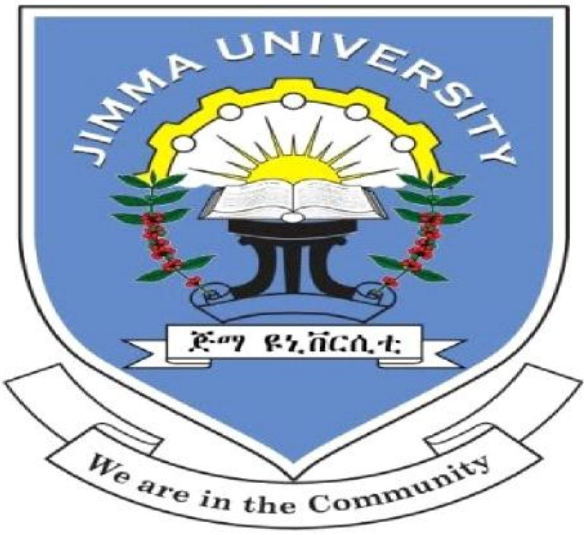

DETERMINANTS OF PNEUMONIA AMONG UNDER TWO YEARS CHILDREN IN TEMBARO WOREDA, SOUTH ETHIOPIA: CASE CONTROL STUDY

BY: DEGINET ALEMBO (BSC)

A RESEARCH THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY PUBLIC HEALTH FACULTY, DEPARTMENT OF EPIDEMIOLOGY; IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR MASTER OF PUBLIC HEALTH IN GENERAL PUBLIC HEALTH

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Jimma, Ethiopia

DETERMINANTS OF PNEUMONIA AMONG UNDER TWO YEARS CHILDREN IN TEMBARO WOREDA, SOUTH ETHIOPIA.

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Abstract

Background: Childhood Pneumonia is the commonest cause of suffering worldwide among under- five children. Community-acquired pneumonia (CAP) was estimated to account for more than one million under five child deaths globally, 80 % of which occurred in children under 2 years of age group. It is the single leading cause of death in Ethiopia; accounting 20% of all under five mortality burdens. Most of the victims were children less than two years old.

Objective: The purpose of the study was to assess the determinant factors associated for pneumonia morbidity in under two years old children in Tembaro woreda.

Methods: Institution based unmatched case control study was conducted from March 1 to March 30, 2019. Cases were children aged under two year, who were diagnosed with pneumonia clinically .Controls were children aged under two year, who were diagnosed with no pneumonia clinically. Interviewer administered structured questionnaire was employed to collect data from consecutively selected 225 individuals (75 cases and 150 controls). Descriptive statistics, both Bivariate and multivariate logistic regression analysis were done using SPSS version 23software, after exported the data from EpiData version 3.1. Candidate variables with p-value < 0.25 during bivariate analysis where included to multivariable logistic regression model. Finally, variables with p-value < 0.05 were expressed as potential determinants of pneumonia. Model fitness checked by Hosmer Lemeshow goodness fit.

Results: Maternal illiteracy (AOR=3.6,95% C.I (1.21-10.7)),Underweight(AOR=5.2,95% C.I(2.02-13.27)),more than five family members(AOR=4.6,95% C.I (1.2-17.8)),more than two under five children in the household (AOR=3.8,95% C.I(1.01-14.85)),history of upper respiratory tract infection within last two weeks (AOR=12.3,95%C.I (4.45-23.96)),living in grass roofed house (AOR=3.7,95% C.I (1.38-9.79)) were determinants of pneumonia among under two years old children.

Conclusion: maternal illiteracy, contact or having upper respiratory tract infection, having acute malnutrition, large family size and living grass roofed house were determinants for pneumonia in under two years children. Therefore, health education regarding on housing and birth spacing, improving child nutritional status, early control of upper respiratory tract infection and female education are important in pneumonia prevention.

Keywords: pneumonia, determinants, under two children.

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List of Abbreviation

AOR	Adjusted Odds Ratio
AURTI	Acute Upper Respiratory Tract Infection
BSc	Bachelor of Science
CAP	Community Acquired Pneumonia
CI	Confidence Interval
EU	European Union
HC	Health Center
HDA	Health Developmental Army
Hib	Haemophilus Influenza Type b
HIV	Human Immune Deficiency Virus
IMNCI	Integrated Management of Neonatal and Child Illnes
MD	Medical Doctor
MPH	Master of Public Health
MSc	Master of Science
OPD	Out Patient Department
OR	Odds Ratio
PI	Principal Investigator
S.N.N.P.R.S	Southern Nations Nationalities Peoples Regional State
SPSS	Statistical package For Social Science
SSA	Sub-Saharan African Countries
WHO	World Health Organizations

1 INTRODUCTION

1.1 Background

Pneumonia is a respiratory infection affecting the lungs. During normal breathing, small sacs in the lungs called alveoli fill with air. When children contract pneumonia the alveoli fill with pus and fluid, restricting breathing and making it painful. Pneumonia can be caused by bacteria, viruses and fungi. Streptococcus pneumonia is the most common cause of bacterial pneumonia in children, followed by Haemophilus influenza type b (Hib). Respiratory syncytial virus is the most common viral cause of pneumonia and Pneumocystis jiroveci is responsible for at least one quarter of all pneumonia deaths in infants infected with HIV(1).

Because most forms of pneumonia are linked to viral or bacterial infections that spread from person to person common. Pneumonia most common during the fall, winter, and early spring, when children spend more time indoors in close contact with others. The chance that a child will develop pneumonia is not affected by how he/she is dressed or by air temperature(2). Establishing the causal agent of pneumonia is essential to guarantee the most appropriate and effective therapy and is pivotal to the development of therapeutic and preventive strategies(3). Pneumonia is responsible for quarter of all deaths in under-five children. Many of the deaths occur in those less than 24 months(4).

Poorly ventilated houses were significant risk factors of acute respiratory infection in children under five(5). It is the single largest infectious cause of death in children worldwide yet it can be prevented with simple interventions, and treated with low-cost, low-tech medication and care. It affects children and families everywhere, but is most prevalent in South Asia and sub-Saharan Africa(6).

.Childhood pneumonia causes substantial mortality and morbidity. Accurate measurements of pneumonia incidence are scarce in low-income and middle-income countries, particularly after implementation of pneumococcal conjugate vaccine(7).

1.2 Statement of problem

Globally, about 150 million new under five pneumonia cases annually. South East Asia, in particular India is reported to have the highest burden of community-acquired pneumonia (CAP) which roughly 43 million in children <5 years of age(8).Pneumonia remains the leading cause of mortality in children under five worldwide. Of the estimated 6.9 million child deaths each year, pneumonia accounts for anywhere from 1.3 to 1.6 million deaths a year in this age group, roughly 16% of deaths among children under age five. Most of the victims were children less than two years old(9).

Pneumonia affects the extremes of life more than other age groups, where two third of all patients were infants and 80% were below 24 months(10).In 2014,community-acquired pneumonia(CAP) was estimated to account for more than one million under five child deaths, 80 % of which occurred in children under 2 years of age group (11).

The effects of indoor air pollution kill more children globally than outdoor air pollution and the rate of care seeking for symptoms of pneumonia has increased by only 8 percent from 55 per cent in 2000 to 63 per cent in 2015. Within countries, there are still significant disparities in care seeking for symptoms of pneumonia between the richest and poorest households, across all regions(12).

Despite improvements in child health, Afghanistan still has a heavy burden of deaths due to preventable causes; 17% of under-5 deaths are due to pneumonia(13). Pneumonia is responsible for approximately 230,000 deaths in Europe, annually. Comprehensive and comparable reports on pneumonia mortality trends across the European Union (EU) are lacking(14).Pneumonia causes around 750,000 child deaths per year in sub-Saharan African (SSA) countries. The lack of accessibility to prompt and effective treatment is an important contributor to this burden(15).

Delays in receiving adequate care for children suffering from pneumonia can be life threatening and have been described associated with parents' limited education and their difficulties in recognizing the severity of the illness(16). In Kenya, it is the second leading cause of mortality, accounting for greater than 30,000 deaths in this age group annually(17).

Prevalence of pneumonia in Ethiopia among under-five children was 33.5%(18).In Ethiopia, pneumonia is a leading single disease killing under-five children. It is estimated that 3,370,000 children encounter pneumonia annually which contributes to 20 per cent of all causes of deaths killing over 40,000 under-five children every year(19).

Most fatalities occur because the parents of the children affected are excluded from health systems as a result of cost or distance, or because they see health providers as ineffective, unresponsive and unaccountable. Tackling pneumonia requires a properly financed health system that reaches the most disadvantaged children, delivering effective care through a trained and supported workforce. Pneumonia presents health planners with a complex challenge because it has such diverse causes(20).

Pneumonia is a global disease that is typically curable in developed countries but often fatal in developing countries. The global perception of pneumonia as a public health problem is emasculated by its familiar and benign image in the industrialized world. Pneumonia has no UN agency to highlight its importance and no fund or series of global networks to advocate for drugs, vaccines, or care. The ambiguity of its various acronyms (e.g., ARI and LRTI) further undermines its perception as a single, tractable problem(21).

There is no available study conducted on determinant factors for pneumonia in under two children in Tembaro woreda and studies done in other areas focused on under five children, but most of variables addressed were infancy time which prone to recall bias. Therefore, it is appropriate to study factors associated with pneumonia among under two children .Identifying determinant factors will help health sectors and stakeholders to target the intervention.

