					
69	Sagantaa kana kanin tajaajile kakka'umsa mataa kootiin malee namaan dirqamee miti					
70	Hojii kanaaf aarsaan kaffale bu'aan argadherra kan caaleedha					

Data collection tool for study-V

Cost and effect estimation/collection tool

Part-I: Cost data collection checklist

1. **Baseline cost (cost for the routine-usual service provided by UHEPs)**
   1.1. UHEP basic salary for 6 months_____ (average of the level IX=4609/minimum to XIII=8017/maximum basic salary-both groups---number of HEPS in both arms:_____)
2. **Intervention cost**
   2.1. Recruitment, and enrollment cost _____USD
   2.2. Training cost; _____USD
   2.3. Logistic cost including material/guideline printing; ____USD
   2.4. Positive deviance inquiry cost:____USD
   2.5. Incentives/refreshment cost for PDs;_____USD
   2.6. Supervision cost including transportation; _____USD
   2.7. Workshop cost; _____USD
   2.8. Facilitation cost; _____USD
   2.9. Review meeting cost; _____USD
   2.10. Visiting and consultation time of PD (estimated cost); _____:(wage rate for urban daily labor:_____)
   2.11. End-users' consultation time (estimated cost);_____(wage rate for urban daily labor:_____)
3. **Research cost**

3.1. Training, pre-test, supervision, data collection, and data entry:_____USD
3.2.Research materials print cost; _____USD
3.3.Communication cost; _____USD
3.4.Preliminary and main result dissemination cost; _____USD
3.5.Review meeting cost ;_____USD
3.6.Logistics including refreshment cost: _____USD
3.7.Guideline and protocol development :_____USD

4. Total cost by arms/groups
4.1.Total cost for intervention group (baseline cost of usual service + cost of the added intervention/PDA);_____USD.
4.2.Total cost for control group (baseline cost of usual service):_____USD
4.3.Total cost for the research: _____USD

5. Effect measures (infant and maternal outcomes)
5.1.Effect on infant feeding practice (proportion of infants EBF till 6months in intervention groups_____%, and in control groups_____%; RR=_____)
5.1.1. Effect of EBF in terms of preventing morbidity(Diarheaa and Pnemonia) and mortality of infants index (DALYs) estimated for both groups using modeling method
5.1.2. Transitional probabilities from healthy state to morbidity with the commonest childhood diseases (Diarheaa and Pnemonia), and mortality in Ethiopia. This will be analyzed from EDHS2016 data set for two categories (EBF and non-EBF).
5.2. Effect on maternal health-QALYs (HRQoL of the mothers in the IG as compared to CG); HRQoL aggregated by five scales and composite mean score_____(to be calculated from the Part-III of this tool.

Information and consent sheet for the maternal HRQoL assessment

Instruction/Information sheet

Interviewer-administered questionnaire prepared for all eligible intervention participants living in intervention and control clusters/Kebeles of Jimma town.

Title of the study; assessement of HRQoL of mothers participated in the positive deviance approach as an intervention used to promote EBF practice using a cluster randomized trial.

Investigators: Mr.Yibeltal Siraneh (PhD fellow) and supervisors (Dr.Zewdie B. and Prof. Mirkuzie W.)

Dear respondent,

I am inviting you to participate in this study b/c of such type of assessment has not been done in Ethiopia following an intervention, specifically in Jimma town. So that assessing mothers' HRQoL who were enrolled into the tiral arms is relevant to understand the QALYs gained by the intervention groups as compared to the control groups. As you know and gave your consent at the beginning, it is important for you to understand why the research is being done now following the intervention. This intevention study is being conducted for the academic use, evidence generation may be used for policy makers so as to have sustainable community based newborn and infant caring program including EBF practice. It has got ethical approval from the Institutional Review Board of the health institute, Jimma University. All

information that is collected from you during the study will be kept confidential, and your name will never be mentioned in any analysis and dissemination of findings.
Taking part in this study is completely voluntary based. If you decide not to be in this study, or if you stop participating at any time, you won't be penalized or lose any benefits. However, the honest information you give us is highly valuable to the study and future program. I am grateful to you for considering this research and look forward to your response!
In fact, at the beginning, you were agreed to be study participant and to respond for the requested information with regard to this research project. Therefore, for this survey, I would ask you the time suitability and comfort since we already taken your written consent before.

Consent sheet

Since this phase of data collection is continuation, your baseline or background information were already recorded at the beginning and coded. Just to update your adgreement? are you willing to participate now?

I (study participant) have heard all the information, understood the aims of the study and noted that participation in this study is completely voluntary and that I can withdraw from the study any time. I'm fully aware that the results of this study will be used for scientific purpose and may be published to desseminate the finding for end-users and programmers including policy makers. I agree to this, provided my privacy is guaranteed.
I hereby give consent to participate in this study.
_____Yes, I want to participate in the study
_____ No, I don't want to participate in the study

Part-II: Socio-demographics and other background characterstics

S.No	Item/question	Response options
18.	Age of Mother	_____ in completed years
19.	Religion	1.Orthodox 2.Muslim 3.Protestant 4.Catholic 5.Other_____
20.	Ethnicity	1.Oromo 2. Dawuro 3. Kaffa 4. Amhara 5.Other_____
21.	Marital status	1. Married 2. Divorced 3. Widowed 4. Single
22.	Educational status	1.Unable to read & write 2. Able to read & write (1-8, 9-10, 11-12, 12+)
23.	Occupational status	1. House wife 2.Merchant 3.Student 4.Gov't employee 5.Private employee 6. Other ___
24.	Household monthly income	(ETB estimated) _____
25.	Number of live birth (Parity)	_____(in number)

26.	Preference for sex of the baby	4. Not prefer 5. Prefer-F 6. Prefer-M
27.	Previous history of receiving home visit from HEPs	1. No 2. Yes
28.	Previous history of receiving home visit from model mothers	1. No 2. Yes
29.	Received support from relevant others (partner, grandmother)	1. No 2. Yes
30.	Do you have a plan or intention to BF for the current baby	1. No 2. Yes
31.	Ever breast fed (proportion will be analyzed from the data)	1. No 2. Yes
32.	EBF (proportion will be analyzed from the data)	1. No 2. Yes

Part-III: Health related quality of life (HRQoL) measurement scale

This part will collect self-report data about HRQoL of mothers who practice EBF and not, among all study participants. Please, rate a given statement 1 to 5 (1=Extreme/worest Problem, 2=Some Problem,3=not sure/uncertain, 4= not as such a problem(negligible),5=Never/not a problem. Some of the statements have a phrase in bracket that used to fit for non-breast feeders; otherwise the remaining items can fit for both practitioners and non-practitioners of EBF. The mother who gave birth and practice EBF, partially BF or not at all can be assessed for HRQoL.

S.No	**EQ-5D (Dimensions) and contextualized items**	**Five point Likert Scale**				
	Mobility for work and social activity due to practicing/not BF	1	2	3	4	5
1.	M1For walking/visiting to neighbors' or friends home					
2.	M2For walking/going for social activities					
3.	M3For working/doing other regular daily activities					
4.	M4The kind of work or other activities difficulty as a result of your breast/body weight gained					
5.	M5You accomplish less than you would like as a result of emotional problems faced due to breast feeding					
6.	M6Returning to usual work with full confidence that the baby can feed including expressed breast milk					
7.	M7Decrement of your usual work performance					
8.	M8I am not happy when I was at home the whole day while my relevant others freely walk					
	Self-care and infant care due to BF/not					
9.	S9Washing/caring and/or dressing the baby is tedious					
10.	S10Shortage of time for self-care					
11.	S11Breast feeding affect my breast cosmetics					
12.	S12Breast feeding need more effort with less infant outcome					

13.	S13Much feeding to enhance amount of milk production resulted to problematic body weight gain					
14.	S14Difficulty of breast feeding practice decreases while the baby's age grow-up					
15.	S15Developing confidence in caring infant					
16.	S16BF helped me for bonding with my baby (not BF helped……)					
	Daily home activities due to BF/not					
17.	D17Doing usual activities					
18.	D18Exclusively BF is costly compared to feeding other foods					
19.	D19At every time the newborn is with me					
20.	D20Weaning period challenge (type of food shifting challenge)					
21.	D21Routines daily caring activities are boring					
	Pain and discomfort due to practicing BF/not					
22.	P22Pain while breast feeding/not					
23.	P23Discomfort while breast feeding/not					
24.	P24Engorgement of breast due to BF/not					
25.	P25Once putting to EBF, BF is painful (once ignoring BF, starting is painful)					
26.	P26After putting to EBF, discontinuing BF is painful (not providing breast milk is painful)					
27.	P27Frequently BF (any other food) to satisfy the baby's nutritional need is challenging					
	Anxiety or depression due to practicing BF (psychological and emotional problems)					
28.	A28I am not depressed due to restricted movement outside from home					
29.	A29Adequacy of breast milk (any other feeding) you are giving					
30.	A30Sleeping disturbance for BF (for feeding other food)					
31.	A31I always depressed while thinking to breach EBF (to shift foods)					
32.	A32I am happy for everything since all what I did (EBF) is for my baby					
33.	A33My general health was good as compared before practicing EBF (newborn care)					
34.	A34I worry about conception in the 1st 6 months since not started modern contraceptive					
35.	A35I worry about the breast milk (food) whether that fulfills nutritional needs of the baby					

