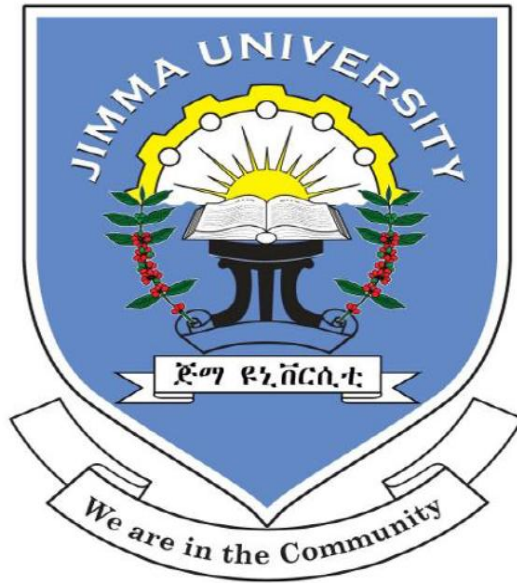


VALIDATION OF ALCOHOL USE DISORDER IDENTIFICATION TEST (AUDIT) SCREENING TOOL AMONG MEDICAL OUTPATIENTS AT DESSIE REFERRAL HOSPITAL, NORTH EAST ETHIOPIA, 2018



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JIMMA, ETHIOPIA

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Abstract

Background: *Alcohol use disorder is a major health problem among medical outpatients and remains undetected by clinicians. To identify alcohol use disorder in a busy clinical setting a brief, rapid, and flexible screening tools are important. Alcohol Use Disorders Identification Test (AUDIT) is most commonly used screening tool which is validated in outpatient setting. The psychometric properties of AUDIT have not been validated for Ethiopian population.*

Objective: *To assess the reliability and validity of AUDIT screening tool among medical outpatients at Dessie Referral Hospital, internal medicine outpatient clinic, 2018.*

Methods: *A cross-sectional study was conducted among 325 patients attending internal medicine outpatient department. Psychometric properties of AUDIT were analyzed against the Mini International Neuropsychiatry Interview (MINI), as the gold standard, to detect AUD based on DSM V. The reliability was determined by examining internal consistency. The receiver operating characteristic curve was established to calculate sensitivity and specificity of the screening tool. Construct Validity was determined using both exploratory and confirmatory factor analysis.*

Result: *The translated version of AUDIT showed language clarity. Internal consistency was excellent (cronbach's alpha=0.9). AUDIT provide an excellent ROC with cutoff point ≥ 8 for females (sensitivity: 0.92, specificity: 0.87, PPV: 70.2, NPV: 96.9, LR+: 7.16 and LR- of 0.) and ≥ 10 for males (sensitivity of 0.91, specificity of 0.84, PPV: 72.6%, NPV: 95.3%, LR+: 5.57 and LR- of 0.10). Principal component analysis provided a 2- factor structure with 67.3% total variance. Confirmatory factor analysis provided good model fit indices for two and three factor model, with superiority of two factor model.*

Conclusions and recommendations: *The AUDIT has been shown to be a valid instrument for screening AUDs in Amharic speaking medical outpatients.*

Key words: *Alcohol Use Disorder, AUDIT, MINI for DSM V, Validation, Medical Outpatient, Ethiopia.*

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Abbreviations and Acronyms

AUC: Area under Curve

AUD: Alcohol Use Disorder

AUDIT: Alcohol Use Disorder Identification Test

CFA: Confirmatory Factor Analysis

CI: Confidence Interval

CSA: Central Statistics Authority

DALYs: Disability Adjusted Life Years

DHS: Demographic Health Survey

DSM: Diagnostic and Statistical Manual

EFA: Exploratory Factor Analysis

LR: Likelihood Ratio

MINI: Mini International Neuropsychiatric Interview

NCDs: Non-Communicable Diseases

NVP: Negative Predictive Value

PCA: Principal Component Analysis

PPV: Positive Predictive Value

ROC: Receiver Operating Characteristics

WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background

Alcohol has been consumed since prehistories of humans and it has taken part likely before the invention of bread (1). Currently, the World Health Organization (WHO) has estimated that more than two billion people worldwide consume alcoholic beverages on a daily basis. Globally, individuals above 15 years of age drink on average 6.2 liters of pure alcohol per year. Within Africa, an estimated 6 liter of pure alcohol is being consumed per year among individuals above 15 years of age(2). The report also shows average consumption of alcohol in Ethiopia aged 15 years and older is 4.2 liter per capita per year of which 3.5-liter of consumption is unrecorded (2).

According to the 2016 Demographic and Health Survey (DHS) report by Central Statistics Authority (CSA) of Ethiopia, a national survey involving a representative sample from the age group 15–49-year-old, show that one third of women (35%) and about half of men (46%) reported drinking alcohol at some point in their lives. Among respondents who ever drank Six percent of women and 9% of men consumed alcoholic drinks almost every day in the last 30 days (3).

Excessive consumption of alcohol is a risk for alcohol use disorder (AUD) which constitute a range of problem alcohol drinking, from hazardous and harmful use of alcohol to severe alcohol dependence (4). The 5th edition of Diagnostic and Statistical Manual of Mental Disorders (DSM–5) which is lastly updated in 2013, integrates the two DSM–IV disorders, alcohol abuse and alcohol dependence, into a single disorder called AUD with mild, moderate, and severe specifiers (5). Hazardous drinking, recognized by the World Health Organization (WHO), is defined as a quantity or pattern of alcohol consumption that places the individual at risk for adverse health events (4,6) . Harmful drinking, defined as alcohol consumption that negatively affects physical and mental health, is also recognized by the WHO (4,6).

It is estimated that 4.1% of people aged 15 years and above are suffer from AUD globally, of which 1.8 % are harmful drinkers and the rest 2.3% people are dependent to alcohol. In Africa 3.3% are affected by AUD, 1.9% for harmful use and 1.4% for alcohol dependence (2).

A wealth of screening instruments has been validated for detecting alcohol-related problems in various clinical settings, including questionnaires that can be self-administered or used by an interviewer. Among them the Alcohol Use Disorder Identification Test (AUDIT) are well known screening tool and widely used across different countries and for different target population.

The AUDIT questionnaire is a screening tool developed and supported by WHO (7). It is used worldwide to pick up early signs of harmful drinking and to identify mild alcohol dependence. In total, the questionnaire includes 10 questions. The first three questions (i.e. questions 1–3) are aimed at determining the level of alcohol consumption, questions 4–6 focus on dependence symptoms, and the last four questions (i.e. questions 7–10) are oriented at the consequences of alcohol abuse and problems that may be caused by excessive alcohol consumption. Based on the answers of the ten AUDIT questionnaire topics, we may determine the total score which may range from 0 to 40 points. Supported by numerous studies, the recommended interpretation of the total score is the following: 0 to 7 points – drinking with a low level of risk, 8 to 19 points – risky or harmful drinking, 20 points and more – highly risky drinking with problems, great probability of alcohol dependence (4).

1.2. Statement of the Problem

The effects of alcohol on the public's health have been and continue to be widely investigated and it is well-recognized that alcohol consumption increases morbidity and mortality. In 2014, WHO estimates the harmful use of alcohol causes approximately 3.3 million deaths every year (6% of all death) and 5% of disability adjusted life years (DALYs) lost worldwide (2). It also decreases the life span of average person by 10 years (5).