2 .LITERATURE REVIEW

2.1 Overview of pneumonia

Pneumonia is the single largest infectious cause of death in children worldwide. Pneumonia is caused by a number of infectious agents, including viruses, bacteria and fungi. The most common are Streptococcus pneumoniae,Haemophilus influenza type b (Hib), respiratory syncytial virus and in infants infected with HIV, Pneumocystis jiroveci is one of the most common causes of pneumonia, responsible for at least one quarter of all pneumonia deaths in HIV-infected infants(22).

2.2. Socio-demographic factors

Many socio-demographic factors that are associated with pneumonia in under five include Age, education, marital status, occupation, and number of children. The excess risk for girls was confirmed in a pneumonia case control study in Brazil and South Asia(23)**.**The study done in Nigeria showed pneumonia was found to be more significantly associated with large family size, and low parental education(24).

A childhood pneumonia case-control study in Ethiopia revealed, the mother's education was more strongly correlated than father`s when both variables were included in an explanatory model(23,24).The finding in Ethiopia revealed children born from mothers whose age is < 18years is 5.3 times more likely to develop community acquired pneumonia(CAP) compared to children born to mothers whose age is 25 years or above(15,23).

Another study done in Ethiopia showed increased risk of pneumonia was associated with the parental primary education as compared to higher education. Similarly, child cared by housekeeper and their relatives were at higher odds of developing pneumonia as compared to child cared by their parents (26). A study also identified having three or more children at home and family size more than four are identified risk factors for under five pneumonia(23,24,25).

2.3. Environmental related factors

Studies conducted in Brazil, South Asia, India and Ethiopia identified that children who live in severely crowded house were more likely to have pneumonia(17,21,26,28,39,40). A study done in

Ethiopia revealed that children carried on the back of care givers during cooking were five times more likely to develop pneumonia than those who were not carried on the back during cooking[AOR=5.38, 95% CI: 2.13-9.65)(28).A study in Thailand showed that infants were at increased risk of having an episode of pneumonia if there was a shorter distance from stove to infant bed(29).Studies also identified using charcoal as fuel source and cooking food in living room are risk factors for the childhood pneumonia(21,26,27).A case control study conducted in Ethiopia revealed that parental smoking is risk factor for childhood pneumonia(24,27).

2.4. Nutritional related factors

Children with long period of breast feeding (>6 months) reported less pneumonia (OR: 0.81, 95% CI: 0.70–0.93)(31) and suboptimal breastfeeding practices among infants and young children under two years of age are associated with increased risk of pneumonia morbidity(29,38). Zinc supplement for children has been reported to prevent pneumonia(21,30).Studies identified timely initiation of complementary feeding significantly associated with childhood pneumonia occurrence(21,28,31). Severe wasting and stunting independently predicts pneumonia morbidity among the children(23,26,32).

2.5. Immunization related factors

A case control study conducted in Brazil and Kenya showed that children who were not immunized against homophiles influenza were susceptible for childhood pneumonia(29,33). Not having been vaccinated against the influenza and pneumococcal conjugate vaccine 10 (OR=3.59; 95 % CI, 2,62–4.91) was found to increase the likelihood of pneumonia compared to immunized children(18,32).A prospective case –control study conducted in India showed that incomplete immunization for age was significantly associated with pneumonia(36).

2.6. Co-morbidity

Co- morbidity has been found to raise the risk of pneumonia. A cross-sectional study conducted in Ethiopia revealed that having past history of Measles, Asthma and diarrheal disease is established risk factor for pneumonia(27,34,36). Measles vaccination was associated with reduction ARI cases by 15–30 percent in India and Pakistan (37).

2.7 Conceptual frame work

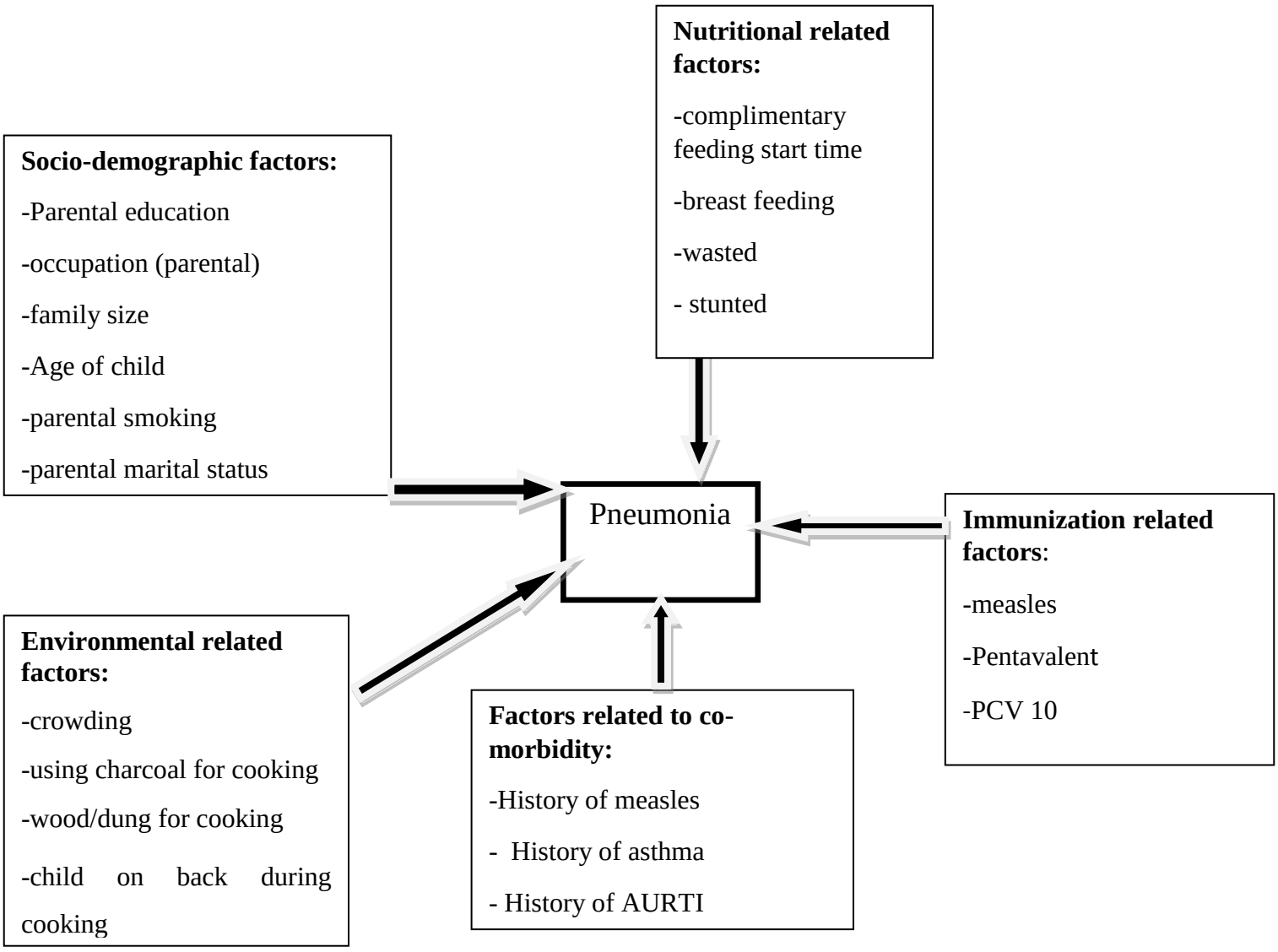

Figure1 Determinants of pneumonia morbidity among under two years children visiting public health facilities in Tembaro woreda, south Ethiopia, 2019(Adapted from Shibre G/Tsadik, 2015 and Ayub Shisia, 2005).

Key ⟹ **factors associated for pneumonia morbidity**

2.8 Significance of the Study

- The result from the study will contribute in filling information gap about pneumonia in under two year's children and associated factors in the study area.
- It helps health professionals to understand the determinant factors about pneumonia in under two years children and to act accordingly by targeting their counseling on commonly determinant factor/s.
- Helps to decide on which factors to intervene more to prevent pneumonia in under two years' children.
- In addition, it serve as an input for other researchers interested to do their study in a similar area.

3: OBJECTIVES OF THE STUDY

3.1 General Objective

To assess determinant factors for pneumonia among under two years children in Tembaro woreda, S.N.N.P.R, Ethiopia 2019.

3.2 Specific Objectives

- To assess socio-demographic determinants associated for pneumonia morbidity.
- To assess nutritional related determinants for pneumonia morbidity.
- To assess environmental related determinants for pneumonia morbidity.
- To assess co-morbidities related for pneumonia morbidity.
- To assess immunization related factors associated for pneumonia morbidity.

4: METHODS AND MATERIALS

4.1 Study area and period

The study was conducted in Tembaro woreda, Southern Nations, Nationalities and People's Region, Ethiopia. According to the information from Tembaro Woreda Health office (population and Housing Census Conducted in 2007), the total population in the woreda is 134,578(35).The 2018/19 projected population is 156102 according to Tembaro woreda health office, among this 8086 (5.18 %) is under two children. Tembaro woreda is one of the woredas found in Kembata Tembaro zone, which is located in SNNPR, and its main town is Mudula. It is far from Addis Ababa, Hawassa and Durame 400km, 185kms, and 60kms respectively. It is bordered: by North Hadya zone, West Omo river, East Hadero Tunto Area District, South Wolaita zone. In Tembaro woreda there are a total land area of 27,917 Hectare, 20 rural and 4 semi-urban kebeles; one primary Hospital, three health Centers, twenty two health posts and three Private health facilities are found. Data was collected from public health facilities in Tembaro woreda from March 1-30, 2019.

4.2 Study design

Unmatched case control study was conducted in Tembaro woreda public health facilities from March 1 - 30, 2019.