HRQoL measuring tool (Amharic version)

የእናቶችን ከጤና ጋር የተገናኘ የተሟላ ይህወት በመጀመሪያዎቹ 6 ወራት የሚለካ መጠይቅ (Health Related Quality of Life measuring tool)

ከጤና ጋር የተገናኘ የተሟላ ይህወት ጡትን ብቻ በሚያጠቡም ሆነ በማያጠቡ እናቶች ዘንድ ለማጥናት የተዘጋጀ መጠይቅ፡፡ ይህም በአጥቢ እናቶች የእለት ከእለት እንቅስቃሴ ላይ ሲሰጥ የነበረዉ የምክርና ድጋፍ አገልግሎት (PDA intervention) ያለዉን ተፅኖ የሚዳስስ ይሆናል፡፡

መመሪያና ፈቃደኝነት መጠዬቂያ ቅፅ

የዚህ ከጤና ጋር የተገናኘ የተሟላ ይህወት ለማጥናት ተሳታፊ የሚሆኑት ከዚህ ቀደም የምክር አገልግሎት በተሰጠበት ቡድን ውስጥ ተሳታፊ የሆኑ እና ጡትን ብቻ የማጥባት ልምድ አንዲናራቸው ተጨማሪ እገዛ እና ማህበራዊ ድጋፍያልተደረገላቸው መሆን አለባቸው፡፡

ገና ከመጀመሪያው ጥናቱ ሲጀምር እናቶችን ወደ ጥናቱ ስንጋብዝ ሙሉ ፍቃደኝነታቸውን አረጋግጠን በመሆኑ ለዚህ መጠይቅ የተለዬ የፈቃደኝነት መጠዬቂያ ቅፅ አያስፈልግም፡፡ ነግር ግን የሰአቱና የሁኔታው ምቹነትን ጠይቆ ማረጋገጥና ቀድሞ የተስማሙ መሆናቸውን ማሰታዎስ አስፈላጊ ነው፡፡ ነገር ግን የቅርብ እረዳታቸውና አማካሪያቸው/ማህበራዊ ድጋፍ ሲሰጡ የነበሩትን ሙሉ ፈቃደኝነታቸውን መረጋገጥ የግድ ነው፡፡

ስሜ_____ ይባላል፡፡ የዚህ ጥናት (ማለትም ጡትን ብቻ የማጥባት ልምምድ እንዲኖር የሚያስችል አዲስ ዘዴን ውጤታማነት የሚገመግም) መረጃ ሰብሳቢ ነኝ፡፡ ያለፈዉ የፕሮጀክቱ መረጃ እንደሚያሳዬው እርስዎ ከተሳታፊ እናቶች አንዱዋ ሲሆኑ ከወሊድ በፊት ለ-1 ወርና ከወሊደ በኃላ ለ-6 ወር ከናንተው ቀበሌ ተመርጠው በሰለጠኑ ለመልካምነት ያፈነገጡ (positive deviants) እናቶች አማካኝነት ድጋፍ የተሰጣቸዉና ያልተሰጣቸው እናቶችን "ከጤና ጋር የተገናኘ የተሟላ ይህወት" ለማወቅ ነው፡፡ ስለዚህ የመጨረሻ የፕሮጀክቱ አካል ለሆነው ለዚህ ጥናት ለ20 ደቂቃ የሚሆን ቃለ-መጠይቅ አደርጋለሁ፡፡

ፍቃደኝነትዎን በድጋሚ ለማደስ ያክል፤ ለመሳተፍ ፈቃደኛ ነዎት? 1. አዎ_____2. አይ_____

ክፍል አንድ:Cost data and productivity loss estimation

ይህ ክፍል ትርጉም አያስፈልገዉምና በቀጥታ በእንግሊዘኛ ቁዋንቁዋ መረጃዉ የሚሰበሰብ ይሆናል.

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ክፍል ሁለት: የግል መለያ እና መነሻ መረጃ ጥያቄዎች

ተ.ቁ	መጠይቅ	መልስ
41.	እድሜ	_____(በአመት)
42.	ሀይማኖት	21. አርቶዶክስ 22. ሙስሊም 23. ፕሮቴስታንት 24. ካቶሊክ 25. ሌላ_____
43.	ብሄር	21. አሮሞ 22. ዳዉሮ 23. ካፋ 24. አማራ 25. ሌላ _____
44.	የጋብቻ ሁኔታ	17. ያገባ/ች

		18. የፈታ/ች 19. የሞተበት/ባት 20. የላገባ/ች
45.	የትምህርት ደረጃ	29. ማንበብ እና መጻፍ የማትችል 30. ማንበብ እናመጻፍ የማትችል
46.	የስራ ሁኔታ	24. የቤት እመቤት/አባወራ 25. ነጋዴ 26. ተማሪ 27. የመንግስት ሠራተኛ 28. የግል ተቋም ሠራተኛ 29. ሌላ_____
47.	ወርሃዊ የገቢ መጠን	_____ብር
48.	በህይወት የተወለዱ የልጆችሽ ብዛት በቁጥር(Parity)	_____
49.	የምትፈልጊዉ/የምትመርጪዉ የፆታ አይነት	1. አይ ምንም አልመርጥም 2. ሴት አመርጣለሁ 3. ወንድ አመርጣለሁ
50.	ካሁን በፊት በጤና ኤክስቴንሽን ተጎብኝተዋል	1. አይ 2. አዎ
51.	ካሁን በፊት በሞዴልነት ተብላ በተመረጠች እናት ተጎብኝተዋል	1. አይ 2. አዎ
52.	ኬሌሎች በዙሪያዎ ካሉ አስፈላጊ ከሙሉዋቸው ሰዎች ድጋፍ አግኝተዋል	1. አይ 2. አዎ
53.	ለዚህ ለመጨረሻው ልጅዎት ጡት የማጥባት ሀሳብ አለዎት	1. አይ 2. አዎ
54.	ጡት አጥብተው ያውቃሉ(ቀደም ሲል ከተሰበሰበዉ መረጃ የሚገኝ)	1. አይ 2. አዎ
55.	ጡት ብቻ ለ6 ወር አጥብተዋል (ቀደም ሲል ከተሰበሰበዉ መረጃ የሚገኝ)	1. አይ 2. አዎ

ክፍል ሶስት: ከጤናዎ ጋር የተገናኘ የተሟላ ይህወት ስለመኖሩ (HRQoL of mothers)

ከጤና ጋር የተገናኘ የተሟላ ይህወት ጡትን ብቻ በሚያጠቡ እና በማያጠቡ እንዲሁም በእንተርቬንሽንና በኮንትሮል ቡድን ዉስጥ በሚገኙ እናቶች ዘንድ ለማጥናት የተዘጋጀ መጠይቅ፡፡ ይህም በአጥቢ እናቶች የእለት ከእለት እንቅስቃሴ ላይ አገልግሎታችን (PDA intervention) ያመጣዉን ተፅኖ የሚዳስስ ይሆናል፡፡

እባክዎት የችግሩ መጠንን ለያንዳንዱ አረፍተ-ነገር እንደሚከተለዉ ያስቀምጡ (1= በጣም ችግር ነው ፤ 2= መለስተኛ ችግር ነው ፤ 3= አርግጠኛ አይደለሁም ፤ 4=ያን ያክል ችግር አይደለም ፤ 5=ምንም/በፍፁም ችግር አይደለም)፤ በቁጥሩ ስር የ "X" ምልክት ያስቀምጡ፡፡