The harmful use of alcohol is one of the four most common modifiable and preventable risk factors for major non communicable diseases (NCDs) such as cardiovascular diseases, cirrhosis of the liver, various cancers and immune dysfunction and it also linked with increased infectious diseases such as HIV/AIDS, sexually transmitted infections, TB and pneumonia (8). It may also interfere with the treatment of chronic diseases such as diabetes and HIV/AIDS due to it impede patients' ability to comply with treatment regimens (9,10). Furthermore, alcohol use is contraindicated with many medication (11). Intentional and unintentional injuries, domestic violence, unemployment and decreased work productivity are also common among hazardous drinkers (12).

Patients visiting general hospitals outpatients particularly internal medicine department have been shown to have an increased risk of having AUDs than global estimation to general population(13). The prevalence rate was ranging from 6 % in Belgium hospital (14) to 40.5 % in eastern Nepal Hospital outpatients (15). A study conducted in South Africa (2011) to estimate prevalence of AUD among 1532 Hospital outpatients showed that 34.8 percent were found to be hazardous or harmful drinkers (16).

Although studies indicated high prevalence of AUD among general hospital outpatients, such morbidity remains largely neglected by the medical staff. As a result, prevalence of AUD is often under-reported in Hospital and hence untreated (17). This is clearly shown in Wu et al study that less than a third AUD patients in general hospitals are identified by medical staffs and only 5–10% of patients were referred to the psychiatric service for further evaluation and treatment (18). M-C. Huang et al, 2008, also reported that overall identification rate of AUD by medical staff in Taiwan inpatients were found to be 28.2%(19).

The wide variations in the identification rate of AUDs by medical staff in general hospital settings may be due to number of factors like inadequate training, attitudinal barrier, perceived lack of skill (20). Clinicians demonstrate poor sensitivity when it comes to identifying patients based solely on suspicions of alcohol problems (21). For example, a study of general practitioners in Belgium reported that the clinicians relying on clinical judgment alone identified only 33.5% of patients that met diagnostic criteria for an alcohol use disorder; in contrast, a variety of alcohol use screens were able to identify between 68% and 93% of those same patients (22).

Availability of brief and appropriate screening tools is required to address this constraint by quickly identifying AUD among patients. Screening tools can be used by nonprofessionals in where efficiency is required in time and human resources when it comes to the detection of AUD. This could make a dramatic contribution to the health sector's ability to identify those in need of brief intervention and/or mental health support.

To identify patients with alcohol related problems in clinical settings, researchers have developed several screening tools. Among them AUDIT is providing an opportunity for early intervention in non-specialist settings and can be done in the busy outpatient departments which allows early referral and intervention.

Though AUDIT has been validated and found to be effective in different languages and cultural groups, little effort are done to validate in Africa. It has been validated in South Africa and Zambia to detect AUD among Hospital Outpatients and TB and HIV primary care patients respectively (23,24). As far as the knowledge of the researcher, the psychometric performance of AUDIT has not been validated among Ethiopian Population.

This study tried to investigate reliability and validity of AUDIT screening tool among internal medicine outpatients at Dessie Referral Hospital (DRH) and to determine optimal cut-off score to detect AUD.

1.3. Significance of the Study

The finding of the study will be helpful in the following major areas; it might improve the quality of service that will be given at outpatient level through adding standardized screening tools for detection of AUD among medical patients. It will also help clinicians take initiative to screen AUD with minimal burden of resources and enable them to make early referral of patients for further evaluation and management to psychiatry department. Through this referral linkage, integration will be strengthening between the departments.

The findings will be useful as a validated screening tool help researchers who want to conduct a study on AUD in medical outpatient setting. It will also serve as a stepping stone for other researchers who are interested to conduct the validation study of those screening tools for different target population and languages.

CHAPTER TWO: LITERATURE REVIEW

2.1. Reliability of AUDIT

Since the development of AUDIT numerous studies have been published indicating reliability of AUDIT in different setting and languages. A meta-analysis reliability generalization study of 295 studies published from 1991 to 2008 reported weighted reliability estimates of 0.81 with (SD=0.7)(25). Meneses-Gaya et al, 2009, conducted systematic review with his colleagues on psychometric properties of AUDIT to 47 articles. Among them ten studies that evaluated the internal consistency of the AUDIT were identified. In these studies, the mean value of Cronbach's alpha was 80, indicating high internal consistency (26). The author's also published analysis of studies in 2007 that appeared in 2000 or before, yielded a comparable median reliability coefficient of 0.83, with a range of 0.75 to 0.97(27).

2.2. Criterion Validity of AUDIT

Criterion Validity of AUDIT was determined across cultures for different languages and settings. This sub-section tried to show test performance of AUDIT against different gold standard reference. The AUROC with optimum cutoff score and diagnostic parameters were indicated below for each study.

Nepali Version of AUDIT conducted in 2012 among medical outpatient provided an AUROC of 0.99 (95% CI: 0.97- 0.99) for males and 0.97 (95% CI: 0.96- 0.99) for females using MINI DSM IV screening tool as gold standard. The study yielded an optimum cutoff score 9 to detect AUD for both sexes (males: sensitivity 96.7%, specificity 91.7%, PPV 90.3% and NPV 97.2%) and females (sensitivity 94.3%, specificity 91.4%, PPV 80.1% and NPV 97.8%) (15).

Korean Version of AUDIT was determined to 435 medical outpatients using DSM IV-TR gold standard reference. AUROC curve for alcohol-use disorder was 0.87 ± 0.04 SD. The cutoff score for male was ≥ 10 yielded 100% sensitivity and 89.51% specificity and ≥ 8 for females with 100% sensitivity and 93.71% specificity(28). Russian Version of AUDIT among 254 Tb patients

provided an AUROC of 0.8. The optimum cutoff point was ≥ 8 yielding sensitivity of 83.5% and specificity of 71.6% (29)

Persian version of AUDIT is validated at 2015 for 140 subjects (70 of whom had AUD based on DSM V). Using the receiver operating characteristics (ROC) curve at the cutoff point of 8, a specificity and sensitivity of 89% and 99% was achieved for the test and the accuracy of the area under the curve was achieved to be 99% ($P < 0.001$). The cutoff value of 8 in AUDIT questionnaire was specified as the best cutoff point (30).

Lundin et al (2015) conducted a validation study in Sweden at general population, a total of 1,086 (450 men and 636 women) of the interview participants completed AUDIT. The study provided AUROC of 0.90 for AUD with corresponding optimal cut-points of 7 for male, 5 for females and 6 combined. Diagnostic parameters of males (sensitivity:0.71, specificity: 0.82, PPV:0.60 and NPV:0.88) determined at cutoff ≥ 7 and for females (sensitivity:0.71, specificity: 0.82, PPV:0.60 and NPV:0.88) determined at a cutoff ≥ 5 (31).

Malaysian version of AUDIT was validated in 2014 among alcohol user groups. There was a significant correlation between the AUDIT and AUDIT-M scores (Spearman's $\rho=0.979$, $p=50.01$). The total AUDIT-M had a significant positive correlated with the CAGE ($\rho=0.979$, $p=50.01$) (32).

A community based cross-sectional study conducted in India (2017) for Validation of AUDIT among 600 Indian men participants aged 15-49 years old. Concurrent validation of AUDIT was assessed against Mini International Neuropsychiatric Interview (MINI) assessment scale. The study showed internal reliability using Cronbach's alpha was 0.84 and in terms of criterion validity, the area under the ROC curve was 0.93 for alcohol dependence with 0.77 and 0.91 respectively for sensitivity and specificity. Also area under the ROC curve for alcohol abuse was 0.83 with the respective 0.87, 0.77 sensitivity and specificity. The corresponding optimal cut-points selected for the best sensitivity and specificity were 13 and 6 for alcohol dependence and abuse respectively. However, all of the optimal cut-off points from ROC analyses were lower than the WHO recommended for identification of risk of all AUDs, with a score of 6-12 detecting alcohol abuse and 13 and higher alcohol dependence (33).