4.3 population

4.3.1 Source population:

All children under two years visited public health facilities of Tembaro woreda during the study period.

4.3.2 Study population:

Cases: All children who were aged under two years visiting Tembaro woreda public health facilities during March1- 30, 2019 and who were fulfilled inclusion criteria were diagnosed with pneumonia were cases.

Controls: All children who were aged under two years visiting Tembaro woreda public health facilities during March 1- 30, 2019 and who were fulfilled inclusion criteria and diagnosed with no pneumonia were controls.

4.3.3 Exclusion criteria

- Children whose parents/caretakers were unable to hear, speak & communicate or critical ill at the time of the study.

- Children who were diagnosed with cardiac problem, kidney disease, on acute malnutrition treatment and measles treatment.

4. 4 Sample size determination

The sample size was calculated using the Epinfo statistical software version 7.2.2 program by taking assumptions of a 95 percent confidence level, 80 percent power and 4.4% controls children from unmarried women giving OR of 4.76(26).Children from unmarried women were selected because it was the exposure variable that gave the highest sample size of cases and controls among the other variables from previous studies. Therefore, after providing 10% for non-response for both cases and controls the required total sample size is 225. The study uses case to control ratio of 1:2 (75 cases and 150 controls).

Table 1: sample size calculation

Using the EPI-INFO version 7.2.2 .The computed possible sample sizes are

Predictor variables	Percent of exposure in case	Percent of exposure in control	cases	controls	Total no-of sample	Ratio of Cases to Controls	**Total Sample size +10%non-response rate**
Children from Non Educated mothers	88%	56.7%	29	57	86	1:2	95
Children start breast feeding initiation on	56.3%	32%	54	108	162	1:2	178
Children fromNot EBF until six months	45.3%	18.5%	39	78	117	1:2	129
Children from unmarried mothers	**18%**	**4.4%**	**68**	**136**	**204**	**1:2**	**225**

Then the largest sample size were selected for this study as follows

Total Cases = **75**

Total Controls = **150**

Final Sample size = **225**

4.5.1 Sampling procedure

The study was included all public health facilities which are 3 health centers and one primary hospital in the woreda administration purposely. As a marker for proportional sample size allocation for health facilities, client flow of two consecutive previous months prior to the data collection period was observed from register. Finally, children (cases) were recruited by the concurrent controls selection technique.

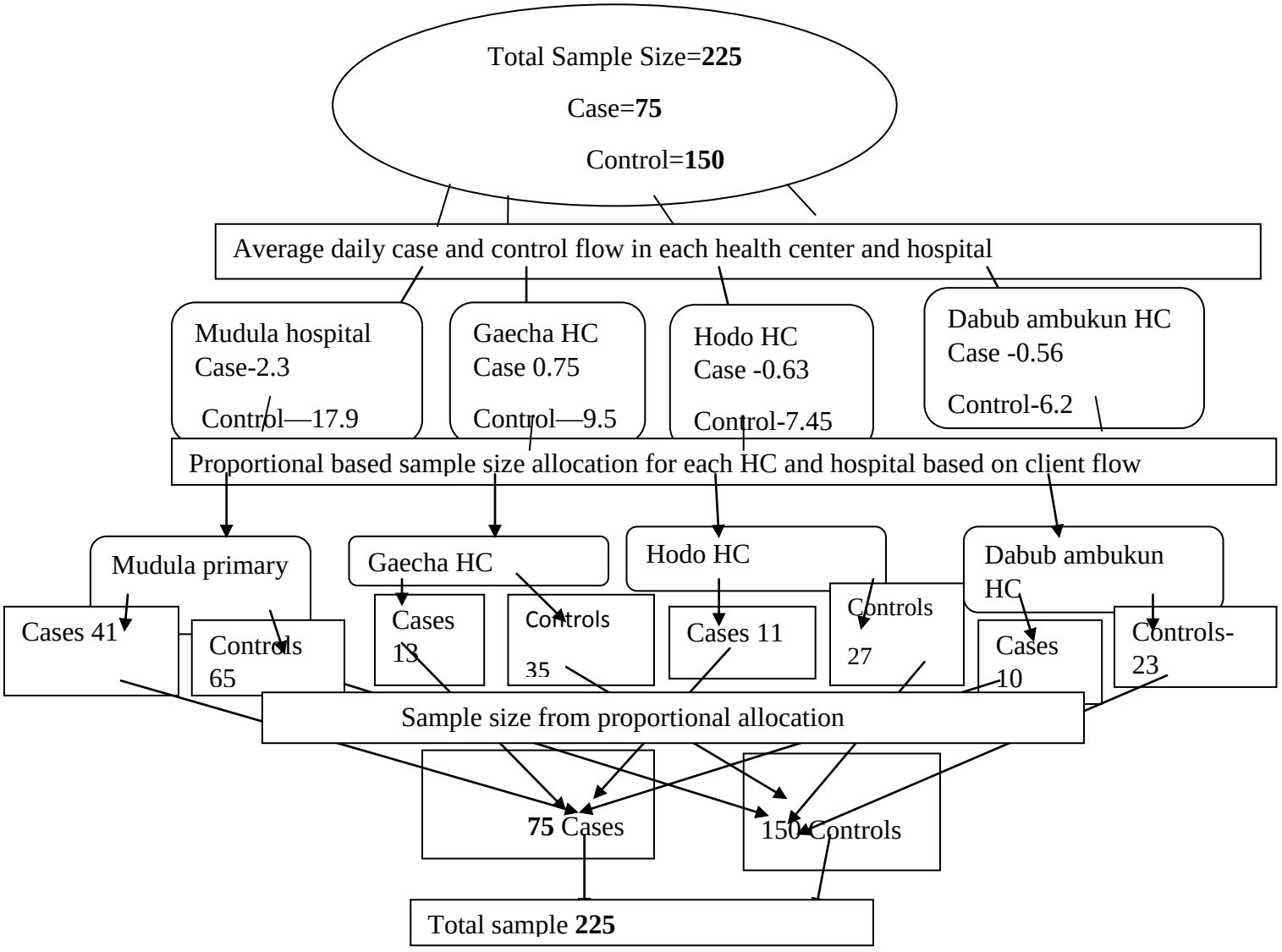

Figure 2: Schematic presentation of sampling procedure for determinants of pneumonia morbidity among under two years children visiting government health facilities in Tembaro woreda, Southern Ethiopia, 2019.

4.6 Variables

Dependent variable: pneumonia in under two years children

Independent variables:-

- Socio- demographic characteristics (father's education, maternal education, marital status, maternal age, sex of child, family size, age of child, parental smoking)
- Environmental characteristics (crowding, using charcoal for cooking, wood/dung for cooking, child on back during cooking, type of kitchen ,presence of window in main house)
- Nutritional factors (weaning time, breast feeding, acute malnutrition)
- Immunization factors (immunization for measles, penta valent, and pneumococcal conjugated vaccine10)
- Past co- morbidities (history of measles, history of asthma, history of AURTI)

4.7 Operational definition

Pneumonia: child having cough with fast breathing and/or chest in drawing or strider in calm child or sub costal or intercostals retraction was diagnosed having pneumonia based on WHO IMNCI guideline.

Under two year children: Children aged birth to 23 months old.

Under five year children: Children aged birth to 59 months old.

Community-acquired pneumonia (CAP): refers to the acute infection of the lung parenchyma in non-hospitalized patients; it is characterized by the development of fever and/or respiratory Symptoms, as well as the presence of pulmonary infiltrates and consolidation on chest x-ray.

Household history of acute upper respiratory infection (AURTI): A child whose family has a history of ear infection, common cold, tonsillitis, or pharyngitis in the last fifteen days prior to data collection.

ALRTI: A household with history of pneumonia or bronchitis in the last fifteen days prior data collection.

IMNCI syndrome classification: Strategy that uses signs and symptoms to classify common childhood illness.

Illiterate: mother/father not attends formal education.

Literate: mother/father attends formal education and complete grade four.

Non-hospitalized: The children not admitted or stay less than 24 hours.

Health facility: health center/hospital.

4.8 Data Collection procedure

4.8.1 Data collection instruments

The questionnaire was adapted from related published literatures. The contents of the questionnaire included Socio-demographic factors about the parents/care givers, environmental factors related to children, immunization status of children, breast feeding and nutritional status of children and co-morbidity related to children.

Data collection tool was translated from English to Amharic and to local language, "Tambaregna" by fluent speaker of the local language then, back translated to English to check for consistency by different person.

4.8.2. Pretesting

Pretest was conducted in neighboring woreda, Jacho health center which is 7 km from the study area. By taking 5% of the sample size and those pretested were not included in the actual study population for three days before the actual data collection takes place.

4.8.3. Data collection techniques

Data were collected from March1 – 30, 2019.Parents/care givers who have children age under two years children who were attended public health facilities in Tembaro woreda during study period and who fulfilled inclusion criteria were interviewed. Data were collected by interview using interviewer administered structured questionnaire and from the under five register. Data collectors

were diploma nurses and supervisors were health officers who work in public health facilities in the woreda. There were 8 data collectors, 2 supervisors and the overall activities were supervised by principal investigator. Supervisors were checked the completeness of the collected data daily.

4.9. Data quality control

To assure the quality of data, the following measures was undertaken including pre-testing of the questionnaire, the final version of the questionnaire was translated into the local language of the respondents (Tambaregna) by fluent speaker of the local language, and two days of intensive training was given to the data collectors and supervisors by the principal investigator on the objective of the study, the methods of data collection, how to recruit cases and controls, and data collectors were familiarized with data collection tools with respect to the study with practical exercises. The collected data were checked for its completeness at the end of interview in each day by supervisors and principal investigator. Missing values and outlier was checked before analysis by running descriptive analysis.