ተ.ቁ	**መርህና አረፍተ-ነገር**	**የችግሩ ደረጃ**				
	ለስራ ማህበራዊ እንቅስቃሴ ጡትን ብቻ ከማጥባት ጋር ሲታይ	1	2	3	4	5
1.	ወደ ጎረቤት ቤት ለመሄድ					
2.	ለማህበራዊ ስራ/ተሳትፎ ለመሄድ					
3.	መደበኛ እለታዉዊ ስራዎችን ለመስራት					
4.	ስራን መስራት አለመቻል በተለይ የጡትና የሰዉነት ክብደት ስለሚጨምር					
5.	በስራ ስኬታማ አለመሆን በጡት ማጥባት የስነ-ልቦና ጫና ምክንያት					
6.	ከወሊድ በኋላ ወደ ተለመደዉ ስራ መመለስ መቻሌ፤ ከልበ-ሙሉነት ጋር ምክንያቱም					

	ያለብኩለትን ስለሚጠባ					
7.	የስራ አፈፃፀም መቀነስ/መዉረድ					
8.	ቀን ሙሉ ቤት በመዋሌ ሌላዉ በነፃነት ሲዝናና ማዬት					
	እራስንና ልጅን ከመንከባከብ አንፃር (ጡትን እያጠቡ)					
9.	ህፃንን ማጠብና ማልበስ አሰልችነት					
10.	እራስን የመንከባከቢያ ጊዜ					
11.	የጡቴን ዉበትና አቋሜን ያበላሻል					
12.	ጡት ማጥባት አድካሚ ግን ለህፃኑ እድገት ብዙም					
13.	የወተት መጠኑ እንዲጨምር አብዝቶ መብላትና ክብደት መጨመር					
14.	ህፃኑ እያደገ ሲሄድ ጡት የማጥባት ክብደቱ ስለመቀነስ					
15.	ልጅ የመንከባከብና የማሳደግ ልበ-ሙሉነት መዳበርሠ					
16.	ጡት ማጥባቴ ከልጄ ጋር ያለኝን ቁርኝት ሰለማጥበቁ					
	እለታዊ የቤት ስራና ከማጥባት ጋር ሲታይ					
17.	የተለመዱ ስራዎችን መስራት					
18.	ሁሌም በዬትኛዉም ሰዓት ልጄ አይለቀኝም					
19.	ጡት የማስቆም ጊዜ ያለዉ ፈተና					
20.	ድግግሞሽና አሰልቺ ግን የተለመዱ ስራዎች					
21.	ቀን ሙሉና በዬቀኑ የእንክብካቤ ስራዎች አሰልችነትሠ					
	ህመምና ያለመመቸት ከማጥባት ጋር ሲታይ					
22.	የህመም ስሜት ጡት ሲያጠቡ					
23.	ምቾት ማጣት በማጥባት ሰዓት					
24.	የጡት መግዘፍ ቶሎቶሎ ከማጥባት ጋር ተያይዞ					
25.	አንዴ ጡት ብቻ አስጀምሬ የጡት ህመሙ ጠነከረ					
26.	አንዴ ጡት ብቻ አስጀምሬ ባቋርጠዉ አመመኝ					
27.	ህፃኑን ለማርካት ጡትም ሆነ ሌላ ነገር መስጠት/ማዘጋጀት ፈታኝ ነዉ					
	መረበሽና መደበር ከማጥባት ጋር ሲታይ (Anxiety or depression)					
28.	ከቤት ዉጭ ባለመንቀሳቀሴ አልደበረኝም					
29.	የጡት ወተት በቂነት					
30.	ለማጥባት የእንቅልፍ መረበሽ					
31.	ጡት ብቻ ማጥባቴን ማቋረጥ ሳስብ ይጨንቀኛል					
32.	ለሁሉም ነገር ደስተኛ ነኝ ምክንያቱም ማደርገዉ ሁሉ ለልጄ ስለሆነ					
33.	ጡት ብቻ ማጥባት ከመጀመሪዬ በፊት የነበረዉ ጠቅላላ ጤንነቴ ይሻል ነበረ					
34.	ዘመናዊ የእርግዝና መከላከያ ስላልወሰድኩኝ በመጀመሪያ 6 ወራቶች ዉስጥ ማርገዝን መፍራት					
35.	የምሰጠዉ ጡት (ምግብ) የህፃኑን የምግብ ፍላጎት ስለማሙዋላቱ እጠራጠራለሁ					

የመረጃ ሰብሳቢ ስም_____ ፊርማ_____

Afan Oromo Version for HRQoL assessment

Miiltoo-I: Boca Qajeelfamaa fi Eeyyamamtummaa ittiin gaafatan

Hirmaataa qorannoo itti-quufinsaa kan taatan kanaan dura tajaajilli gorsaa garee kannameef keessatti hirmaattuu isaan kan filaniifi gaargaarsa isaanii dhiyoo goorsituu keessankan turan jechuun harma qofa waa'ee hoosisuu muuxannoo akka qabaataniif warra isin dandeessisan/gargaaraniifi tajaajila hawaasummaa kan kennan tahuu qabu.

Jalqabumarraa qabee qorannichi yommuu jalqabu haadholii gara qorannichaatti yommuuu affeerru, eeyyamamummaa isaanii guutuu erga mirkaneeffannee booda gaaffii kanaaf boca eeyamamummaa addaa kan biro hin barbaachisu. Haa tahu malee mijatiinsa sa'atii fi haalaa gaafatanii mirkaneeffachuufi dursanii kan itti waliif galan tahuu isaanii yaadachuun barbaachisaa dha. Haa tahu malee gargaartuu keessan dhiyoo fi gorsituu /tajaajila hawaasa bu'uureffate yoo kennan kan turan eeyyamamummaa isaanii guutuu mirkaneessuun fardiidha.

Maqaankoo_____jedhama. Nama qorannoo kanaaf (Bartee gochaa kunuunsa daa'imman kichuu fi harma qofa hoosisuu hawaasa bu'uureffate Tarsiimoo Diddaa Gaarummaa gargaaramuudhaan fooyyessuuf) odeeffannoo funaanuudha. Odeeffannoon Piroojectii kanaa darban akka agarsiisutti isin haadholii hirmaattuu kessaa tokko yoo taatan dahumsa dura baatii-1 fi dahumsa booda baatii-26 ganda keessanii filatamanii kan leenji'an gaarummaaf haadhota fincilan (Positive deviants) keessaa waa'ee gorsaa fi deeggarsa hawaasummaa akkasumas mala walitti siqeenyaa irratti ittti-quufinsa keessan beekuuf taha. Kanaafuu qorannoo dhumaa qaama Piroojectii kanaa taheef afgaaffii daqiiqaa 30 hin caalleef eeyyamamtummaa keessan haaressuuf, hirmaachuuf ni eeyyamtuu?

1. Lakkii_____ 2. Eeyyee_____

Kutaa tokko:Cost data and estimation

Cost data and estimation was done using the English version tool without translation since it has technical terms.

Kutaa Laama: Addaan baastuu matayyaa fi Gaaffilee raga bu'uuraa

T.L	Gaaffii	Deebii
1	Umurii	Waggaa_____
2	Amantaa	21. Ortodooksii 22. Musiliima 23. Pirootestaantii 24. Kaatolikii 25. Kan biroo
3	Qomoo	21. Oromoo 22. Daawuroo 23. Kafaa 24. Amaara 25. Kan biroo
4	Gaa'ila	17. Kan fuudhe/heerumte 18. Kan hike/hiikte 19. Kan jalaa du'e/duute 20. Qeerroo/qarree
6	Sadarkaa Barnootaa	29. Dubbisuu fi barreessuu kan hin dandeenye 30. Dubbisuu fi barreessuu kan dandahu/dandeessu garuu barnoota idilee kan hin baratin 31. Sadarkaa tokkoffaa kan baratte 32. Sadarkaa lammaffaa kan baratte 33. Hamma qophaa'inaatti kan baratte 34. Digrii jalqabaa fi sanaa ol kan qabdu 35. Kan biroo
7	Hojii	24. Haadha warraa 25. Daldaltuu 26. Barattuu

		27. Hojjettuu mootummaa 28. Hojjettuu mit-mootummaa 29. Kan niroo_____
8	Galii ji'aa	Qarshii_____
9	Hariiroo hirmaattuu kallattii qorannichaa waliin qabdu	7. Abbaa warraa/haadha warraa 8. Haadha 9. Akkoo 10. Fira dhiigaa 11. Hiriyaa 12. Kan biro_____
10	Previous history of receiving home visit from HEPs	1. Lakki 2. Eyyee
11	Previous history of receiving home visit from model mothers	1. Lakki 2. Eyyee
12	Received support from relevant others (partner, grandmother)	1. Lakki 2. Eyyee
13	Do you have a plan or intention to BF for the current baby	1. Lakki 2. Eyyee
14	Ever breast fed (proportion will be analyzed from the data)	1. Lakki 2. Eyyee
15	EBF (proportion will be analyzed from the data)	1. Lakki 2. Eyyee

Kutaa seedi: Unka Safartuu baasii maallaqaa fi bu'a qabeessummaa (HRQoL measuring tool)

Unka qulqullina jireenyaa fayyaadhaan walitti hidhate harma qofa hoosisuudhaan argamu. Kunis haadholiin hoosisan sosochii yeroon godhan irratti dhiibbaa inni qabu kan hammatu ta'a. Maaloo hangamtaa rakkinichaa tokkoo tokkoo himichaatiif akka itti aanutti kaa'aa. (1= baayyee rakkoo qaba, 2= rakkoo giddugaleessaa qaba, 3=garhingorree, 4= Homaa rakkoo miti, 5= baayyee rakkoo enqaba) lakkoofsicha jala mallattoo 'X' guutaa.