A study conducted in Northern Taiwan (2005), cutoff point of AUDIT for 122 hospitalized patient diagnosed as "harmful users" was a score of 8. The sensitivity was 0.96, specificity was 0.85, positive predictive value (PPV) was 0.85, negative predictive value (NPV) was 0.96, and area under the receiver-operating characteristic curve (AUROC) was 0.93. The cutoff point for participants diagnosed as alcohol dependent was an AUDIT score of 11. The sensitivity was 0.94, specificity was 0.63, PPV was 0.31, NPV was 0.98, and AUROC was 0.84. Furthermore, males had significantly higher AUDIT. Males were also significantly more likely than females to be diagnosed as harmful users or alcohol dependents (34).

A validation study of AUDIT to identify unhealthy alcohol use and alcohol dependence was conducted among 625 southern US primary care patients in 2013. The study used to gold standard references i.e. 29 days TLFB to identify risk drinking and DIS for alcohol dependence. AUDIT scores of 15 for men and 13 for women detected AD with 100% specificity but low sensitivity (20 and 18%, respectively). AUDIT dependence subscale scores of 2 or more showed similar specificities (99%) and slightly higher sensitivity (31% for men, 24% for women) (35).

A study conducted among 614 patients at primary healthcare center in Spain (2009) validated AUDIT against with gold standard reference of Schedule for Clinical Assessment in Neuropsychiatry (SCAN) interview. The study indicated that the cut-off value of AUDIT to detect hazardous drinking were score >7 with 91.7% sensitivity and 91.9% specificity. The area below the curve was 0.95 with 95% CI ranges from 0.937 to 0.975. To detect possible dependence, the optimum cut-off value was 6 points. According to ICD-10, sensitivity was 81.6%, specificity 82.3%, and the area under the curve 0.885 (95% CI 0.848 to 0.923; $p>0.001$), whereas according to DSM-IV criteria, sensitivity was 88.3%, specificity 83.1%, and the area under the curve 0.918 (95% CI 0.885 to 0.951) (36).

The study conducted in France among 1207 primary care patients (2005) to assess excessive alcohol drinking. AUDIT showed a good capacity to discriminate dependent patients (with AUDIT 13 for males, sensitivity 70.1%, specificity 95.2%, PPV 85.7%, NPV 94.7% and for females: sensitivity 94.7%, specificity 98.2%, PPV 100%, NPV 99.8%); and hazardous drinkers (with AUDIT >7 , for males: sensitivity 83.5%, specificity 79.9%, PPV 55.0%, NPV 82.7% and with AUDIT >6 for females, sensitivity 81.2%, specificity 93.7%, PPV 64.0%, NPV 72.0%).

The study also compared AUDIT with MAST & CAGE and it gives better results than detecting Alcohol abuse/dependence as showed on the comparative ROC curves (37).

Chishinga et al (2011) conducted validation AUDIT screening tool among TB and HIV patients in Zambia primary health care center. The study used MINI for DSM IV TR as a gold standard reference. The result showed the AUDIT had high internal consistency (Cronbach's alpha = 0.98). Confirmatory factor analysis showed that the two-factor AUDIT model fitted the data well (TFI = 0.99; SRMR = 0.04). It also demonstrated good discriminatory ability in detecting MINI-defined AUD (AUDIT = 0.98 for women and 0.75 for men). The optimum cut-off score of the AUDIT in screening for AUD was 24 for women (sensitivity 60%, PPV 60%), and 20 for men (sensitivity 55%, PPV 50%) (24).

2.3. Construct Validity

The original inventors of AUDIT were intended to measure three conceptual domains of consumption, dependence and alcohol related negative consequence (7). Yet, several empirical evidences exploring the factor structure of AUDIT did not reached definite conclusion on whether AUDIT measure one or more dimensions. Examination of AUDIT's facture structure among different population groups provided a variation result of one, two or three factor dimension.

One dimensional structure of AUDIT was supported by Carey et al which were conducted among 671 Indian psychiatric patients using principal component analysis and confirmatory factor analysis. Lima et al (2005) reported as AUDIT would result one factor solution in a population with high prevalence of alcohol dependence(38).

In contrast, numerous studies have found superiority of two and three factor model over one factor model. A systematic review of construct validity of AUDIT examined seven studies published from 2002-2008 and reported that two factor model is preferable (26). The two factor model merged alcohol dependence and alcohol related consequence into alcohol related problems. Moehring et al. with his colleagues were also evaluated measurement invariance of AUDIT and compared one and two factor model using CFA among 28,345 participants from six studies(39). The study revealed as two factor model were superior than one factor model.

However, Medina-Mora (1998) suggested one factor model to be used to assess general prevalence of AUD as a whole though the study provided two factor structure(40).

Though one factor model were inferior than two factor model, it fitted well to model indices and can be used to measure the total score(39).

Principal component analyses AUDIT in Malaysia, Korea, Czech Republic and Russia published since 2010 had provided only two factor solutions which labeled as alcohol consumption and alcohol related problems (29,32,41,42).

Hallinan et al (2011) comprised 2005 samples found that the two factor model provided the best data fit. Comparison of two and three factor model provided almost an equally model fit indices, but dependence and alcohol related consequences subscales in three factor model were correlated highly and the better parsimony value of two factor model would make two factor model preferable(43). Nonetheless, superiority of three factor model over one and two factor model were reported in the study done in Spain in 2013 among 386 participants (44).

Three recent African studies which assessed factor structure of AUDIT have been published in Zambia, Tanzania and Uganda for different populations (24,45,46). A Tanzanian study revealed that all conceptual models (one, two and three factor models) fitted well with factor loading ranged from 0.41-0.71, suggesting that any of these models are acceptable (45). CFA analyses of Ugandan and United kingdom study were also indicating that all the three factor models were acceptable, with three factor model had shown overall superiority than one and two factor models (46,47). However, Chishinga et al investigated only the two factor model of AUDIT using CFA and reported as the model fitted well in all model fit indices (24).

In contrast, a research published in Sweden among elderly people and an Iranian study among psychiatric outpatient published in 2018 provided poor model fit for all conceptual domains (48,49).

CHAPTER THREE: OBJECTIVE

3.1. General Objective

1. To assess the reliability and validity of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.

3.2. Specific Objectives

1. To investigate semantic validity of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.
2. To investigate content validity of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.
3. To investigate reliability of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.
4. To investigate criterion validity of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.
5. To investigate construct validity of Alcohol Use Disorder Identification Test screening tool among medical outpatients in DRH, 2018.

CHAPTER FOUR: METHODS AND MATERIALS

4.1. Study area & period

Dessie Referral Hospital (DRH) is found in Dessie, South Wollo Zone, Amhara National Regional State, Ethiopia. Dessie is located 401 Kilometers North East from Addis Ababa, the capital city. It is the only referral Hospital in Wollo province which provides service with a total of nearly 500 hospital staffs for catchment area population of 8 million people including the neighboring regions. It has 7 Wards and 4 case teams including outpatient service.

The study was conducted in Dessie Referral Hospital (DRH) internal medicine outpatient clinic from May 20 to June 20/ 2018.

4.2. Study design

Institutional based Cross-sectional study design was conducted.

4.3. Population

4.3.1. Source population

All medical outpatients who visited DRH, internal medicine outpatient clinic

4.3.2. Study population

All medical patients who visited DRH, internal medicine outpatient clinic, from May 20 to June 20/2018.

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

All medical patients visiting internal medicine outpatient

More than 18 years of age.