4.10. Data processing and Analysis

Data completeness were checked manually, then entered into Epi-data software and exported to SPPS Version 23 for analysis. The analyses were presented in descriptive statistics in frequency, percentage and tables. Crude and adjusted Odds ratios were computed to determine the strength of association. Bivariate analyses were performed to assess the association of each independent factor with pneumonia morbidity. Candidate variables with p-value less than 0.25 in bivariate analysis were simultaneously included to multivariable binary logistic regression with backward likelihood ratio method. Finally; the variables with statically significant association at p-value of < 0.05 with dependent variable were declared as potential determinants of pneumonia. Muliticolinearity was checked by using VIF (variance inflation factor). The assumption fitness was test by Hosmer Lemeshow goodness fit test.

4.11 Ethical Consideration

Before the study begins, ethical clearance was obtained from the ethical committee of Jimma University. Official permission was secured from zonal health department of Kembata Tembaro zone as well as permission to conduct study was taken from Tembaro woreda health office and facilities administration. The respondents were informed about the objective and purpose of the study and verbal consent was obtained from each respondent. Confidentiality of the information assured by omitting names of study subjects from the questionnaire and maximum effort made to maintain privacy of the respondent during the interview.

4.12 Dissemination plan

The results of this study will be disseminated to Jimma university department of epidemiology, Tembaro woreda health office and Kembata Tembaro zonal health department and local institutions and other concerned bodies through reports and publication on peer reviewed scientific journal.

5. RESULTS

Total, 225 child populations (75 cases and 150 controls) were recruited in to the study making 100% response rate for both study groups. Of these recruited 68(90.6%) cases and 137(91.3%) controls were permanent rural residents. The remaining were semi-urban residents. Female children were account for 37(49.3%) of cases and 87(58%) of controls from all participants. The mean age of the children was 12.7(with SE±0.35) and 10.3(with SD±0.83) months for cases and controls respectively.

Regarding to maternal education 54(72%) cases and 68(45.3%) controls were illiterate .Majority mothers 54(72%) cases and 102(68%) controls were house wife.

In bivariate logistic regression analysis, variables such as maternal education status (p-value=0.001), maternal occupation (p-value=0.041), roofing material of living house (p-value=0.001), floor of living house (p-value=0.037), family size (p-value=0.001) and number of under five children in the house (p-value=0.001) were identified to be associated with pneumonia in under two children at $p < 0.25$ significance level.

Table 2 Descriptive and bivariate result for Socio-demographic characteristics of respondents and their association with pneumonia in under two years children in Tembaro district, South Ethiopia, March 2019.

Variables	Cases		Controls		Total		P-Value	COR(95% C.I)
	n	%	n	%	n	%		
Age of mother								
Less than 18 years	10	13.3	23	15.3	33	14.7	0.748	0.87(0.37-2.04)
18-24 years	32	42.7	61	40.7	93	41.3	0.875	1.05(0.58-1.91)
Above 25 years	33	44	66	44	99	44		1

Marital status								
Not married	7	9.3	9	6	16	7	0.363	1.6(0.5-4.5)
Married	68	90.7	141	94	209	93		1
Sex of child								
Male	37	49.3	63	42	100	44.4	0.297	1.35(0.77-2.35)
Female	38	50.7	87	58	125	55.6		1
Age of child								
Birth-<12months	30	40	61	40.7	91	40.4	0.923	0.97(0.55-1.71)
12-23months	45	60	89	59.3	134	59.6		1
Maternal Education Status								
Not attend	54	72	68	45.3	122	54.2	0.001*	3.1(1.70-5.6)
Yes (attend)	21	28	82	54.7	103	45.8		1
Maternal level of education								
Primary	6	26	25	31	31	30	0.872	0.88(0.19-4.17)
secondary	11	48	35	43	46	44	0.847	1.15(0.27-4.9)
Technical/vocational	3	13	11	13	14	13	1.000	1.0(0.16-6.10)
Higher	3	13	11	13	14	13		1
Maternal occupation								
House wife	54	72	102	68	156	69.3	0.041*	3.7(1.1-12.9)
Merchant	3	4	21	14	24	10.7	0.025*	4.7(1.2-17.9)
Civil servant	18	24	27	18	45	20		1

Paternal educational status								
Not attend	32	42.7	64	42.7	96	42.7	1.00	1.0(0.6-1.8)
Yes(attend)	43	57.3	86	57.3	129	57.3		1
Paternal occupation								
Farmer	36	48	71	47	107	47.6	0.76	0.87(0.5-2.3)
Student	3	4	9	6	12	5	0.68	0.9(0.17-3.1)
Merchant	14	19	32	21	46	20.4	0.55	0.8(0.56-2.9)
Civil servant	22	29	38	26	60	27		1
Roofing material of house								
Grass	53	70.7	47	31.3	100	44.4	0.001*	5.3(2.8-9.7)
Iron sheet	22	29.3	103	68.7	125	55.6		1
Building material of floor								
Earth	68	90.7	119	79.3	187	83	0.037*	2.5(1.1-6.1)
Cement	7	9.3	31	20.7	38	17		1
Number of people in the house								
>5 people	47	62.6	32	21.3	79	35.1	0.001*	5.2(2.3-11.6)
4-5 people	17	22.7	79	52.7	96	42.7	0.533	0.8(0.3-1.7)
≤3 people	11	14.7	39	26	50	22.2		1
Number of under five children in the house								
>2 children	25	33.3	12	8	37	16.4	0.001*	5.8(2.8-12.3)
≤2children	50	66.7	138	92	188	83.6		1

*Variables which show significant association at bi-variate logistic regression at p-value < 0.25 are indicated using star.

Environmental related factors associated with pneumonia in under two years children

The bi-variable logistic regression analysis showed that, fuel used for cooking (p-value=0.051), place mainly used for cooking (p-value=0.038), type of kitchen (p-value=0.003), availability of window in main house (p-value=0.001), location of child during cooking(p-value=0.001) and parental smoking(p-value=0.013) had identified significant association with pneumonia among children at p-value <0.25 significance level.

Table 3 Descriptive and bivariate result for Environmental related factors and their association for pneumonia in under two years children in Tembaro district, South Ethiopia, March 2019.

Variables	Cases		Controls		Total		P-value	COR(95% C.I)
	n	%	n	%	n	%		
Fuel using for cooking								
charcoal	10	13.3	22	14.7	32	14.3	0.508	1.4(0.54-3.4)
Wood	47	62.7	74	49.3	121	53.7	0.051*	1.9(0.99-3.6)
electricity	18	24	54	36	72	32		1
Place mainly use for cooking								
Main house	48	64	74	49.3	122	54.2	0.038*	1.83(1.03-3.22)
Kitchen	27	36	76	50.7	103	45.8		1
Type of kitchen								
Not separated from main house	41	54.7	51	34	92	40.8	0.003*	2.3(1.33-4.12)
separated	34	45.3	99	66	133	59.2		1
Availability of window in main house								
No	48	64	50	33.3	98	43.6	0.001*	3.6(1.99-6.36)
Yes	27	36	100	66.7	127	56.4		1
Location of child during cooking								

back of cooking mother or besides	41	54.7	45	30	86	38.2	0.001*	2.8(1.58-4.9)
Outside cooking place	34	45.3	105	70	139	61.8		1
Parental smoking								
Yes	11	14.7	7	4.7	18	8	0.013*	3.5(1.3-9.4)
No	64	85.3	143	95.3	207	92		1

*Variables which show significant association at bi-variate logistic regression at p-value < 0.25 are indicated using star.

Nutritional factors associated with pneumonia in under two years children

Breast feeding status in the first six months (p-value=0.106), weight for age (p-value=0.001), weight for height (p-value=0.001), height for age (p-value=0.248) and zinc supplementation (p-value =0.002) were associated with pneumonia at p-value <0.25 significance level.

Forty nine (65.3%) cases eighty one (54%) controls were non-exclusive breast fed during first six month of their life. Regarding Anthropometric measurement a large proportion of cases (74.7%) were under weight compared to controls (28%), but 14% cases and 9.3 % controls were wasted. Large proportion of controls (69.3%) and 48% of cases had history of zinc supplementation.

Table 4 Nutritional related factors and their association with pneumonia in under two years children in Tembaro district, South Ethiopia, March 2019.

Variables	Distribution of subjects						p-value	COR(95% C.I)
	Cases		Controls		Total			
	n	%	n	%	n	%		
Birth to 6 Months Breast feeding								
Non-Exclusive	49	65.3	81	54	130	58	0.106*	1.6(0.9-2.9)

Exclusive	26	34.7	69	46	95	42		1
Height for Age								
Stunted(≤-2 Z Score)	19	25.3	28	18.7	47	20.9	0.248*	1.5(0.76-2.9)
Normal (>-2 Z Score)	56	74.7	122	81.3	178	79.1		1
Weight for Age								
Underweight(≤-2 Z Score)	56	74.7	42	28	98	43.6	0.001*	7.6(4.0-14.2)
Normal(>-2 Z Score)	19	25.3	108	72	127	56.4		1
Weight for Height								
Wasted(≤-2 Z Score)	24	32	14	9.3	38	16.9	0.001*	4.6(2.19-9.51)
Normal(>-2 Z Score)	51	68	136	90.7	187	83.1		1
Zinc supplementation								
No	39	52	46	30.7	85	38	0.002	2.5(1.38-4.33)
Yes	36	48	104	69.3	140	62		1
A Child Received Penta-valent Vaccine								
No	15	20	13	8.7	28	12.4	0.018*	2.6(1.18-5.87)
Yes	60	80	137	91.3	197	87.6		1
A Child Received PCV Vaccine								
No	15	20	13	8.7	28	12.4	0.018*	2.6(1.18-5.87)
Yes	60	80	137	91.3	197	87.6		1
A Child Received Measles Vaccine								
No	24	32	25	16.7	49	21.8	0.01*	2.4(1.23-4.49)
Yes	51	68	125	83.3	176	78.2		1
AURTI Among Family in Last 2 weeks								
Yes	55	73.3	36	24	91	40.4	0.001*	8.7(4.6-16.4)
No	20	26.7	114	76	134	59.6		
History of measles disease								
Yes	6	8	5	3.3	11	4.9	0.138*	2.5(0.74-8.55)

No	69	92	145	96.7	214	95.1		1

*Variables which show significant association at bi-variate logistic regression at p-value < 0.25 are indicated using star.