T.L	Tarsiimoo fi hima	Scale				
	Hojiif sosocho'uu fi dalagaawwan hawaasummaa harma hoosisuu waliin yoo ilaalamu	1	2	3	4	5
1	Gara mana olla deemuuf					
2	Hojii hirmaannaa hawaasaaf deemuuf					
3	Hojii idilee guyya guyyaa hojjechuuf					
4	Hojii hojjechuu dadhabuu keessumatti ulfaatina harmaafi qaamaa waan fiduuf					
5	Hojiidhaan milkaa'uu dhabda sababa harma hoosisuun ba'aa xiinsammuu fiduuf					
6	Dahumsa booda gara hojii baratameetti deebihuu dandahuunkoo onnee guutuudhaani sababnisaas isaelmameef waan hodhuuf					
7	Guyyaa guutuu mana ooluu kootti hin gammadu kan biraan bilisummaadhaan					
8	Dahumsa booda gara hojii baratameetti deebihuu dandahuunkoo onnee guutuudhaani sababnisaas isaelmameef waan hodhuuf					

	Kunuunsa dhuunfaa fi Daa'imaa harma qofa hoosisuu waliin yoo ilaallamu					
9	Nuffiidhaan daa'ima uwwisuu ykn miicuu					
10	Yeroo of kunuunsaa					
11	Harma hoosisuun miidhagina harma kootii miidha					
12	Harma hoosisuun tattaaffii baayyee gaafata garuu bu'aan daa'imni argatu xiqqoodha					
13	Hamma aannan oomishamuu guddisuuf baayyee nyaachuu fi ulfaatina dabaluu qaama kootii					
14	Harma hoosisuun miidhagina harma kootii miidha					
15	Harma hoosisuun tattaaffii baayyee gaafata garuu bu'aan daa'imni argatu xiqqoodha					
16	Hamma aannan oomishamuu guddisuuf baayyee nyaachuu fi ulfaatina dabaluu qaama kootii					
	Hojii manaa guyyaa guyyaa harma hoosisuu waliin yoo ilaallamu					
17	Hojiima baratame hojjechuu					
18	Yeroo daa'imni dhalattuun na bira jirtu yoomiyyuu					
19	Rakkoo harma guusii					
20	Keessa deddeebi'anii hoosisuun nuffisiisaadha					
21	Yeroo daa'imni dhalattuun na bira jirtu yoomiyyuu					
	Dhukkubbii fi namaaf tahuu dhabuu harma hoosisuu waliin					
22	Dhukkubbii harmaa wayitaa hoosisanu					
23	Namaaf mijatuu dhabuu hogguu hoosisan					
24	Sababii harma hoosisuutiin harmi dhiitahuu					
25	Harma qofa hoosiisuu jalqabsiisnaan, hoosni harmaa nama dhukkubsa					
26	Harma qofa hoosiisuu jalqabsiisnaan, addaan kutuun laalessaa dha					
27	Harma qofa hoosiisuu jalqabsiisnaan, addaan kutuun laalessaa dha					
	Yaaddoo fi muusa'uu harma hoosisuun dhufu					
28	Mana irraa fagaadhee deemuu dhabuu kootiin ni hin aarres hin muusofnes					
29	Gahaa tahuu aannan harmaa					
30	Sababii harma hoosisuun jeeqamsa hirribaa					
31	Yeroo hunnda na muusessa hogguun harma hoosisuu addaan kutuu yaadu					
32	Waan hundattiyyuu ningammada; wannin godhe hundinuu dhala kootiif waan taheef					
33	Mana irraa fagaadhee deemuu dhabuu kootiin ni hin aarres hin muusofnes					
34	Yeroo hunnda na muusessa hogguun harma hoosisuu addaan kutuu yaadu					
35	Waan hundattiyyuu ningammada; wannin godhe hundinuu dhala kootiif waan taheef					

Annex-II: PCA outputs

PCA/FA outputs for study-III

Communalities

	Initial	Extraction
1. With the comfortability of the approach	1.000	.864
2. With the lived experience sharing approach	1.000	.849
3. With the positive deviant (counselor) assigned to you	1.000	.896
4. With community based/home based ways of promoting EBF	1.000	.880
5. With the promoted component of newborn care that is EBF practice	1.000	.834
6. With the health outcome of EBF practice as you observed on your infant	1.000	.691
7. With the appearance of PD/counselor	1.000	.860
8. With the communication skill of PD/counselor	1.000	.863
9. With the emphatic nature of PD/counselor	1.000	.802
10. With the emotional supporting ability of PD/counselor	1.000	.781
11-With the practical information (skill shared) provided to you	1.000	.838
12-With the relevancy of experience shared by PD/counselor	1.000	.894
13-With the convenience and long-term value of social support given	1.000	.765
15-With the length of consultation/counseling time	1.000	.816
16-With the knowledge of counselor on EBF	1.000	.884
17-With the content of counseling and experience shared at each visit	1.000	.911
18-With the understandability(non-complexity) of information provided	1.000	.807
19-With the understandability of appraisal support provided	1.000	.882
20With the ways of information delivery at each visit	1.000	.865
21-With adequacy of number of visit	1.000	.906
22-With the credibility of information provided	1.000	.865
23-With the transferable skill you got	1.000	.734
24-With the confidence built to be a potential counselor in your community network	1.000	.691
25-With the experience of EBF you got	1.000	.894
26-With the skill of breast milk expression	1.000	.794
28-With your active involvement during each counseling sessions	1.000	.928
29-With the support provided considering your interest (user centeredness)	1.000	.875
30-With the practical/participatory aspect of BF experience sharing	1.000	.904

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.105	36.090	36.090	10.105	36.090	36.090	7.092	25.329	25.329
2	5.245	18.734	54.823	5.245	18.734	54.823	6.219	22.212	47.541
3	4.077	14.559	69.383	4.077	14.559	69.383	4.826	17.235	64.776
4	2.283	8.155	77.538	2.283	8.155	77.538	2.745	9.804	74.580
5	1.863	6.655	84.193	1.863	6.655	84.193	2.692	9.613	84.193
6	.816	2.915	87.108						
7	.788	2.816	89.923						
8	.695	2.482	92.405						
9	.390	1.393	93.798						

10	.335	1.196	94.995						
11	.276	.987	95.982						
12	.201	.719	96.701						
13	.141	.503	97.204						
14	.130	.463	97.668						
15	.121	.434	98.102						
16	.095	.339	98.440						
17	.085	.304	98.744						
18	.071	.253	98.997						
19	.059	.212	99.209						
20	.054	.192	99.402						
21	.043	.153	99.554						
22	.042	.151	99.705						
23	.029	.103	99.809						
24	.024	.085	99.893						
25	.018	.064	99.957						
26	.006	.023	99.980						
27	.006	.020	100.000						
28	-1.000E-013	-1.001E-013	100.000						

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
12-With the relevancy of experience shared by PD/counselor	.913				
8-With the communication skill of PD/counselor	.906				
16-With the knowledge of counselor on EBF	.902				
7-With the appearance of PD/counselor	.899				
9-With the emphatic nature of PD/counselor	.889				
11-With the practical information (skill shared) provided to you	.850				
15-With the length of consultation/counseling time	.850				
13-With the convenience and long-term value of social support given	.834				
10-With the emotional supporting ability of PD/counselor	.834				
25-With the experience of EBF you got		.910			
20With the ways of information delivery at each visit		.885			
22-With the credibility of information provided		.885			
23-With the transferable skill you got		.850			
18-With the understandability(non-complexity) of information provided		.833			
26-With the skill of breast milk expression		.813			
24-With the confidence built to be a potential counselor in your community network		.761			
4-With community based/home based ways of promoting EBF			.926		
1-With the comfortability of the approach			.913		
3-With the positive deviant (counselor) assigned to you			.893		
5-With the promoted component of newborn care that is EBF practice			.891		
2-With the lived experience sharing approach			.836		
6-With the health outcome of EBF practice as you observed on your infant			.825		