Able to converse Amharic language.

4.4.2. Exclusion criteria

A patient with acute medical conditions that could prevent them from properly answering the questionnaire.

A patient who has hearing impairment patients was excluded.

4.5. Sample size determination and Sampling procedures

4.5.1. Sample size determination

A formula for calculating sensitivity and specificity for single tests was used as indicated below (50).

$$\text{Sample size (n) based on sensitivity} = \frac{Z_{1-\alpha/2}^2 (S_N * (1-S_N))}{L^2 * P}$$

$$\text{Sample size (n) based on specificity} = \frac{Z_{1-\alpha/2}^2 (S_P * (1-S_P))}{L^2 * (1-P)}$$

Where n= required sample size,

S_N = anticipated sensitivity

S_P = anticipated specificity

α = size of the critical region ($1-\alpha$ is the confidence level),

$Z_{1-\alpha/2}$ = standard normal deviate corresponding to the specified size of the critical region (α), and

L= absolute precision desired on either side of sensitivity or specificity.

Based on the above formula the following assumptions were used for calculating sample size as follows: anticipated sensitivity is 92.7% and anticipated specificity is 80%,

Alpha= 0.05,

L (desired precision) 0.05,

$Z_{1-\alpha/2}^2 = 3.84$, and

prevalence= 34.8% which was taken from South Africa study (16).

Finally, the required sample size using the assumption for AUDIT screening tool was 299 and 180 respectively to sensitivity and specificity.

The researcher has taken the required sample of 299 to have larger sample size.

Considering 10% non-respondent the total sample size is 329.

4.5.2. Sampling technique

All medical patients coming to DRH internal medicine outpatient department during data collection period were included in the study by using consecutive sampling technique until the required sample size were achieved.

4.6. List of variables

- ✓ Socio demographic factors
- ✓ Semantic validity of AUDIT
- ✓ Content validity of AUDIT
- ✓ Reliability of AUDIT
- ✓ Criterion validity of AUDIT
- ✓ Construct validity of AUDIT

4.7. Data collection procedures and Instrument

4.7.1. Instruments

4.7.1.1. Socio-demographic data

A brief questionnaire was used to record relevant background information including age, gender, marital status, education level, occupational status and place of residency.

4.7.1.2. Gold standard reference

The Mini International Neuropsychiatric Interview (MINI) Version 7.0 was used to identify current alcohol use disorder (51). The MINI 7.0 is a short diagnostic structured interview to explore psychiatric disorders according DSM V diagnostic criteria. It is intended for administration by non-specialized interviewers. At least two items have to be responded “yes” for the diagnosis from total of 11 questionnaires.

4.7.1.3. Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT was developed by the World Health Organization (WHO) as a simple method of screening for AUDs in the past 12 months (7). It consists of 10 questions on recent alcohol

consumption (items 1-3), alcohol dependency syndromes (items 4-6) and alcohol-related problems (items 7-10). Each of the 10 questions is rated on a four-point scale. The total score ranges from 0 to 40. A total score of 8 or more is recommended as an indicator of alcohol related problems. The AUDIT was developed and validated in multinational samples involving Kenya (7) and has been validated in Zambia (24) and South Africa (23).

4.7.2. Data collection procedure

Prior to study, two days of training were given separately for two general nurses working in internal medicine outpatient department and two BSc psychiatry nurses. On first day, general nurses were trained on how to use AUDIT screening tool. On the second day, BSc psychiatry nurses were trained on how to diagnose AUD using gold standard reference. The study used two stage interview processes to control problem of order effect. Immediately after participants were agreed for participation, the general nurses carried the first interview for 50% of the participant for AUDIT. Later the trained psychiatry nurses who were blind to all initial data conduct the second interview using MINI version 7.0 for AUD. The remained halves of the participant were first assessed by MINI by psychiatric nurses and later they proceeded to AUDIT. The first participant was identified by lottery method to begin either on AUDIT or gold standard tool. All assessment materials were administered in an interview using Amharic language. Inter-rater reliability of AUDIT between data collectors were determined using 20 participants.

Semantic Validity: AUDIT was translated to Amharic language which is a dominant language in the study community. Two Bilingual Instructors from Dessie Teacher's College, Department of Linguistic translated the original version into Amharic language. The forward-translated instruments then translated back into English by two other bilingual instructors who were expert in the translation of research questionnaires. Discrepancies in conceptual and semantic equivalence were resolved through discussion with both forward and back translators until final versions of the questionnaires were reached to consensus by research team members.

Content Validity: The translated Amharic Version of AUDIT was administered to 20 participants by principal investigator. Half of participants were asked if they understood the question and if they needed repetition of item. Once the item was responded the interviewer encouraged them to explain their answer and to suggest local word which expressed the concept

in a better way. The researcher used the following three criteria to identify items which needed modification.

1. If the respondent disclosed that the meaning is not clear.
2. If the respondent gave a response but struggled to elaborate and
3. If respondent gave examples that indicated wrong conceptualization of the question

The interviewer then modified the problematic item based on recommended local word before proceeding to the remaining half of the participants to assess how they understood the modified item. Final decision was made for each item based on judgment of principal investigator.

4.7.3. Data quality assurance

Regular supervision, control as well as support data collectors by the principal investigator was made daily and each completed questionnaire were checked and the necessary feedback was offered to interviewers on the next morning. The collected data were properly handled, reviewed and checked for completeness and consistency by the principal investigator each day. Only questionnaires which were properly filled and signed by the data collector were accepted.

4.7.4. Data processing and analysis

The collected data were be cleaned, coded, and entered to Epi data 3.1 using double data entry and exported to Statistical package for the Social Sciences version 24 (SPSS 24) for statistical analysis. Descriptive statics such as frequencies, means and standard deviations were calculated. Cronbach's alpha coefficient was used to measure internal consistency and ascertain the reliability. Internal consistency ranges between zero and one and α value ≥ 0.7 indicates acceptable reliability. High reliabilities (0.95 or higher) are not necessarily desirable, as this indicates that the items may be entirely redundant. Kappa coefficient was used for analysis of inter-rater reliability.

Criterion Validity of was determined using Area under the Receiver Operating curve (AUROC) to estimate the diagnostic accuracy of AUDIT and cutoff scores which give high sensitivity and specificity with the correspondent 95% confidence interval (CI). Positive and Negative predicted

value and likelihood ratios were also calculated for the yielded cutoff score. Positive and Negative likelihood ratio (LR+ & LR-) indicated ≥ 5 and ≤ 0.1 respectively were considered as acceptable. Construct validity of AUDIT was determined by Factor analysis. The study used both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The exploratory factor analysis (EFA) was performed to categorize the common items in clusters. The Kaiser-Meyer-Olkin test (KMO) and Bartlett's sphericity test were calculated to estimate sampling adequacy and statistical significance of the test respectively. An eigenvalue higher than 1 were used to determine number of structure with total cumulative variance $\geq 60\%$. Factor loading ≥ 0.4 of each item were taken to factor component. Confirmatory factor analyses were fitted using Analysis of Moment of Structure (AMOS version 24) software to examine the three existing hypothesized models of previous studies. The fit of the models was expressed in combination of model fit indices Chisquares (χ^2) to degrees of freedom ratio (χ^2/df) < 2 , Root mean square error of approximation (RMSEA) ≤ 0.08 , Comparative Fit Index (CFI) and as Tucker Lewis index (TLI) expected to be ≥ 0.9 as rule of thumb for goodness of fitting model. At least three indices should be fitted to be acceptable.