Factors independently associated with pneumonia in under two years children

The variables which showed significant association at p-value <0.25 at bi-variate analysis were simultaneously included to multiple logistic regression. The finding revealed a child born to uneducated mother is 3.6 times (AOR=3.6, 95% C.I (1.21-10.74), p-value=0.022) more likely to develop pneumonia compared to child born from educated mother. The odds of having pneumonia is 3.7 times more likely a child who living in grass roofed house compared with a child who living in iron sheet roofed house (AOR=3.7, 95% C.I (1.38-9.79), p-value=0.009).On the other hand, a child who with family size more than five members is 4.6 times more likely to have pneumonia (AOR=4.6, 95% C.I (1.2-17.8), p-value=0.026). Those children who came from family more than two under five siblings' were 3.8 times more likely to develop pneumonia (AOR=3.8,95% C.I (1.01-14.85) ,p- value =0.04) compared to children who had less than or equal to two siblings. The odds of having pneumonia is 12.3 times more likely a child with family history of URTI in last fifteen days (AOR=12.3, 95 C.I (4.45-23. 96), p-value=0.001) compared with child from no history URTI in last fifteen days. Likewise, a child who was wasted is 5.2 times more to develop pneumonia (AOR=5.2, 95% C.I (2.02-13.27), p-value=0.001) than normal children.

Table 5 Determinants of pneumonia among children aged under two years in Tembaro woreda, South Ethiopia, March 2019.

Variables	Cases No (%)	Controls No (%)	COR(95% C.I)	AOR(95% C.I)
Maternal formal school attendance status				
Not attend	54(72)	68(45.3)	3.1(1.7-5.6)	3.6(1.21-10.74)**
Attend	21(28)	82(54.7)	1	1
The Roof main living house				
Made of Grass	53(70.3)	47(31.3)	5.3(2.8-9.7)	3.7(1.38-9.79)**
Iron sheet(tiles)	22(29.3)	103(68.7)	1	1
Family size				
More than five	47(62.6)	32(21.3)	5.2(2.3-11.6)	4.6(1.20-17.8)**
Four to Five	17(22.7)	79(52.7)	0.8(0.3-1.7)	2.4(0.65-9.05)
Less than or equal three	11(14.7)	39(26)	1	1
Under five children in the house				
>2 Children	25(33.3)	12(8)	5.8(2.8-12.3)	3.8(1.01-14.85)**
≤2 Children	50(66.7)	138(92)		1
Family History of URTI in the last 2 weeks				

Yes	55(73.3)	36(24)	8.7(4.6-16.4)	12.3(4.45-33.96)**
No	20(26.7)	114(76)		1
Weight for Age status of child				
Under weight(≤-2 Z Score)	56(74.7)	42(28)	7.6(4.0-14.2)	5.2(2.02-13.27)**
Normal(>-2 Z Score)	19(25.3)	108(72)		1

**Variables which show significant association during the multiple logistic regression at p-value <0.05 are indicated using star.

6. DISCUSSION

Maternal illiteracy, contact or having upper respiratory tract infection, being underweight, > 5 family members, having more than one under five sibling and living grass roofed house were determinants for pneumonia morbidity in under two years children. Knowledge on the possible determinant factors is helpful for proper prevention and management strategy of pneumonia. The findings of this study identified maternal education as a risk factor for pneumonia in under two years children. There were similar studies conducted in Afghanistan, Western Kenya, Peruvian Amazon and Southwest Ethiopia reported maternal illiteracy risk factor for developing childhood pneumonia (13, 16, 17, 25). The possible explanation might be education has remarkable input in increasing child health care service seeking behavior.

Family size was also another factor identified to affect occurrence of pneumonia indicating that children who live in families with more than five members had 4.6 times higher risk to develop pneumonia compared children from family size three or less, and this is in line with studies conducted India, Western Kenya ,Nigeria and Southwest Ethiopia(17,26,36,39).This finding was inconsistent with studies done in Northwest Ethiopia which was no association between

pneumonia and family size (28,46) .The possible explanation could be maternal attention on the child minimized, low care to child due to sharing time to family and crowding. On other hand when sharing food with a number of siblings or family might leads to shortage of food which cause malnutrition .malnutrition weakens body defense to pathogen, then susceptible to infection.

In this study having more than two under five children in the household 5.8 times more risk to encounter pneumonia which is in line with studies done in Europeans respiratory society,Brazil,Brasila,South Ethiopia, South west Ethiopia(27,25,26,32,44,45).The possible explanation could be maternal attention on the child minimized ,short birth space and low child care due to sharing time to his/her siblings and crowding. On other hand, when sharing food with a number of siblings might leads to shortage of food which cause malnutrition .malnutrition weakens body defense to pathogen, then susceptible to infection.

This study also identified, odds of children who live in grass roofed house had 3.7 times higher risk to develop pneumonia compared to children who live in iron sheet roofed house. This finding in line with study done in Brazil and North east Ethiopia (28, 32), the possible explanation might be grass roofed houses less likely to have windows compared to iron sheet roofed houses. In grass roofed house people usually live with cattle and cook inside living house which also important factor for URTI then URTI is risk factor for pneumonia in under two years children.

Underweight was also statistically significant as a determinant of pneumonia in this study consistent with study conducted in India and Western Pacific region (7, 39, 40), this findings inconsistent with studies done in South and South west Ethiopia, which reported absence of association between child underweight and occurrence of pneumonia(17,25,26),the difference might be seasonal change due to acute malnutrition .The possible explanation for the known association is the fact that underweight children has less body fat accumulation which weakens body natural defense and child become susceptible to infection causing agents.

The history of URTI in a child/family in the last two weeks preceding the pneumonia infection was identified to put a child at more than 12 times risk of occurrence of pneumonia as compared to a child of counterpart. This result goes in line with the study conducted in India, Europeans respiratory society, Western Pacific region and South west Ethiopia (7, 27, 25), the possible explanation might be when repeated encounter with URTI might be due to unhealthy indoor air,

poor sanitation cause the child predisposing to poor health leads to poor appetite which make to malnutrition.

7. LIMITATIONS

- Diagnosis of pneumonia was based on clinical WHO IMNCI classification guideline, which might introduce selection bias.
- Due to facility based case-control study that can limit generalization.
- Temporal relationship between the determinants and outcome is also difficult to know for acute malnutrition and AURTI in this paper.

8. CONCLUSION

Maternal illiteracy, contact or having upper respiratory tract infection, being underweight, > 5 family members, having more than one under five sibling and living grass roofed house were determinants for pneumonia in under two years children.

9. RECOMMENDATION

At Community level

➢ Health extension workers should promote nutrition education to improve women nutritional knowledge on child feeding, birth spacing and to improve their house during different contact points like community health day, pregnant forum and one to five network and women development army meeting.

At Health Facilities level

➢ Health professionals should advice early treatment for respiratory tract infections, birth spacing during service delivery.

Educational office, Zone Education Department and Regional Education bureau

➢ Should provide public awareness for girl education as illiteracy is a factor for pneumonia morbidity.

Health office

- Should enhance community awareness to benefit women for better nutritional knowledge. Child nutrition messages can also be advocated through electronic and print media.

Agricultural and Micro finance office

- Collaboration with stakeholders should transform rural housing.

Researchers

- Future studies should consider gathering more data from a more diverse sample to address the generalazability issue.

REFERENCES

1. UNICEF. One is too many: Ending child deaths from pneumonia and diarrhea,UNICEF,New York 2016.

2. Pneumonia - HealthyChildren,2018.

3. G DR. iMedPub Journals Basic Concepts on Community-Acquired Bacterial Pneumonia in Pediatrics. 2016;(Table 2):1–6.

4. WHO. Global under-five mortality trend, 1980-2011 and gap for achieving theMDG 4 target. Child Health: World Health Organisation, 2012. 2017;

5. Walker CLF, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA, et al. Childhood Pneumonia and Diarrhoea 1 Global burden of childhood pneumonia and diarrhoea. 2013;381:1405–16.

6. Marshall c.Dominic, Goodson J Ross XY. Trends in mortality from pneumonia in the Europe union_ a temporal analysis of the European detailed mortality database between 2001 and 2014.

7. Zar, Roux Le;M David;Myer L;Nicol Landon;P Mark;J Heather. Incidence and severity of childhood pneumonia in the first year of life in a South African birth cohort: The Drakenstein Child Health Study. Lancet Glob Heal [Internet]. le Roux et al. Open Access article distributed under the terms of CC BY-NC-ND; 2015;3(2):e95–103. Available from: http://dx.doi.org/10.1016/S2214-109X(14)70360-2

8. Gothanks Jayashree,Doke Prakash DG. Reported incidence and risk factors of childhood pneumonia in India_ a community-based cross-sectional study,2018.