17-With the content of counseling and experience shared at each visit				.870	
21-With adequacy of number of visit				.858	
19-With the understandability of appraisal support provided				.837	
29-With the support provided considering your interest (user centeredness)					.926
28-With your active involvement during each counseling sessions					.918
30-With the practical/participatory aspect of BF experience sharing					.910

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

PCA/FA output for study-V

PCA was done with fixed number of Egain value (5) only to determine the TVE by the scales

Communalities		
	Initial	Extraction
M1For walking/visiting to neighbors' or friends home	1.000	.898
M2For walking/going for social activities	1.000	.900
M3For working/doing other regular daily activities	1.000	.777
M4The kind of work or other activities difficulty as a result of your breast/body weight gained	1.000	.870
M5You accomplish less than you would like as a result of emotional problems faced due to breast feeding	1.000	.757
M6Returning to usual work with full confidence that the baby can feed including expressed breast milk	1.000	.534
M7Decrement of your usual work performance	1.000	.805
M8I am not happy when I was at home the whole day while my relevant others freely walk	1.000	.768
S9Washing/caring and/or dressing the baby is tedious	1.000	.513
S10Shortage of time for self-care	1.000	.817
S11Breast feeding affect my breast cosmetics	1.000	.623
S12Breast feeding need more effort with less infant outcome	1.000	.633
S13Much feeding to enhance amount of milk production resulted to problematic body weight gain	1.000	.835
S14Difficulty of breast feeding practice decreases while the baby's age grow-up	1.000	.674
S15Developing confidence in caring infant	1.000	.618
S16BF helped me for bonding with my baby (not BF helped……)	1.000	.785
D17Doing usual activities	1.000	.511
D18Exclusively BF is costly (feeding other foods is costly)	1.000	.644
D19At every time the newborn is with me	1.000	.786
D20Weaning period challenge (type of food shifting challenge)	1.000	.832
D21Routines daily caring activities are boring	1.000	.799
P22Pain while breast feeding/not	1.000	.599
P23Discomfort while breast feeding/not	1.000	.594
P24Engorgement of breast due to BF/not	1.000	.542
P25Once putting to EBF, BF is painful (once ignoring BF, starting is painful)	1.000	.510
P26After putting to EBF, discontinuing BF is painful (not providing breast milk is painful)	1.000	.820
P27Frequently BF (any other food) to satisfy the baby's nutritional need is challenging	1.000	.600

A28I am not depressed due to restricted movement outside from home	1.000	.542
A29Adequacy of breast milk (any other feeding) you are giving	1.000	.885
A30Sleeping disturbance for BF (for feeding other food)	1.000	.702
A31I always depressed while thinking to breach EBF (to shift foods)	1.000	.912
A32I am happy for everything since all what I did (EBF) is for my baby	1.000	.827
A33My general health was good as compared before practicing EBF (newborn care)	1.000	.780
A34I worry about conception in the 1st 6 months since not started modern contraceptive	1.000	.861
A35I worry about the breast milk (food) whether that fulfills nutritional needs of the baby	1.000	.825
Extraction Method: Principal Component Analysis.		

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.885	28.244	28.244	9.885	28.244	28.244	6.265	17.899	17.899
2	5.529	15.797	44.041	5.529	15.797	44.041	6.224	17.783	35.682
3	3.904	11.156	55.196	3.904	11.156	55.196	5.131	14.659	50.341
4	3.025	8.643	63.839	3.025	8.643	63.839	3.797	10.850	61.191
5	2.734	7.813	71.652	2.734	7.813	71.652	3.661	10.461	71.652
6	1.637	4.677	76.329						
7	1.281	3.661	79.990						
8	1.108	3.165	83.155						
9	.950	2.715	85.870						
10	.850	2.429	88.298						
11	.751	2.147	90.445						
12	.690	1.972	92.418						
13	.499	1.426	93.844						
14	.376	1.073	94.917						
15	.249	.712	95.629						
16	.224	.640	96.269						
17	.210	.600	96.869						
18	.175	.500	97.369						
19	.159	.454	97.824						

20	.142	.404	98.228						
21	.105	.301	98.529						
22	.092	.262	98.792						
23	.084	.241	99.033						
24	.079	.226	99.259						
25	.067	.192	99.451						
26	.050	.144	99.595						
27	.047	.135	99.730						
28	.044	.125	99.855						
29	.017	.048	99.903						
30	.014	.039	99.942						
31	.010	.029	99.970						
32	.006	.017	99.987						
33	.004	.010	99.998						
34	.001	.002	100.000						
35	-1.023E-013	-1.065E-013	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
M2For walking/going for social activities	.914				
M1For walking/visiting to neighbors' or friends home	.914				
M4The kind of work or other activities difficulty as a result of your breast/body weight gained	.891				
M7Decrement of your usual work performance	.862				
M8I am not happy when I was at home the whole day while my relevant others freely walk	.848				
M3For working/doing other regular daily activities	.841				
M5You accomplish less than you would like as a result of emotional problems faced due to breast feeding	.783				
M6Returning to usual work with full confidence that the baby can feed including expressed breast milk	.654				
A31I always depressed while thinking to breach EBF (to shift foods)		.943			
A29Adequacy of breast milk (any other feeding) you are giving		.927			
A34I worry about conception in the 1st 6 months since not started modern contraceptive		.907			

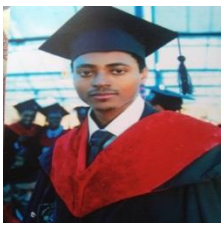
A32I am happy for everything since all what I did (EBF) is for my baby		.906			
A35I worry about the breast milk (food) whether that fulfills nutritional needs of the baby		.881			
A33My general health was good as compared before practicing EBF (newborn care)		.870			
A30Sleeping disturbance for BF (for feeding other food)		.817			
A28I am not depressed due to restricted movement outside from home		.642			
S10Shortage of time for self-care			.854		
S13Much feeding to enhance amount of milk production resulted to problematic body weight gain			.846		
S16BF helped me for bonding with my baby (not BF helped……)			.803		
S12Breast feeding need more effort with less infant outcome			.751		
S11Breast feeding affect my breast cosmetics			.739		
S14Difficulty of breast feeding practice decreases while the baby's age grow-up			.734		
S15Developing confidence in caring infant			.679		
S9Washing/caring and/or dressing the baby is tedious			.617		
P26After putting to EBF, discontinuing BF is painful (not providing breast milk is painful)				.891	
P23Discomfort while breast feeding/not				.760	
P22Pain while breast feeding/not				.752	
P27Frequently BF (any other food) to satisfy the baby's nutritional need is challenging				.738	
P25Once putting to EBF, BF is painful (once ignoring BF, starting is painful)				.684	
P24Engorgement of breast due to BF/not				.530	
D20Weaning period challenge (type of food shifting challenge)					.902
D21Routines daily caring activities are boring					.888
D19At every time the newborn is with me					.868
D18Exclusively BF is costly (feeding other foods is costly)					.774
D17Doing usual activities					.517

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Annex-III: Curriculum Vitae



Personal details

- **Full name**: YIBELTAL SIRANEH BELETE
- **Sex:** Male
- **Date of Birth**: 1989 (1982 E.C.)
- **Place of Birth**: kutti kebele, Gimbo Woreda, Kaffa zone, S/N/N/P region.

- **Marital status:**Married
- **Health status:** Normal
- **Nationality**: Ethiopian
- **Address:** Jimma town
- **Place of work:** Jimma university main campus, dep't of Health Policy and Management (Fuculty of public health)-Assistant Professor of Health System Management (MPH/HSM, PhD Candidate) and Innovator.
- **Position in the University**:- Reform and Academic quality assurance coordinator, Coordinator of IPAS-Ethiopia SRH project, and Managing editor of Ethiopian Journal of health sciences.
- **Phone number**: (+251) 0917017092
- **Email**: **yibeltal_siraneh@yahoo.**com

Educational background

- From grade 1-8 in Kutti complete primary school, Gimbo, kaffa.
- From grade 9-10 in Gimbo secondary school, Gimbo, kaffa.
- From grade 11-12(Preparatory program) in Bonga secondary and preparatory school.
- I earned my BSC degree in public health officer and MPH/HSM from Jimma University. Some of major course I took as an undergraduate public health officer student were health service management, SRH, epidemiology, research methodology, env'tal heath sciences, human physiology, human anatomy, human pathology and other all minor and major clinical courses.
- During studying MPH-majorly project management, monitoring & evaluation, health service management, advanced health economics, health policy, principles of health education/behavioral sciences, BCC/IEC material development, Behaiveral intervention models and reproductive health courses were some of well taken and highly scored with demonstrable skill.
- Currently, I am PhD candidate with the financial support of John Hopkins University-USA, and Jimma University, specialization in Health Communication and Health Behavior.