4.8. Ethical considerations

The ethical approval was taken from the Ethical review board of Jimma University Institute of medicine. Written informed consent was obtained from the study participants. Participant's strict confidentiality was insured and their identity was not showed. The data given by the participants were used only for research purposes. Those who are diagnosed as AUDs during data collection were referred or consulted to the psychiatric outpatient department responsible clinician after they visited medical outpatient service.

4.9. Dissemination plan

The results of the study will be disseminated to all relevant stakeholders through presentation and publication. Copies of the research will be submitted to Jimma University Institute of Medicine, DRH medical director, department office of Internal Medicine and Psychiatry. The research paper will be presented in health professional organizations' annual meetings, professional conferences and trainings. Finally, attempts will be made to publish results in national and international journal to disseminate worldwide.

4.10. Operational Definitions

Reliability: The degree of AUDIT items to consistently measure AUD.

Internal consistency reliability: Measures the consistency of results across items within a test.

Validity: the degree to which AUDIT actually measures AUD based on MINI.

Content Validity: the degree to which the AUDIT of items, tasks, or questions on a test is representative of some defined content.

Criterion validity: The diagnostic ability of AUDIT to detect AUD compared to standard tool of MINI.

Construct validity: Indicates how well AUDIT measures the construct (component) it was designed to measure.

Sensitivity: the ability of AUDIT to detect true positive, thus correctly identified by MINI.

Specificity: the ability of AUDIT to detect true negative, thus correctly identified as non-case in MINI.

Positive likelihood ratio: refers to the likelihood of a patient with the AUD to be tested as positive compared to a patient without the AUD.

Negative Likelihood ratio: refers to the likelihood of patient with AUD to be tested negative as compared to a patient without AUD.

CHAPTER FIVE: RESULTS

5.1. SOCIODEMOGRAPHIC CHARACTERISTICS

A total of 325 patients were fully participated in the study with a response rate of 98.8%. The reason for non-interview was urgency for other work. Males comprised 55.4% (n=180) of the respondents. The mean age of respondents was 32.5± SD 9.1 years. Of all participants, 52.6% were married followed by single 36.9%. Regarding educational status, 28% (n=91) and 22.2% (n=72) respondents had completed primary and secondary school education respectively. Out of total participant 20.3% were merchant followed by governmental employee (17.8%, n=58%). Regarding current living place majority of participants 63.1% were residing in urban.

Table 1: Sociodemographic characteristics of people visiting Internal medicine outpatient clinic at DRH, North East Ethiopia, 2018 (n=325).

Variables	Category	Frequency	
		Number (n=325)	Percent (%)
Sex	Male	180	55.4
	Female	145	44.6
Age Mean (SD, range)		32.5 (SD 9.1, range 18-63)	
Educational status	Uneducated	47	14.5
	Able to read and write	53	16.3
	primary(1-8)	91	28.0
	secondary(9-12)	72	22.2
	tertiary(+12)	62	19.1
Marital status	Single	120	36.9
	Married	171	52.6
	Divorced	25	7.7
	Windowed	9	2.8
Occupation	Employed	58	17.8
	Farmer	55	16.9
	Merchant	66	20.3
	House Wife	44	13.5
	Daily laborer	38	11.7
	Student	44	13.5
	Unemployed	20	6.2
Residency	Urban	205	63.1
	Rural	120	36.9

5.2. Semantic Validity

Back translated English version of AUDIT were compared with the original version of AUDIT. There were no major discrepancies among each of 10 items which resulted meaning difference. The team which consisted of linguistic professionals from Dessie Teachers college and psychiatry professional were finally reached to consensus as the Amharic version of AUDIT is understandable and culturally acceptable for Amharic speaking populations. The Amharic version of AUDIT is indicated in Annex II.

5.3. Content Validity

Twenty participants were requested to judge on the simplicity and understandability of each of AUDIT item. During the course of interview the first 10 participants were asked to report the clarity of each item. Item two: *“How many drinks containing alcohol do you have on a typical day when you are drinking?”* and Item three: *“How often do you have six or more drinks on one occasion?”* were found to be unclear and poorly understood items including the response options. Eight participants (80%) indicated as those items were unclear even after repetition of items. Respondents explained their difficulties as they consumed mixed type of alcoholic beverages which have different cups like “Araque termus”, “Tassa”, “Birlle” and beer bottle in a single day respectively for “Araque”, “Tella”, “Tej” and beer. These varieties affected the response option of those items to determine the amount of drinks. As a result further explanations with examples were added to item two and three to assist understanding of items.

Item two is modified into *“How many drinks containing alcohol do you have on a typical day when you are drinking? (Consider to add all types of cups of beverage like Brille, bottle, Araque termus).*

Item three modified into *“How often do you have six or more drinks on one occasion? (Consider to add all types of cups of beverage like Brille, bottle, Araque termus).*

The remaining 10 of the respondents answered the item without difficulty and responded as item were clear and understandable. The modified English version of AUDIT is indicated in Annex I.

5.4. Reliability of AUDIT

Reliability of internal consistency for AUDIT was excellent (Cronbach's $\alpha = 0.90$) (See Table 02). The result of the inter-item correlation matrix indicated that inter-item correlations ranged from a low of 0.23 between Item 2 (quantity in a typical day) and Item 10 (concern of others about drinking) to a high of 0.757 between Item 6 (Need alcohol first in the morning) and item 7 (Feelings of guilty). All 10 items were significantly correlated ($r \geq 0.30$) with at least two other items in the matrix. The corrected item-total correlation coefficient of each item exceeds 0.5 and it ranged from 0.522 to 0.783, indicating as all items are measuring the same construct. Item 6 (need a first drink in the morning) achieved the highest correlation (0.783) with the scale (See Table 02). Removing of any of the 10 items of the questionnaire did not improve α coefficient value (See Table 05).

Inter-rater reliability of AUDIT provided a kappa coefficient of 0.93, indicating an excellent agreement between two data collectors.

Table 2: Reliability and Item Analyses of AUDIT to detect AUDs among Medical Outpatients visiting DRH, North east Ethiopia, 2018.

	Scale Mean if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ITEM 1	10.23	.532	.897
ITEM 2	11.04	.522	.897
ITEM 3	11.48	.576	.894
ITEM 4	11.99	.730	.884
ITEM 5	12.04	.769	.882
ITEM 6	12.01	.783	.881
ITEM 7	11.97	.761	.882
ITEM 8	12.12	.712	.886
ITEM 9	12.29	.585	.896
ITEM 10	12.35	.579	.896

Cronbach's Alpha: 0.90
Mean Inter-Item Correlation: 0.48
Kappa coefficient: 0.93

5.5. Criterion Validity of AUDIT

Criterion Validity of AUDIT to detect AUDs was determined using ROC analysis. The comparison of total score of AUDIT against gold standard measure of MINI 7.0 for DSM V provided an area under curve of .94 (95% CI .91- .96). Table 03 indicated as the most appropriate cutoff point for simultaneously maximizing sensitivity and specificity was 8. At this cut-off point, the sensitivity and specificity was 94% and 84% respectively together with 70% Positive predictive value (PPV) and 97% Negative predictive value (NPV). Positive likelihood ratio (LR+) and Negative likelihood ratio (LR-) for AUDIT \geq 8 with Youden Index (0.77) were 5.67 and 0.08 respectively. Lowering the cutoff value to 7 indicated that the specificity, PPV and LR+ would relatively decrease to 80%, 65.7% and 4.7 respectively. When cutoff value was raised to 9, the sensitivity became fall to 88% and LR- considerably increased to 0.14. Figure 2 and 3 displayed the ROC curve of AUDIT 0.93 (95%CI: .90-.97) for males and 0.96 (95%CI: .92-.99) for female separately. The appropriate cutoff score for male was 10, yielded sensitivity of 0.91, specificity of 0.84, PPV: 72.6%, NPV: 95.3%, LR+: 5.57 and LR- of 0.10 (Table 3). The optimum cutoff score for female was 8, provided that sensitivity of 0.92, specificity of 0.87, PPV: 70.2, NPV: 96.9, LR+: 7.16 and LR- of 0.1 (Table 3).