9. Tong BN. Priority Medicines for Europe and the World " A Public Health Approach to Innovation " Update on 2004 Background Paper Background Paper for Pneumonia. 2013.

10. Aa A, Rm I, Man A. Childhood pneumonia at the University of Ilorin Teaching. 2013;40(3):284–9.

11. WHO _ World Pneumonia Day 2018.

12. UNICEF. Ending child deaths from pneumonia and dirrhoea-. 2016. 76 p.

13. Higgns Ariel YK and SS. Ending Preventable Child Deaths from Pneumonia and Diarrhoea in Afghanistan_ An Analysis of Intervention Coverage Scenarios Using the Lives Saved Tool,2017.

14. Amaha Admasie, Abera Kume AW. Children under Five from Houses of Unclean Fuel Sources and Poorly Ventilated Houses Have Higher Odds of Suffering from Acute Respiratory Infection in Wolaita-Sodo, Southern Ethiopia_ A Case-Control Study 2018.

15. Druetz Thomas, Siekmans Kendra, Goossens Sylivie RV and HS. .The community case management of pneumonia in Africa_ a review of the evidence,2015.

16. MJ Pajuelo, Huaynate Anticona C MC. Delays in seeking and receiving health care services for pneumonia in children under five in the Peruvian Amazon_ a mixed-methods study on caregive,2018.

17. Onyango Dickens, KikuviGideon AE and OJ. Risk factors of severe pneumonia among children aged 2-59 months in western Kenya_ a case control study,2012.

18 Teshome Abuka .Prevalence of pneumonia and factors associated among children 2-59 months old in Wondo Genet district, Sidama zone, SNNPR, Ethiopia.

19. Afonso ET, Minamisava R, Bierrenbach AL, Escalante JJ, Alencar AP, Domingues CM et al. Effect of 10-valent pneumococcal vaccine on pneumonia among children, Brazil. Emerg Infect Dis. 2013;19:589–97. 2017;21(1):19–25.

20. UNICE Ethiopia-pneumonia.2016.

21. Safe the chidren-call to action on childhood pneumonia.2017.

22. J.Antony G.Scott. Pneumonia research to reduce childhood mortality in the developing world.2008.

23. WHO. World health organization(WHO) Pneumonia 2016.

24. Hasan Sohail. prevalence and risk factors associated with under five morbidity and mortality. 2017.

25. Fa U, Ct E. Risk Factors for Acute Respiratory Tract Infections in Under five Children in Enugu Southeast Nigeria. 2014;4(1):95–9.

26. Daniel Geleta, FT and HE. Determinants of Community Acquired Pneumonia among Children in Kersa District, Southwest Ethiopia_ Facility Based Case Control Study 2016.

27. Yinager Workineh,Desta Hailu and Tekilemariam Gultie . Determinants of pneumonia among under two children in southern Ethiopia_ A case control study 2016.

28. Gedefaw Abeje. Prevalence of Pneumonia among under- five Children in Este Town and the Surrounding Rural Kebeles, Northwest Ethiopia; A Community Based Cross Sectional Study. 2014.

29. Claudia T. High Rates of Pneumonia in Children under Two Years of Age in a South East Asian Refugee Population ,2013.

30. Shibre G. Assessment of the prevalence and associated factors of pneumonia in children 2to 59 months old, Debreberhan district,North east Ethiopia. 2015;

31. Xiaohong Z, Hua Q, Yili Z, Hongping S, Zhuohui Z, Yuexia SUN, et al. Home risk factors for childhood pneumonia in Nanjing , China. 2013;58(34):4230–6.

32. Jorge E, Júlia M, Mello G, Fátima M De, Militão P, Isabella M, et al. Risk factors for community-acquired pneumonia in children under five years of age in the post-pneumococcal conjugate vaccine era in Brazil : a case control study. BMC Pediatr. BMC Pediatrics; 2016;1–9.

33. Lassi Z S, Moin A BZ. Zinc supplementation for the prevention of pneumonia in children aged two to 59 months. 2016.

34. Nirmolia N, Mahanta TG, Boruah M, Rasaily R, Kotoky RP, Bora R. Prevalence and risk factors of pneumonia in under fi ve children living in slums of Dibrugarh town. Clin Epidemiol

Glob Health. Indian; 2018;6(1):1–4.

35. Nigeria journal of health science. Childhood community-acquired pneumonia at the wesley guild hospital, Ilesa_ Prevalence, pattern, and outcome determinants 2015.

36. Ayub Shisia Manya. risk factors for pneumonia in children under five years of age, hospitalized in a rural district hospital of western Kenya, 2005.

37. Abishek Singh: Does Measles Vaccination Reduce the Risk of Acute Respiratory Infection (ARI) and Diarrhea in Children: A Multi-Country Study, 2017.

38.Laura M Lamberti et al:Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two: a systematic literature review and Meta analysis, 2013.

39.Preeti Srivastava et al:predisposing factors of community acquired pneumonia in under five children India 2015.

40.T.K.P.Niguyen and C.L.Roberts:risk factors for child pneumonia focus on Western Pacific region,2017.

41.Dessalegn B.Household feul use and acute respiratory infection among younger children .An exposure Assessmentin shebadino woreda,South Ethiopia 2012.

42.Gebretsadik A,Worku A and Birhane F: Factors associated with acute respiratory infection in children under the age of 5 years: evidence from the Ethiopia Demographic and Health Survey 2011.

43. George PrayGod et al: Indoor Air Pollution and Delayed Measles Vaccination Increase the Risk of Severe Pneumonia in Children: Results from a Case-Control Study in Mwanza, Tanzania 2016.

44 Fonseca W, Kirkwood B, Barros A. et al. Attendance at day care centers increases risk of childhood pneumonia among the urban poor. Fortaleza, Brazil, Cad. SaúdePub, Rio de Janeiro 2009; 12: 133-140.

45 Fernando C, Nascimento R, Marcitelli R. et al. Hierarchical approach to determining risk factors for pneumonia in children. Soupolo, Brazil, J Bras Pneumol 2008; 30: 445-451.

46 Abel Fekadu, Yigzaw K, Zelalem B. Determinants of Pneumonia in Children Aged Two Months to Five Years in Urban Areas of Oromia Zone, Amhara Region, Ethiopia, 2014.

ANNEXES

Information sheet and consent form for mothers or caregivers (English Version) Jimma University, of Public Health, Department of Epidemiology, program in General Mph

Section I. Information sheet 01

Name of study area (Health facility) _____ 02.

Questionnaire identification no. _____

INTRODUC TION

Good morning / afternoon? My name is _____. In this study which is undertaken by Jimma University, Faculty of public Health, Department of Epidemiology, program in General MPH, you and me would have a short discussion of about 20-30 minutes only and I am asking you to help me. Before we got to our discussion, I request you to listen carefully to what I am going to read to you about the purpose and general condition of the study and you will tell me whether you agree or disagree to participate in this study at the end. The purpose of this study is to assess determinant factors for pneumonia among under two children in Tembaro woreda, SNNPR, Ethiopia, 2019. The study will be conducted through interviews. The result of the study will inform design to intervene based on the findings. I would like to assure you that privacy will be maintained strictly throught. A code number will identify every participant and no name will be used. Your responses to any of the questions will not be given to anyone else and no reports of the study will ever identify you. If a report of results published, only information about the total group will appear. The interview is voluntary and your participation /non- participation or refusal to respond or stop responding to the questions will have no effect now or in the future on services that you or any member of your family may receive from the service providers. Are you willing to participate in this study?

1. Yes 2. No

Thank you!!!

NB: 1. if the study subjects agree to participation in the study, go to consent form

2. No need of enforcing the clients to be included in the study.

Section II. Consent form for mother/caregiver (English Version)

I undersigned have been informed about the purpose of this particular research project. I have been informed that I am going to respond to this question by answering what I know concerning the issue. I have been informed that the information I give will be used only for the purpose of this study and my identity as well as the information I gave will be treated confidentially. I have also been informed that I can refuse to participate in the study or not to respond to questions if I am not interested. Furthermore I have been informed that I can stop responding to the questions at any time in the process. Based on the above information I agree to participate in this research voluntarily.

Signature: _____ Date: _____

NB: 1. if the study subject is voluntary to participate in the study, start the interview.

2. Interviewer signature certifying that informed consent has been given verbally by the respondent. Name _____ Signature _____ Date _____ Tele. _____ 3. If there are things that require clarification please don't hesitate to ask the interviewer or the principal investigator for clarification.

Address of the principal investigator:

Deginet Alembo

Jimma University, Faculty of public Health, Department of Epidemiology, program General MPH.