Language skill

Language	Reading	Writing	Speaking
English	Excellent	Excellent	Fluent
Amharic	Excellent	Excellent	Fluent
Kaffinoono	Excellent	Excellent	Excellent
Afan Oromo	Good	Good	Good
Geez	Good	Good	Good

Work experience

When I was student in Jimma University, I worked in multi extra-academic services by representing students union in different positions. I designed and coordinated many projects that provide a lot service to Jimma University students and community of Jimma town especially in collaboration with OSSHD/OSSA and IPAS-Ethiopia. I took many trainers of training (TOT) in varies topics such as Technology and innovation, peer-counseling & guidance, gender issue, peer-education, giving tutorial class for junior female students, sustained campus dialogue in peace and security, basic leadership skill, sexual & reproductive health (SRH), weekend online program at Jimma FM 102.0 radio (Basic principles of journalism-TOT by SNNPR For community radio program establishment), are the major ones. I have taken trainings were on Research ethics by Oslo university/SACCED project, Innovation-Design thinking by Mekerer University/ HoARILab.team, Business Modeling by HoARILAB Office of JU and Need finding training with online and by HoARILAB Office of JU staff. Some of my extra academic services in Jimma University can be attached with this letter as a recommendation and certificate form if needed.

Beside lecturing as a public health professional(HSM specialist), the researches and projects I involved in designing, writing synopsis, collecting and supervising data collection process, Conducting FGD & IDI, compiling statistical data, interpret and draft appropriate reports were on maternal health project(option B+ ART program and on health professionals' commitment to increase MCH services utilization), RH services projects, producing new insecticidal spray that kill mosquitoes as an innovation, outcome and determinants of abortion project, BCC material development sub-project, Innovator of mobile application to follow labor and delivery, and many others. Besides the experience I have in research project, publishing articles, presenting results/findings on different national and international conferences were some of my experiences.

Project/Research experience

1) HoARILab.Youth spark innovation grant winner of USAID grant in 2016--Co-Innovator
2) Sexual and reproductive health services project, HAPCCO, in 2014-2016.—Co-PI
3) Maternal and child health: implication to SDG project, JU, in 2016---PI
4) Outcome and determinants of safe 2nd TM medical abortion supported by University of Michigan-USA, 2015-2016…PI
5) KOFIH-JU-JZHD project on maternal and child health as an internal consultant for BCC/educational material development and radio program script/audio content preparation, 2016/17 –Coordinator
6) Investigator for the innovative project "Phone based maternal and child health services" funded by Grand challenge Ethiopia/FMoH.
7) Managing Editor of Ethiopian journal of health sciences based Jimma University and supported by US-National library at Thomson Reutors scholar one.

8) Investigator for Community based newborn and infant caring practice: to improve EBF practice using positive deviance approach in Jimma Town: Community based a cluster Randomized Controlled Trial: Supported by iifphc-Ethiopia with JHU, USA.
9) Kangaro Mother care implementation research project-PI and Clinical fellow-Supported by center for EEBHC-JBI
10) PI of "Model support system for street children in Jimma Town" community service project-Supported by JU
11) Co-PI, and data collector of 4 FGD and in-depth interviews for the pilot project entitled as 'Designing metaphor-based message to improve youth health in Ethiopia', with full financial support of Wayne state University, USA.
12) Co-PI, Documenting knowledge, attitudes and practices on sexual and reproductive health among university students; The case of Jimma, Arsi, Diredewa and Dilla universities, supported by IPAS-ethiopia (NGO).
13) PI and Co-PI of Two Mega research projects supported by JUIH namely (Implementation status of citizen charter in JUMC, Violence against children in Jimma town secondary school)
14) PI of M-health based communication and follow up to increase uptake of MH uptake: Paired cluster RCT study.
15) PI of developing effective mobile application to follow labor and delivery: CDSS for safe and appropraite delivery-innovation project.
16) PI of UV-C apparatus to prevent the spread of covid-19 pandemic: efficacy test project-supported by idrc-canada.
17) advising post graduate and under graduate students thesis work.

Awards and special skill

- Bachelor of Science degree in public health and MPH/HSM from Jimma University
- Certificate from Jimma university community based education office for valuable contribution and coordination of community service activities.
- Certificate of valuable contribution in the process of overall activities in Jimma University students' union office.
- Certificate of TOT from NGOs like OSSA, Dkt, FGA, and mary-stops international and from different projects
- Appreciation for designing, implementing and coordinating of varies projects in collaboration with governmental and non-governmental organization.
- Certificate for my research presentation on national and international conferences.
- In addition to this, I had basic computer skill including SPSS quantitative research analyzing software, and Atlas-ti 7.1 software to analyze qualitative study.
- Many award letters for winning different innovation and research projects from national and internation funding organizations.

Research and Publication experience

- I had 10 contributions on conference proceedings of Jimma university, Arbaminch university, Mekele University, organized by University of Michigan (USA) international conference, EPHA, FMOH, RMNCH, IIFPHC-E, AABM College, and EPHI after presenting on those national and international research conference.(If you need evidence, I can submit book of abstract or certificates-Or you may google using my full name to see online)
- **Currently I have 28 published articles listed as follows, and 4 in press and 6 on manuscript preparation stage.**

S.N	**Publication list and details: Yibeltal Siraneh**
1	**Yibeltal Siraneh** and AhaduWorkneh; Determinants and Outcome of Safe Second Trimester Medical Abortion at Jimma University Medical Center, Southwest Ethiopia
	Journal: Hindawi: Journal of Pregnancy, Volume **2019** (V10), Article ID 4513827, 13 pages; https://doi.org/10.1155/2019/4513827
2	**Yibeltal Siraneh,** Shimeles Ololo, Gebeyehu Tsega, Kiddus Yitbarek, Ayinengida Adamu, Belay Erchafo, Meaza Hailu, Mirkuzie Woldie; Level and Factors Associated with Professional Commitment of Health Professionals Providing Institutional Delivery Services in Public Health Facilities, Southwest Ethiopia
	Journal: Ethiop J Health Sci.2017; V**28**(4):495. Doi:http://dx.doi.org/10.4314/ejhs.v28i4.15
3	Edosa Tesfaye Geta, **Yibeltal Siraneh Belete**, Elias Ali Yesuf; Cost of treatment among self-referred outpatients in referral hospitals compared to primary health care facilities in East Wollega, western Ethiopia: A comparative cross-sectional study
	Journal: Journal of Public Health in Africa 2019; V**10**:1024: doi:10.4081/jphia.2019.1024
4	Edris Hasanpoor, **Yibeltal Siraneh Belete**, Ali Janati, Sakineh Hajebrahimi, Elaheh Haghgoshayie; Nursing Managers' Perspectives on the Facilitators and Barriers to Implementation of Evidence-Based Management
	Journal: Worldviews on Evidence-Based Nursing, V**2019** (V16); 1–8. © 2019 Sigma Theta Tau International;10.1111/wvn.12372 WVN 2019;0:1–8
5	Mulugeta Hailu Rad, Dejene Melese Handalo, Tilahun Fufa Debela,**Yibeltal Siraneh**, Firehiwot Worku, Elias Ali Yesuf; Practice and Associated Factors of Health Professionals towards Citizens' Charter at Jimma University Medical Center
	Journal: Ethiop J Health Sci.2019;**29**(5):535. Doi:http://dx.doi.org/10.4314/ejhs.v29i5.2