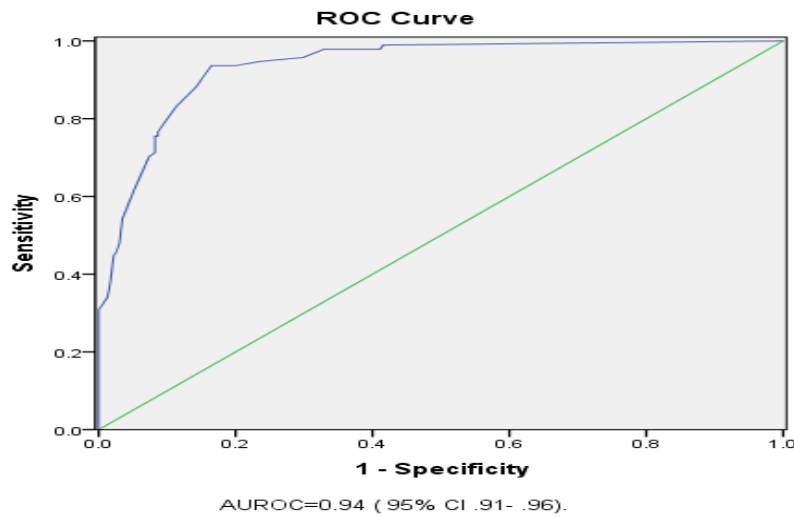


Figure 1. Receiving Operating Characteristics (ROC) curve of AUDIT for identifying alcohol use disorders among Medical Outpatients.

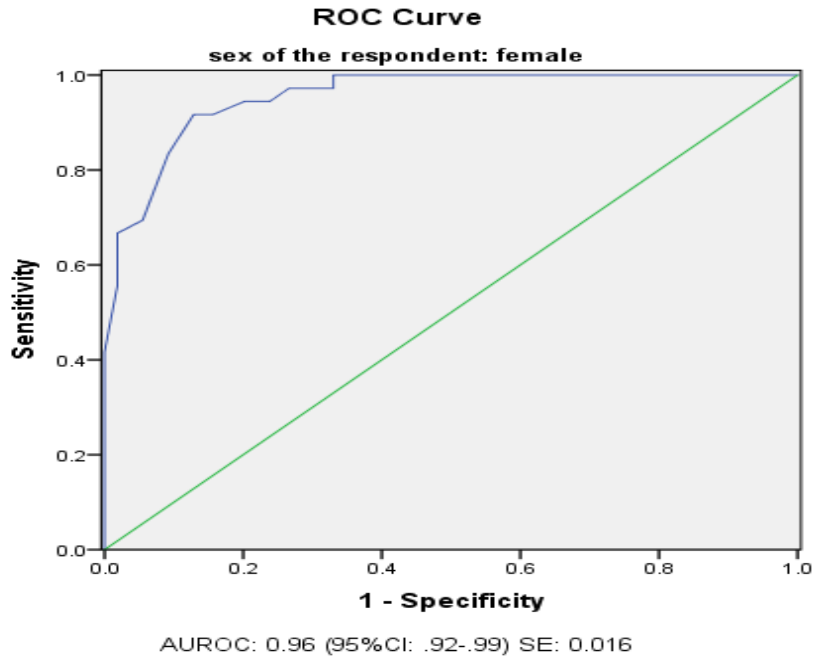


Figure 2: Receiving Operating Characteristics (ROC) curve of AUDIT for identifying alcohol use disorders among Female participants.

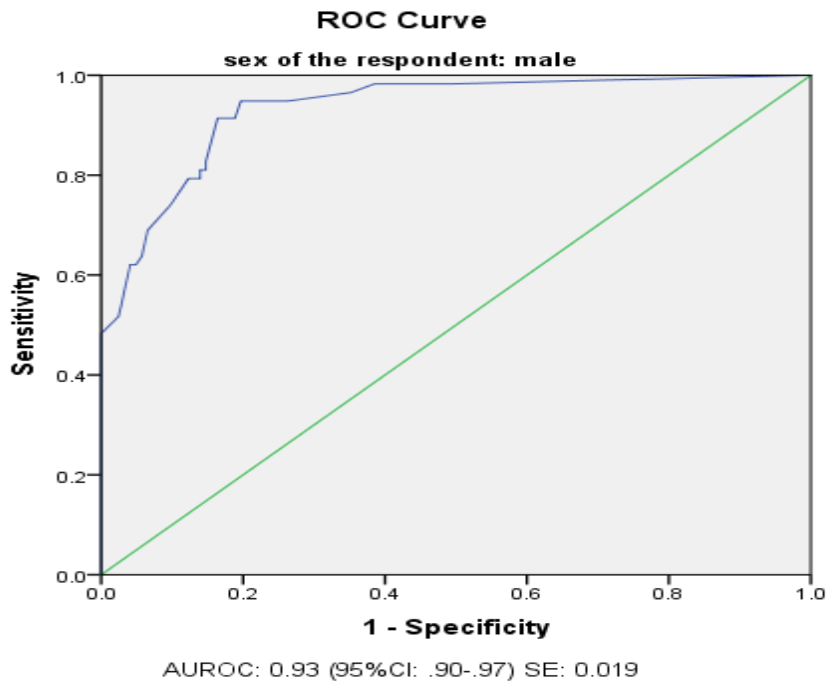


Figure 3: Receiving Operating Characteristics (ROC) curve of AUDIT for identifying alcohol use disorders among Male Participants.

Table 3: Diagnostic properties of AUDIT to detect AUDs among Medical outpatients visiting DRH, North east Ethiopia, 2018.

	AUDIT cutoff score	Sensitivity	Specificity	PPV	NPV	LR+	LR-	Youden Index
Total	5	0.96	0.70	56.6	97.6	3.20	0.06	0.66
	6	0.95	0.77	62.2	97.3	4.05	0.07	0.71
	7	0.94	0.80	65.7	96.9	4.70	0.08	0.74
	8	0.94	0.84	69.8	97.0	5.67	0.08	0.77
	9	0.88	0.86	71.6	94.7	6.17	0.14	0.74
	10	0.83	0.89	75.0	92.8	7.35	0.19	0.72
	11	0.77	0.91	78.3	90.6	8.80	0.26	0.68
	12	0.76	0.91	78.0	90.2	8.68	0.27	0.67
	13	0.76	0.92	78.9	90.2	9.21	0.27	0.67
	14	0.71	0.92	77.9	88.7	8.70	0.31	0.63
Area under Curve for men= 0.93 (95%CI: .90-.97) SE: 0.019								
For Male	5	0.97	0.65	56.6	97.5	2.74	0.05	0.61
	6	0.95	0.74	63.2	96.8	3.62	0.07	0.69
	7	0.95	0.76	65.5	96.9	3.98	0.07	0.71
	8	0.95	0.80	69.6	97.0	4.81	0.06	0.75
	9	0.91	0.81	69.7	95.7	4.84	0.11	0.73
	10	0.91	0.84	72.6	95.3	5.57	0.10	0.75
	11	0.83	0.85	72.7	91.2	5.59	0.20	0.68
	12	0.81	0.85	72.3	90.4	5.47	0.22	0.66
	13	0.81	0.86	73.4	90.5	5.83	0.22	0.67
	14	0.79	0.86	73.0	89.7	5.71	0.24	0.65
Area under Curve for men= 0.93 (95%CI: .90-.97) SE: 0.019								
For Female	5	0.94	0.76	56.7	97.6	3.95	0.07	0.71
	6	0.94	0.80	60.7	97.8	4.67	0.07	0.74
	7	0.92	0.84	66.0	96.8	5.88	0.10	0.76
	8	0.92	0.87	70.2	96.9	7.16	0.10	0.79
	9	0.83	0.91	75.0	94.3	9.05	0.18	0.74
	10	0.69	0.95	80.6	90.4	12.62	0.32	0.64
	11	0.67	0.98	92.3	89.9	37.06	0.34	0.65
	12	0.58	0.98	92.3	89.9	32.39	0.42	0.57
	13	0.56	0.98	92.3	89.9	30.89	0.45	0.54
	14	0.42	1.00	91.3	87.7	--	0.58	0.42
Area under Curve for women= 0.96 (95%CI: .92-.99) SE: 0.016								