Mobile: 0955065035/0916975697

Email: deginetalembo424@gmail.com

Jimma

QUESTIONNAIRES

English version Questions related to the determinants of pneumonia in children aged less than two years

Date_____

Part I. Socio-demographic characteristics related to child and parents/caretaker

Questionnaire code: 001

Instruction: Choose the appropriate answers of the study participants for each of the following questions

Part I. Socio demographic factors

NO-	Questions	Coding category	Skip
101	Sex of child:	Male----1 Female----2	
102	Age of the child	birth-11months--1 12 -23 months----2	
103	What is the age of mother	less than 18yrs----1 18-24---- 2 25 and above- 3	
104	Have you ever attended school?	Yes-------1No----------2	If no → 106

105	What is the highest level of schooling you attended?	primary -1 secondary----2 technical/vocational -3Higher level---4	
106	Has your husband ever attended school?	Yes---1No--------2	If no -- > 108
107	What is the highest level of schooling you attended?	primary -1 secondary---2 technical/vocational--3 Higher level-4	
108	What is your current occupation?	Housewife---1 Maid servant-2 Civil servant--3 Merchant--4 Student-5 Other specify--99	
109	What is your husband's occupation?	Farmer-1 Student2 Civilservant-3 Merchant4 Other specify-99	
110	What type of roofing material is your house made of?	Iron sheets--1Grass---2 Tiles--3 other…99	
111	What type of material is the floor of your house made of?	Cement --1earth ---2 Tiles---3other…99	

112	How many rooms are there in your house (including the sitting room)?	One—1 Two—2 Three3 Other--99
113	How many people are there in your household? (People who reside in the house and who share at least one meal a day, or share living accommodation with you)	One—1Two—2 Three—3Other--99
114	How many children under five years live in your house (including this child)?	One1 Two2 Three3 Other 99

Part II: questions on environmental factors

Code: 002

201	What fuel is used most for cooking in your home?	Charcoal1 Wood2 Electricity3 Kerosene4 animal dung5Crop wastes6 Other 99
202	Where is the cooking usually done?	Mainhouse----1

		Kitchen---2 Outdoors-3 Other-----99
203	Is the kitchen separated from the main house?	Yes-1No-2
204	Number of windows in the household?	One-1 Two------2 Three----3 none-4
205	Number of windows in the kitchen?	One—1Two----- 2Three—3non-----4
206	Where is the usual location of the child during cooking?	On cooking mothers back or besides the mother----------1 Outside of the cooking house--------2
207	Does the father of the child smoke cigarettes?	Yes----1 No ---2
208	Does the mother of the child smoke cigarettes?	Yes---1 No--2
209	Is there any other cigarette smoker in the member of the household?	Yes------1No----2

210	If they smoke, do they smoke inside the house?	Yes------1 No--2 Occasionally--3

Part III. Questions related to Breast feeding, immunization, Nutritional and past co-morbidity

code:003

301	What is breast feeding status of the child during the first 6 months of life?	EBF-----1Partial Breast feeding-2 Not Breast feeding--3
302	For how long have you breasted fed your child?	Less than 6 months-1 6 to 12 months----2 More than a year----3
303	Have your child been immunized?	Yes ---1No ---2
304	Did he/she take pcv antigen?	Yes ---1No ---2
305	Did he/she take penta antigens?	Yes ---1No ---2
306	Did he/she take measles antigen?	Yes ---1No ---2
307	Did he/she ever take zinc supplement?	Yes--1No---2

308 Has your child ever had Measles?Yes-- 2
1No-

309 Has your child ever had asthma? Yes ---1No ---2

310 Is there any other member of the household Yes ---1No ---2
who had acute respiratory infection last
fifteen day?

311 Weight of the child (kg)……

312 Height of the child (cm)……..

313 Height for age Z-score.1. Normal 2.
Stunted (< -2 z score)

314 Weight for age Z-score…1.Normal 2.
Under weight.

315 weight –for-height Z score 1.normal
2.wasted

ክፍል 2. ከሁለት ዓመት በታች ህዓናት ለሉ እናቶች /አሰደግዎች የፈቃደኝነ ት ማጠየ ቂያ ቅጽ

ከታች ፊርማዉ ን ያኖረኩት እኔ የ ጥናቱ ዓላማ የተነ ገረኝ ስሆን ለሚጠየ ቀዉ ጥያቄ የ ማዙወን መመለስ እንደምችል እኔ የ ምስጠው ለዚህ ጥናት አገ ለግሎት ብቻ የ ሚዉል ስሆን ስሜን ና የ ሚሰጠዉን መረጀ በ ምስጥር እንደሚጠበቅ ተነ ግሮልኛል ፡፡ ፍለጎ ት ከሌለኝ በ ጥናቱ ያለመሳተፍ ፡ ጥያቄ ያላመመለስና በ ጥያቄዉ መሳከል አቋርጬመዉጣት እንደምችል ተነ ግሮኛል ፡፡ በዚህ መሰረት በ ጥናቱ ለመሳተፍ ፈቃደኛ መሆኔ ን በፊርማ አረገ ግጣለሁ፡ ፡

ፊርማ----------

ቀን ----------

ማሳታወሻ፡

1. የ ጥናቱ ተሳታፊ በ ጥናቱ ፈቃደኛ ከሆኑ ማጠይቁን ይጀምሩ ፡ ፡

2. የ ጥናቱ ተሳታፊ ፈቃደኛ መሆናቸወን የ ሚያረጋግጥ የ ሚጀ ሰብሰቢዉስምና ፊርማ

ስም----------

ፊርማ----------

ማንኛዉም ገለፃ የ ሚያስፈልጋቸዉ ነገሮች ካለ መረጀ ሰብሰቢወንም ሆነ ዋና ተመራማሪወን በአከልም ሆነ በአድረሻዉይጠይቁ ፡ ፡

የ ዋና ተመራማሪ ዉአድራሻ ፤

ደግነ ት አለምጦ

ጅማዩኒቨርስቲ የህብረተሰብ ጤና ሳይንስ ኮሌጅ ኢፒዲምዮሎጂ ድህረ ምረቃ ት/ት ክፍል

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ከሁለት ዓመት በታች ህጓናት ለሉ እናቶች /አሰደግዎች የፈቃደኝነ ት ማጠየ ቂያ ቅጽ

ከታች ፊርማዉ ን ያኖረኩት እኔ የ ጥና ቱ ዓላማየ ተነ ገ ረኝ ስሆን ለ ሚጠየ ቀዉ ጥያ ቄ የ ማቅወጓ መሞላ ስ እን ደምችል እኔ የ ምሰ ጠው ለዚህ ጥና ት አ ገ ለግሎ ት ብቻ የ ሚዉል ስሆን ስ ሜጌና የ ሚሰ ጠዉን መረጀ በ ምሰ ጥር እን ደሚጠበቅ ተነ ግሮልኛል ፡ ፡ ፍለጎ ት ከሌለኝ በ ጥና ቱ ያለ ማሰ ተፍ ፡ ጥያ ቄ ያላ መሞላ ስና በ ጥያ ቄዉ መሳ ከል አቋር ጨመዉጣት እን ደምችል ተነ ግሮኛል ፡ ፡ በዚህ መሰ ረት በ ጥና ቱ ለ ማሰ ተፍ ፈ ቃደኛ መሆኔ ን በ ፊር ማዉ አ ረ ገ ግጣለሁ፡ ፡

ፊርማ----------

ቀን ----------

ማሳ ታወሻ፡ -

1. የ ጥና ቱ ተሳ ታፊ በ ጥና ቱ ፈ ቃደኛ ከሆኑ ማጠይቁን ይጀምሩ ፡ -

2. የ ጥና ቱ ተሳ ታፊ ፈ ቃደኛ መሆና ቸዉን የ ሚየ ረ ጋግጥ የ ሚጀ ሰብሰቢዉ ስ ምና ፊር ማ

ስም----------

ፊር ማ----------

ማን ኛዉም ገ ለፃ የ ሚየ ስፈ ልጋቸዉ ነ ገ ሮች ካለ መረጀ ሰብሰቢዉን ም ሆነ ዋና ተመራ ማሪ ዉን በ አ ከ ልም ሆነ በ አ ድረ ሻዉ ይጠይቁ ፡ ፡

የ ዋና ተመራ ማሪ ዉ አ ድራ ሻ ፤

ደግነ ት አ ለ ምጥ

ጅማዩኒቨርስቲ የህብረተሰብ ጤና ሳይንስ ኮሌጅ ኢፒዲምዮሎጂ ድህረ ምረቃ ት/ት ክፍል

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ጥያቄ	አማረጭመልስ	እላፍ
101	የልጁ/የልጅቷ ጾታ:	ወንድ--1 ሴት--2
102	የልጁ/የልጅቷ እድሜ	ከወልደት-11ወር -1 12 ወር -23 ወር -2
104	ተምረዋል ?	አዎ----1 አይ----2 አይ ከሆነ ->106
105	የትምህርት ደረጃ?	አንደኛደረጃ--1 ሁለተኛደረጃ--2 ቴክኒክናሙያ --3 ከፍተኛ ተቋም--4
106	ባላቤቶዎ ተምሯል?	አዎ---1 አይ--2 አይ ከሆነ ->108
107	የትምህርት ደረጃ?	አንደኛደረጃ..1 ሁለተኛደረጃ-2

		ቴክኒክና መያ -3
		ከፍተኛ ተቋም-.4
108	በአሁን ወቅት ስራዎ ምንድነ ወ?	የ ቤትእ ማቤት---1
		የ ቤትሰራተኛ--2
		የ መንግስትሰራተኛ--3
		ነ ጋዴ--4ተማሪ ---5
		ለላ ካለ ይጥቀሱ--99
109	የ በላ ቤቶዎ ስራ?	አርሶ አደር --1
		ተማሪ --2
		የ መንግስትሰራተኛ3
		ነ ጋዴ--4
		ለላ ካ ይጥቀሱ--99
110	የ ቤታቸሁ ጣሪያ ከማንድነ ዉየ ተሣራዉ?	ቆርቆሮ--1ሣር --2
		ሳክላ --3ሌላ --99
111	የ ቤታቸሁ ወላል ከማንድነ ዉየ ተሣራዉ?	አፈር --1ስሚ ቶ--2
		ሌላ -99
112	በ ቤቱ ወይን ምበኩሢና ወስጥ ስንት ሜኮት አለ ወ?	አንድ-1ሁለት-2
		ሶስት-3ሌላ --99

113	በቤታቸሁ ወስጥ ስንት ሰዉይኖራለ?	አንድ-1 ሁለት-2 ሶስት-3 ሌላ --99
114	ከአምስት ዓመት በታች ስንት ህናት አሉ?	አንድ-1ሁለት- 2ሶስት-3ሌላ --99