6	Sakineh Hajebrahimi, Ali Janati, Morteza Arab-Zozani, Mobin Sokhanvar, Elaheh Haghgoshayie, **Yibeltal Siraneh**, Mohammadkarim Bahadori, Edris Hasanpoor; Medical visit time and predictors in health facilities: a mega systematic review and meta-analysis
	Journal: International Journal of Human Rights in Healthcare, **Vol. 12** No. 5, pp. 373-402. © Emerald Publishing Limited, ISSN 2056-4902. https://doi.org/10.1108/IJHRH-05-2019-0036
7	Zenebe Hubena, AhaduWorkneh, and **Yibeltal Siraneh;** Prevalence and Outcome of Operative Vaginal Delivery among Mothers Who Gave Birth at Jimma University Medical Center, Southwest Ethiopia
	Journal: Hindawi/Journal of Pregnancy, **Volume 2018** (V9), Article ID 7423475, 12 pages; https://doi.org/10.1155/2018/7423475
8	Gholam Reza Sharifzadeh, Djavad Ghoddoosi-Nejad, Susan Behdani, Elaheh Haghgoshayie, **Yibeltal Siraneh,** Edris Hasanpoor; Diabetes patients' perspectives on the patients' rights: evidence from east of Iran
	Journal: INTERNATIONAL JOURNAL OF HUMAN RIGHTS IN HEALTHCARE; **VOL. 12** NO. 4 2019, pp. 276-284, © Emerald Publishing Limited, ISSN 2056-4902; DOI 10.1108/IJHRH-09-2018-0060
9	Kiddus Yitbarek, Ayinengida Adamu, Gebeyehu Tsega,**Yibeltal Siraneh**, Belay Erchafo, Delenasaw Yewhalaw, Firew Tekle and Mirkuzie Woldie; Technical Efficiency of Maternal and Reproductive Health Services in Public Hospitals of Oromia Regional State, Ethiopia
	Journal: Health Services Insights **Volume 12 (2019)**: 1–8; https://doi.org/10.1177/11786329198376
10	Habib Jalilian, Leila Doshmangir, Soheila Ajami, Habibeh Mir, **Yibeltal Siraneh**, Edris Hasanpoor; Economic burden of gastric cancer in the first six months after diagnosis
	Journal: International Journal of Pharmaceutical and Healthcare Marketing **Vol. 13** No. 4, 2019 pp. 436-446 © Emerald Publishing Limited 1750-6123; DOI 10.1108/IJPHM-12-2018-0061
11	Belay Erchafo, Tesfamichael Alaro, Gebeyehu Tsega, Ayinengida Adamu, Kiddus Yitbarek, **Yibeltal Siraneh**, Meaza Hailu, Mirkuzie Woldie; Are we too far from being client centered?
	Journal: PloS ONE **V13**(10): 2018: e0205681.https://doi.org/10.1371/journal.pone.0205681
12	Ghasem Abedi, Ghahraman Mahmoodi, Roya Malekzadeh, Zeinab Khodaei, **Yibeltal Siraneh Belete**, Edris Hasanpoor; Impact of patients' safety rights and medical errors on the patients' security feeling: a cross-sectional study
	Journal: INTERNATIONAL JOURNAL OF HUMAN RIGHTS IN HEALTHCARE;**VOL. 12** NO. 3 2019, pp. 215-224, © Emerald Publishing Limited, ISSN 2056-4902. DOI 10.1108/IJHRH-01-2019-0001
13	Bezawit Birhanu, **Yibeltal Siraneh**, Beshea Gelana, Gebeyhu Tsega; Quality of Family Planning Services and Associated Factors in Jimma Town Public Hospitals, Southwest Ethiopia
	Journal: Ethiop J Health Sci.2019;**29**(5):559.doi:http://dx.doi.org/10.4314/ejhs.v29 i5.5
14	Edris Hasanpoor, Jamal Hallajzadeh, **Yibeltal Siraneh**, Ebrahim Hasanzadeh, Elaheh Haghgoshayie;Using the Methodology of Systematic Review of Reviews for Evidence-Based Medicine
	Journal: Ethiop J Health Sci. 2019; **29**(6):775.doi:http://dx.doi.org/10.4314/ejhs.v29 i6.15
15	Edris Hasanpoor,**Yibeltal Siraneh Belete**, Ali Janati, Sakineh Hajebrahimi, Elaheh Haghgoshayie; The Use of Evidence-Based Management in Nursing Management
	Journal: Africa Journal of Nursing and Midwifery-ISSN 2520-5293 (Online). https://upjournals.co.za/index.php/AJNM/index. **Volume 21** | Number 1 | 2019 | #4179 | 16 pages. https://doi.org/10.25159/2520-5293/4179
16	**Yibeltal Siraneh**, Fanta Assefa and Mahlet Tesfaye; Feto-Maternal Outcome of Vaginal Birth after Cesarean and Associated Factors Among Mothers with Previous Cesarean Scar at Attat Lord Merry Primary Hospital, Gurage Zone, South Ethiopia
	Journal: J Preg Child Health, an open access journal. ISSN: 2376-127X. J Preg Child Health **V5 (2018)**: 390. Doi:10.4172/2376-127X.1000390
17	**Yibeltal Siraneh**, Ahadu Workneh; Prevalence and Management Outcome of Patients Underwent Vaginal Hysterectomy in Gynecology Ward of Jimma University Medical Center, Southwest Ethiopia

	Journal: Journal of Gynecology and Women's Health ISSN 2474-7602, **Volume 13,** Issue 3 – December 2018. DOI: 10.19080/JGWH.2018.13.555863
18	**Yibeltal Siraneh**, Uptake of Prevention of Mother to Child HIV Transmission (PMTCT) Option B+ ART Program among Pregnant and Lactating Mothers Attending Ante Natal Care (ANC) Clinic at Jimma University Specialized Hospital, Southwest Ethiopia
	Journal: J Complement Med Alt Healthcare **V 8**(3): JCMAH.MS.ID.555738 (2018). DOI: 10.19080/JCMAH.2018.08.555738
19	**Yibeltal Siraneh**, Fisseha Wondimnew; Institutional Delivery Services Utilization and Associated Factors among Mothers who gave Birth in the Last One Year in Jimma Town, Southwest Ethiopia
	Journal: J Complement Med Alt Healthcare **V 8**(3): JCMAH.MS.ID.555736 (2018). DOI: 10.19080/JCMAH.2018.08.555736
20	**Yibeltal Siraneh**, Ahadu Workineh, Zenebe Hubena; Factors Affecting Feto-Maternal Outcome of Operative Vaginal Delivery among Mothers Who Gave Birth at Jimma University Medical Center
	Journal: Advances in Obstetrics and Gynaecology (2018) **V1** (1). Adv in Obs and Gynec: AOAG-102
21	Fanta Asefa, Amanuel Hunde,**Yibeltal Siraneh**, Abonesh Taye, **Outcome Of Hypertensive Disorders Of Pregnancy And Associated Factors Among Pregnant Women Admitted To Jimma University Medical Center, Southwest Ethiopia**
	Journal: Ethiopian Journal of Reproductive Health (EJRH) April, 2020 ; Volume 12, No. 2
22	Biniam Worku Hailu, Yohannes Ejigu, **Yibeltal Siraneh**;Occupational Stress and Associated Factors among Nurses working in Public Hospitals of Arsi Zone, Oromia Regional State, Central Ethiopia
	Journal: International Journal of Biomedical Engineering and Clinical Science. Vol. 6, No. 2, 2019, pp. 17-28. Doi: 10.11648/j.ijbecs.20200602.11
23	**Yibeltal Siraneh**, Melkamu Berhane, Gelila Abraham, Garumma Tolu Feyissa¸ Morankar Sudhakar¸ Compliance to Kangaroo Mother Care Best Practice: Evidence Based Implementation Project
	Journal: JBI Evidence Implementation Journal, V19, 2021
24	**Yibeltal Siraneh,** Abonesh Taye, Fanta Asefa, Abraraw Tesfaye, Yesuf Ahmed¸ Sexual Assault Profile in Jimma University Medical Center, Southwest Ethiopia.
	Journal: Dove Press journal: Adolescent Health, Medicine and Therapeutics: 12 17–25
25	Meaza Hailu, Fikru Tafese, Gebeyehu Tsega, Ayinengida Adamu, Kiddus Yitbarek, Tizta Tilahun, **Yibeltal Siraneh**, Belay Erchafo, and Mirkuzie Woldie. Expanding Maternity Waiting Homes as an Approach to Improve Institutional Delivery in Southwest Ethiopia: A Community-Based Case-Control Study
	Journal: SAGE- INQUIRY: The Journal of Health Care Organization, Provision, and Financing, Volume 58: 1–8, 2021. DOI:- ttps://doi.org/10.1177/004695802110182948
26	Nigusu Getachewu, **Yibeltal Siraneh**, Eliyas Ali Yesu, et al. Healthcare Manager Commitment towards Implementation of Citizen Charter Standards and Associated Factors in public hospitals of Jimma zone, Southwest Ethiopia
	Journal: BMC Health Services Research 2021
27	**Siraneh Y**, Woldie M, Birhanu Z. Effectiveness of Positive Deviance Approach to Promote Exclusive Breastfeeding Practice: A Cluster Randomized Controlled Trial. *Risk Manag Healthc Policy*. 2021;14:3483-3503: https://doi.org/10.2147/RMHP.S324762.
28	**Siraneh Y**, Woldie M, Birhanu Z. End-Users Satisfaction with Positive Deviance Approach as an Intervention to Promote Exclusive Breastfeeding in Jimma, Ethiopia: A Multi-Level Analysis. *Int J Womens Health*. 2022;14:179-197: https://doi.org/10.2147/IJWH.S349053