Bold indicated an optimum cutoff point corresponding with diagnostic properties. PPV: Positive predictive value, NPV: Negative predictive value, LR: likelihood ratio

5.6. Construct Validity

5.6.1. Exploratory Factor Analysis

Exploratory Factor Analysis was applied using Principal Component Analysis to determine the 10 items of the AUDIT into factors. The suitability of data for factor analysis was assessed prior to performing EFA. Inspections of the correlation matrix revealed the presence of 42 coefficients in 45 were above 0.3. The study found out that the Bartlett's test of sphericity was significant with a chisquare value of 1117.6 at the degree of freedom of 45 and $p < .000$. In addition, the study obtained Kaiser-Meyer-Olkin (KMO) value of 0.888, which suggests those results indicate a strong correlation among the measurement variables which is enough to conduct factor analysis. All the ratio of question item communality is larger than the minimum level of 0.5, which ranged from 0.51 (Item 10) to .759 (Item 2) (See table 07). Therefore all the items meet acceptable level of explanation and retain for interpretation and further analysis.

Table 4: Values of Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Barlett's sphericity of AUDIT (n=325).

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.888
Bartlett's Test of Sphericity	Approx. Chi-Square	1117.64
	Df	45
	Sig.	.000

Table 5: Inter-Item Correlation Matrix of AUDIT (n=325).

	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7	ITEM 8	ITEM 9	ITEM 10
ITEM 1										
ITEM 2	.590									
ITEM 3	.603	.622								
ITEM 4	.399	.379	.398							
ITEM 5	.370	.429	.418	.724						
ITEM 6	.411	.385	.467	.729	.711					
ITEM 7	.400	.349	.391	.637	.687	.757				
ITEM 8	.404	.347	.486	.546	.600	.704	.693			
ITEM 9	.395	.258	.272	.469	.547	.431	.503	.414		
ITEM 10	.381	.230	.307	.466	.468	.471	.491	.461	.637	

Principal components analysis revealed the presence of two components with eigenvalues exceeding 1. The two component solution explained a total of 67.26% of the variance, With Component 1 contributing 54.3% and Component 2 contributing 12.97%. As shown in fig 04 the drawn scree plot also clearly indicated as two components were enough to retain for rotation. To aid in the interpretation of these two components, varimax rotation was performed and all items factor loading were exceeding .4. The rotated solution revealed the presence of simple structure, with both components showing a number of strong loadings and all variables loading substantially on only one component.

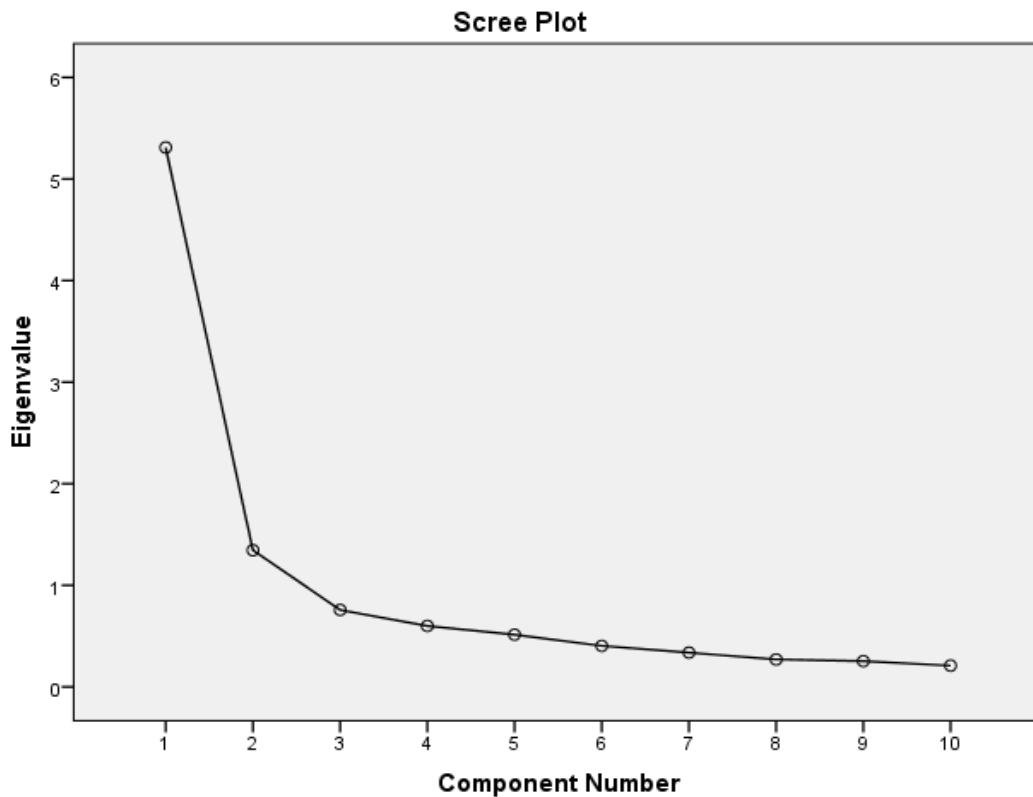


Figure 4: Scree Plot of AUDIT for Principal component analyses.

Table 6: Extraction of AUDIT factors for principal factor analysis (n=325).

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.429	54.291	54.291	4.266	42.657	42.657
2	1.297	12.970	67.261	2.460	24.603	67.261
3	.895	8.947	76.208			
4	.552	5.522	81.730			
5	.396	3.961	85.690			
6	.390	3.903	89.593			
7	.339	3.386	92.978			
8	.266	2.664	95.643			
9	.234	2.343	97.986			
10	.201	2.014	100.000			

Extraction Method: Principal Component Analysis.

The first factor consists of the first three items (frequency, typical quantity, and frequency of heavy drinking) and it explained 54.3% of variance with an eigenvalue of 5.43. Those three items are interpreted as relating to level of alcohol consumption. Table 07 indicated as Item 2, “How many drinks containing alcohol do you have on a typical day when you are drinking?” contributed the highest for the factor (factor loading: 0.85) followed by Item 3, How often do you have six or more drinks on one occasion?” with factor loading 0.83. The second factor consists seven items (Item 4-10) which can be interpreted as a measure of alcohol related problems. Item 7 (feeling of guilty) achieved the highest value of factor loading (0.83) followed by Item 6 (need alcohol first in morning) with factor loading 0.81.

Table 7: Factor loading and Communalities of AUDIT for principal component analysis with varimax rotation.