ክፍል፡ ሁለት፤ አከባቢያዊ ሁኔታን በተመለከተ:-

201	ብዙንጊዜለምግብማብሰያነት/ማዘጋጃነት የሚጠቀማቸት ነዳጅ ምንድነ ው?	ከሰሌ---1እንጨት-2 ኮረንቲ---3 ነ ጭጋዝ--4የ ከብት እበት--5ማ ዶ---6 ሌላ ካለ ይጥቀሱ----99
202	በብዛት ምግብ የ ምታበስለት/የ ምታዘጋጁት የ ት ነ ው?	ዋና ወቤት--1ኩሽ-2 ከቤትወጪ3 ሌላ ካሠይጠቀሱ--4
203	ኩሽነ ውከዋና ውቤቱ የ ተላየ ነ ው? 1 አዎ 2 አይደለ ም	
	204 በቤቱ ወስጥ ስንት ማኮት አላ ዉ? አንደ---1	ሁሌት--2 ሶስት-3 hulet—2 sosit --

		3ምንም-4
205	በኩሽነ ውወስጥ ስንት መስኮት አላወ? አንድ--1	ሁሌት--2 ሶስት-3 ምንም-4
206	ምግብ በሚዘጋጅበት ጊዜ ልጁ/ልጅቱ የትነ ወ የሚሆነ ወ/የ ሚቆየ ወ?	ምግብ የ ምታስለ ወ እናት ጀርባ ላይ , አገ ብ ----1 ምግ ብ ከሚበሰሌበት ቤት ወጭ ----
207	በላ ቤቴዋ ስጋራ ያጠሰሉ?	አዎ---1 አይ--2
208	የ ህፃ ኑ/ኗ እናት ያጠሰሉ?	አዎ---1 የ ለም--2
209	ቤታችሁ ወስጥ ሲጋራ የ ሚያ ጨስ የ ቤተሰብ አባሌ አለ?	አዎ--1 የ ለም--2
210	የ ሚያ ጠሱት ከሆኔ ቤት ወሰጥ ነ ው ?	አዎ--1 የ ለም--2

ክፍል ሶስት : የ እናት ጠትን ከማጥባት፣ ክትባት ከመወሰድ ና ያ ላፉ/የ ቆዩ በ ሽታዎችን በ ተመለ ከተ

301	በመጀመሪ ያ ዎቹ 6 ወራት የ ልጁ/የ ልጅቷ የ እ ና ት ጠት ያ መጋ ገ ብ ሁኔ ታ	ለ 6 ወር የ እ ና ት ጠ ት ብቻ---1 ጠትና ሌላ ምግ ብ 2

		ምን ምአልጠበም 3
302	በአጠቃላይ ልጁ/ሌጅቱ ለምን ያህል ጊዜ ጠት ጠባ/ጠበች?	ከ 6 ወር በታች----1 ከ 6 -12 ወር---2 ከ አንድ አመት በታች--3
303	ልጁ/ልጅቱ ከትባት ወስዶል/ወሰደለች?	አዎ--1 አያወቅም--2
304	ልጁ/ልጅቱ ከትባት የሳንባ ማጅ ከትባት ወስዶል/ ወሰደለች?	አዎ-1 አያወቅም--2
305	ልጁ/ልጅቱፔንታክትባትወስዶል/ወሰደለች?	አዎ--1 አያወቅም--2
306	ልጁ/ልጅቱየ ኩፍኝክትባትወስዶል/ወሰደለች?	አዎ--1 አያወቅም-2
307	ልጁ/ልጅቱ ተቅማጥ ተይዞል/ዘለች?	አዎ----1 አያወቅም-2
308	ልጁ/ልጅቱ ኩፍኝ ተይዞል/ዘለች?	አዎ-1 አያወቅም-2
309	ልጁ/ልጅቱ አስሚተይዞል/ዘለች?	አዎ--1 አያወቅም-2
310	ሌላ ቤቴሳብአባል ያልቆየ የሳል ችግር አገጥሞል?	አዎ--1 አያወቅም--2
311	የህኑ ክብቱ ስንት ነው?-------	ከመዘገብ ይወሰዱ
312	ቁማት ስንት ነው?---------	ከመዘገብ ይወሰዱ

313 ቁማኽ ላ ዕድሜስንት ዝ ሰኩየ ር?------- ከመዘገ ብ ይወሰዱ/ይቀይሩ

314 ክብደት ለ ዕድሜስንት ዝ ሰኩየ ር?------ ከመዘገ ብ ይወሰዱ/ይቀይሩ

ስላ ትብብርዎ እናመሰግናለን

Tamibaregn Tamishata

Wollu sakihu kuturu Tembarsa tamishata

Lamo wogech azin you osuta le,esa anakata hogodda amakaa tamisata

Kanch woron firmitaa lalishomihu ka tinati buddin hujiita sumae asamii malisakata misitirn afamee yetanne gagiee fakadiin became danidemiga firminn lalisam

Firmmuu-----

Bariitii----

Mastawoshaa

1.Tamachata ekuu yeda tamachasi jamar

2.Tamachata fakademaga malahiseno malakatuta : sumu------

Jimii universitaa Firmmuuuu-----

Wona marmarach manitta dakeno wokohu : silikuce 0955065035

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sumuce :Deginet Alembo

wonaa shohutt:Tamamach huddanika hecha tane ehanoo

tamachace maratu ehannuhaa

101.Adabeehado/meseletado 1.Adabaha 2.meseletaa

102 .Edimeti meotii? 1.elachach-11 aganu elakatechetii 2.12—23 aganaa

103 .chili ama edimose meoo wogahani? Tona hezetich azita—1,18-24 wogaha—2,25 wogechi abaha---3

104.Tamartetido? 1.ahaa 2. Tamaruba ,tamaritubuda----------106

105 .Timirti darajuce meotii? 1 .wonaha 2.lakimesa 3.tekinikinaa muyaaa 4.universiitaa

106. Minenukii Tamaredo? 1.ahaa 2.tamaruba-----tamarubuda 108 marrii

107.Timirti darajuce meotii? 1. Wonaha 2.lakimesaa 3.tekinikinaa muyaa 4. Universiittaa

108.Tesuu hujikii mahanii? 1.minee hujatachuta 2.nagadichuta 3.megisitii hujatachutaa

109.Menenikii hujitii mahanii?1.gabarecho 2.tamarita 3.nagadicho 4. Mengisitii hujatacho

110. Minikine hiluti michii hujatanitehanii? 1.korkoruta 2.ubanaa

111.Minikine gatuu mich hujatamehanii? 1.buchaa 2.cimituta 99.woloraa

112 Minetakinee meu maskotu yohu? 1.matuu 2.lammu 3.sasu 99. Woluu

113.Minetakinee meu manu heanoni?1.<3 2.4-5 3.>5

114 Oto wogech azinn meu osutii yohu? 1.≤2 2.>2

Laki shoho tamachatti :Hegegitane ehanuu

201 Batinasha jechuu wassa shole mahaa tatakatenatanii? 1.kashalaa 2.buseno hakaa 3.mabirataa 4.gazaa 5.kifaa 99.woluraa

202. Bata,a jechu wasa hakannee sholitenanitaan? 1.galite minen 2. Koshinnaa 3.minich hadaa.

203 koshinu galite minich layamehado? 1.ahaa 2. Layamuboo

204 koshina masikotu yohado? 1 aha 2.yobaee

205 wasaa sholeno jechu chiluce hakanee egeranonii? 1.wasaa sholita amaa gujonni/shinnaa 2. Wasaa sholenoo minich hadanii

206 Minetace meu masikotu yohu? 1.matu 2.lamu .sasuu 99.wolu

207 Menenuk cigaraa busanodo? 1.aha 2.busuboha

208 Atii cigara busantedo? 1.aha 2.busuboha

209 Minetakinee wolu cigaraa busanohu yondo? 1.aha 2.yoba

210 Cgara busano manuu yodaa,hakane busanoni? 1.mine 2.hadaa 3.me- metee mine

Sakii tamachatii:anuna kanicinii,kitibataa kakinih chilano mocine apami yoha tiyakitaa

301 wona leou agane ununa kaninu maha awudano ? leou agane tali ununa qanee 2.ununaha wasaha 3.ununa mikani kanuba

302 horankasinii ununa meo jeche kanee? 1.leou aganichi azinii 2.6-12 aganee 3.wogech abaa

303 chilatii/chilu kitibataa akedoo? 1.aha 2.akubaa

304 chilu/chilatii gidih/sambamichii kitibata aqedoo? 1 aha 2.aqubaa

305 chilu/chilat pentaaa kitibata aqedoo? 1 aha 2.aqubaa

306 chilu/chilatii osoma kitibata aqedoo? 1 aha 2.aqubaa

307 chila/chilataa godabu otaedo? 1.aha 2.otaubaa

308 chilaa/chilataa osomatii afedoo? 1.aha 2.afuba

309 chilaa/chilataa asimuu afedoo? 1.aha 2.afuba

310 wolu mini manu agerubu kuchani afamehu yonidu? 1.aha 2.yobaa

311 chilii /chilaa kibidatu 1.likacho 2.kotaa 3.aba

312 chilii /chilaa urishatii 1.likacho 2.kotaa 3.aba

313 urishat umure meohu Z-squaraani?1.gabotaa/<-2 Z score 2.kitacho

314 kilucii umure meohu Z-squaraani? 1.gabotaa/<-2 Z score 2.kitacho

3015 kilucii urishata meohu Z-squaraani? 1.gabotaa/<-2 Z score 2.kitacho

Hudareka abishii galataam