Reference

1. **Tayetollemariyam (PH.D.):** Vice president for academic affair of Jimma University. Email**:**taye.tolemariam@ju.edu.et, tayetolaa@yahoo.com
2. **KifleWeldemichael** (MD, MPH, Professor of Epidemiology, Principal Investigator, Monitoring and Evaluation Training Program, Focal Person for One Health Ethiopia, Jimma University, Jimma) ; **Tel:** +251 917804029 ; ***E-Mail:*** *bethy_kifle@yahoo.com, kwoldemichael@ju.edu.et*
3. **Abrham Haileamlak** (MD, Professor of Pediatrics and Child Health, Dean of College of Public Health and Medical Sciences, Jimma University); **Tel:** +251921324889, **E-mail**: *asratab@yahoo.com*

Short Biosketch

BIOGRAPHICAL SKETCH

NAME: Yibeltal Siraneh Belete

POSITION TITLE: Assistant Professor of Health Policy and Management

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Jimma University, Ethiopia	BSc.	June 21/2014	Public health (Health Officer)
Jimma University, Ethiopia	MPH	June 21/2016	Health System Management
Jimma University , Ethiopia, with the financial support of John Hopkins University, USA	PhD Candidate	--active--	Public Health/Health Communication and Health Behavior

A. Personal Statement

Mr.Yibeltal Siraneh is an academic staff who started his work by providing lecture for undergraduate and post-graduate students, doing research/innovation activities along with providing community services. He is one of the staff in the dep't of Health Policy and Management, Fuculty of public health, Jimma University. Currently, he is Assistant Professor of HSM, and PhD candidate in Public health/Health Communication and Behavior. His professional background was public health (health officer) and employed at Jimma University since 2014, and then after two years of masters education earned his MPH. In addition to the academic activities, he is working as a reform and academic quality assurance coordinator, coordinator of IPAS-Ethiopia SRH project, PI and Co-PI of different innovations and implementation researches, and managing editor of Ethiopian Journal of health sciences.

When he was student in Jimma University, he worked in multi extra-academic services by representing students union in different positions. He designed and coordinated many projects that provide a lot service to Jimma University students and community of Jimma town especially in collaboration with OSSHD/OSSA and IPAS-Ethiopia. He took many trainers of training (TOT) in varies topics such as Technology and innovation, peer-counseling & guidance, research ethics, GCP, implementation research, gender issue, peer-education, giving tutorial class for junior female students, sustained campus dialogue in peace and security, basic leadership skill, sexual & reproductive health (SRH), weekend online program at Jimma FM 102.0 radio (basic principles of journalism-TOT by SNNPR For community radio program establishment), are the major ones. Recently after being an accademic staff, he had taken trainings were on Research ethics by Oslo university/SACCED project, Innovation-Design thinking by Mekerer University/ HoARILab.team, Business Modeling by HoARILAB Office of JU and need finding training with online and by HoARILAB Office of JU

staff. Some of my extra academic services in Jimma University can be attached with this letter as a recommendation and certificate form if needed.

Beside lecturing as a public health professional, the researches and projects he involved in designing, writing synopsis, collecting and supervising data collection process, conducting FGD & IDI, compiling/analyzing statistical data, interpret and draft appropriate reports were some of his experiences. Besides the experience he has in research project, publishing articles, presenting results/findings on different national and international conferences were also his best experiences.

Ongoing and recently completed projects

1) HoARILab.Youth spark innovation grant winner of USAID grant in 2016--Co-Innovator

2) Sexual and reproductive health services project, HAPCCO, in 2014-2016.—Co-PI

3) Maternal and child health: implication to SDG project, JU, in 2016---PI

4) Outcome and determinants of safe 2nd TM medical abortion supported by University of Michigan-USA, 2015-2016…PI

5) KOFIH-JU-JZHD project on maternal and child health as an internal consultant for BCC/educational material development and radio program script/audio content preparation, 2016/17 –Coordinator

6) Investigator for the innovative project "Phone based maternal and child health services-Hello Doctor! Program" funded by Grand challenge Ethiopia/FMoH, in collaboration with Grand challenges Canada.

7) Managing Editor of Ethiopian journal of health sciences based Jimma University and supported by US-National library at Thomson Reutors scholar one.

8) Investigator for Community based newborn and infant caring practice: to improve EBF practice using positive deviance approach in Jimma Town: Community based a cluster Randomized Controlled Trial: Supported by iifphc-Ethiopia with JHU, USA.

9) Kangaro Mother care implementation research project-PI and Clinical fellow-Supported by center for EEBHC-JBI

10) PI of "Model support system for street children in Jimma Town" community service project-Supported by JU

11) Co-PI, and data collector of 4 FGD and in-depth interviews for the pilot project entitled as 'Designing metaphor-based message to improve youth health in Ethiopia', with full financial support of Wayne state University, USA.

12) Co-PI, Documenting knowledge, attitudes and practices on sexual and reproductive health among university students; The case of Jimma, Arsi, Diredewa and Dilla universities, supported by IPAS-ethiopia (NGO).

13) PI and Co-PI of Two Mega research projects supported by JUIH namely (Implementation status of citizen charter in JUMC, Violence against children in Jimma town secondary school)

14) PI of M-health based communication and follow up to increase uptake of MH uptake: Paired cluster RCT study.

15) PI of developing effective mobile application to follow labor and delivery: CDSS for safe and appropraite delivery-innovation project.

16) PI of UV-C apparatus to prevent the spread of covid-19 pandemic: efficacy test project-supported by IDRC-canada.

17) PI of Clinical performance test of locally designed Infant Radiant Warmer: supported by GCE and IDRC.

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2020– Present	Assistant Professor, Department of Health Policy & Management, JU
2020– Present	JBI-Australia Implementation Fellow, core staff of Ethiopian EBHC Center
2014 – Present	Trainer of SRH, HIV/AIDS & Life skill program of OSSHD and JU program
2019 – 2020	Coordinator of m-health RH program at JU through the support of IPAS-Ethiopia
2017 – Present	Reform and Academic Quality Assurance Coordinator of faculty of Public health, JU
2016–2017	Coordinator and consultant for SBCC radio program for KOFIH-MCH program
2016 – 2020	JBI-Australia Clinical Fellow and core staff of Ethiopian EBHC Center, JU
2016 – 2019	Lecturer of HSM, Faculty of Public Health, Jimma University (JU)
2016– Present	Managing Editor of Ethiopian Journal of Health Sciences
2014 – 2016	Assistant Lecturer of HSM, College of public health and Medical sciences, JU
2014 – Present	Member, Ethiopian Public Health and Health Officers Association

Honors/Awards

- Certificate from Jimma university community based education office for valuable contribution and coordination of community service activities.
- Certificate of valuable contribution in the process of overall activities in Jimma University students' union office.
- Certificate of TOT from NGOs like OSSA, Dkt, FGA, and mary-stops international and from different projects
- Appreciation for designing, implementing and coordinating of varies projects in collaboration with governmental and non-governmental organization.
- Certificate for research presentation on national and international conferences.

- Many award letters for winning different innovation and research projects from national and internation funding organizations.
- Certificate for completion of different TOT and as a best trainer for TOT in SRH and related fields

C. Contributions to Science (Publications)

I had more than 10 contributions on national and international conferences/Workshop and book of abstract published by the organizing institution as a proceedings. Currently I have 26 published articles listed in the following table, and 4 in press and 6 on manuscript preparation stage.

S.N	**Publication list and details: Yibeltal Siraneh**
1	**Yibeltal Siraneh** and AhaduWorkneh; Determinants and Outcome of Safe Second Trimester Medical Abortion at Jimma University Medical Center, Southwest Ethiopia
	Journal: Hindawi: Journal of Pregnancy, Volume **2019** (V10), Article ID 4513827, 13 pages; https://doi.org/10.1155/2019/4513827
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Annex-IV: Dissertation Declaration Form (DDF)

Signed declaration form was submitted to the department using hard copy.