No. of Items	Description of Item Content	Communalities	Component	
			1	2
Item 1	Frequency of drinking	.689	.279	.782
Item 2	Quantity on typical day	.759	.174	.853
Item 3	Frequency of heavy drinking	.755	.256	.830
Item 4	Impaired control of drinking	.672	.775	.268
Item 5	Failed to do as expected	.721	.803	.276
Item 6	Need alcohol first in the morning	.746	.808	.305
Item 7	Feelings of guilty	.736	.825	.234
Item 8	Blackout	.626	.722	.323
Item 9	Alcohol related injury	.513	.706	.125
Item 10	Other concerned about drinking	.510	.703	.126

Bold indicates factor loading > 0.4

5.6.2. Confirmatory Factor Analysis

Confirmatory Factor Analysis was conducted to evaluate the fitness of two factor model from PCA analysis and the rest one factor and three factor models which were hypothesized from previous studies. For each factor solution, the acceptable model fit was determined using model fit indices. The value of Chi Square test with degree of freedom for all three factor solution indicated significant test statics (P value: .00). However, the result taken into caution to interpret as model is poor fit since chi-square is sensitive for large sample size.

The one factor model did not provide the good model fit to the observed data (CFI of .81 a TLI of .82 and RMSEA of .13). Factor loading were ranged from .60(frequency of drinking) to .85(need a morning drink) (fig 05). The factor two and three models had shown improvement considerably to all fit indices than factor one model as indicated in table 08.

The two factor model, which represent alcohol consumption (item 1-3) and alcohol related problem provided acceptable fit indices in CFI and TLI indices. The value of RMSEA (0.08) was at the edge. As indicated in fig 06, all the items loaded above .5 which ranged from .59 item 10 (concern of others) to .89 item 1(frequency of drinking). The estimated factor correlation

between two subscales were .73 ($p < .001$). Internal consistency of the two sub scales provided .82 and .90 for alcohol consumption and alcohol related problems respectively (table 08).

The three factor model, which exemplifies the AUDIT developer factors, provided almost equivalent fit indices with factor two model. The estimated correlation between alcohol consumption and dependence was .72 and between alcohol consumption and consequence was .71. However, the correlation between alcohol dependence and consequence was very high ($r = .94$, $p < 0.001$) which revealed that there was an extensive overlap between two factors. The standardized factor loading for each item was also parallel with the factor two model as it's shown in fig 07. Internal Consistency for this model was (cronbach's alpha, .82, .87 and .81) respectively for alcohol consumption, dependence and alcohol related problems (table 08).

Hence, selection of the paramount model fit should be determined based on comparison of parsimony value. As a result, table 08 indicated as the factor two model provided more PNFI (.55) and PCFI (.57) than factor three model with PNFI (.54) and PCFI (.52). In addition, the high correlation between alcohol dependence and alcohol consequence ($r = .94$) in the three factor model would provide that the two factor model had an acceptable factor structure.

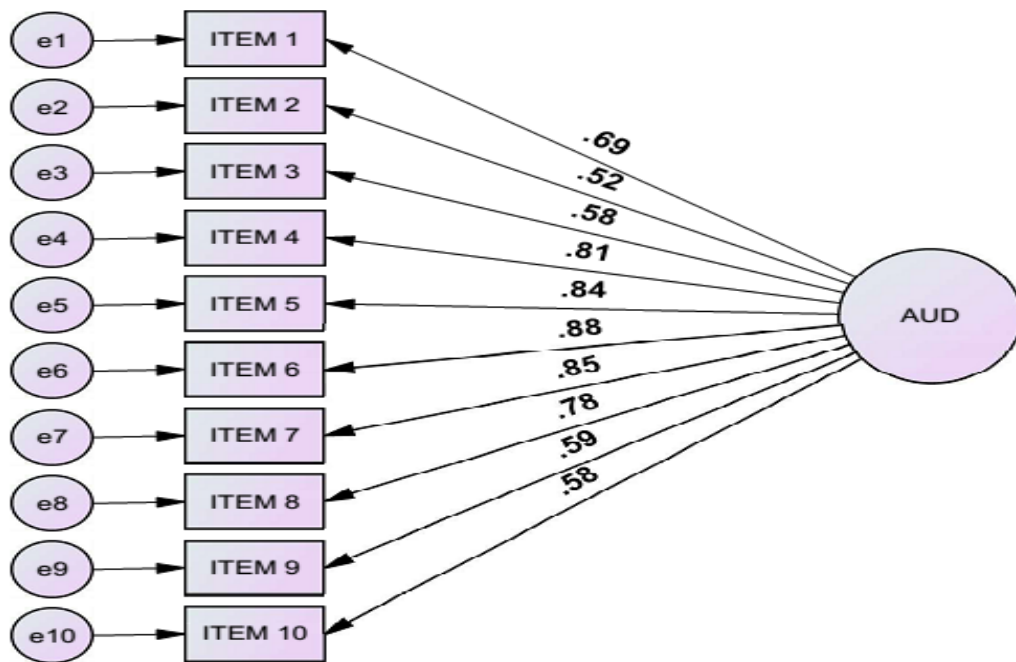


Figure 5: One factor Model of AUDIT with corresponding factor loading of items.

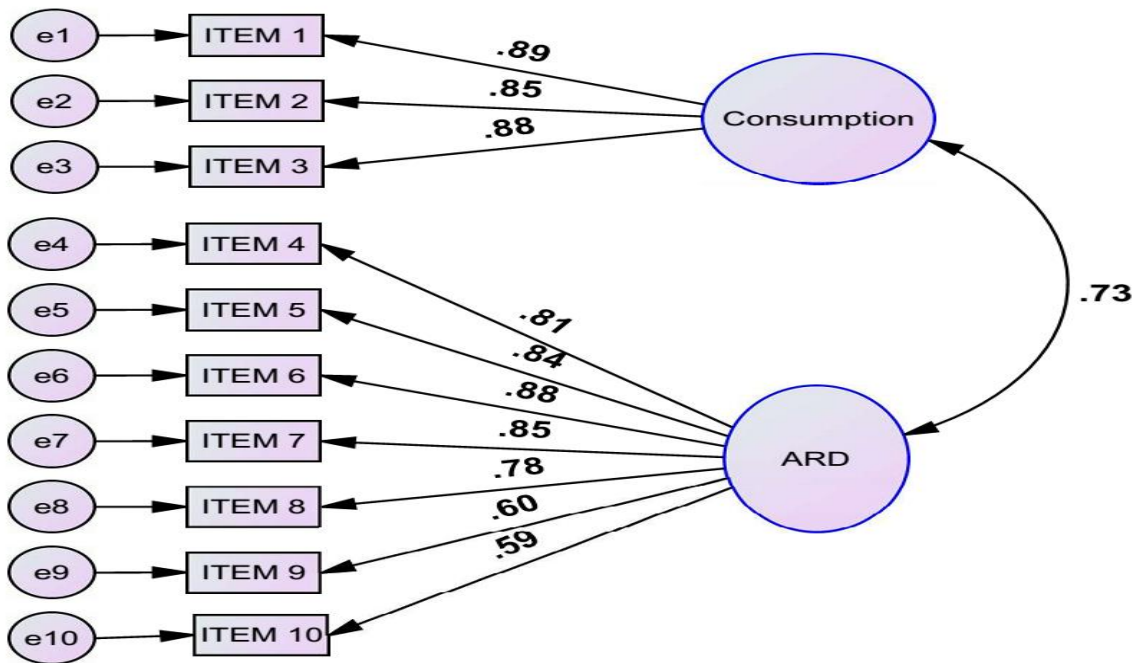


Figure 6: Two factor Model of AUDIT with corresponding factor loading of items.

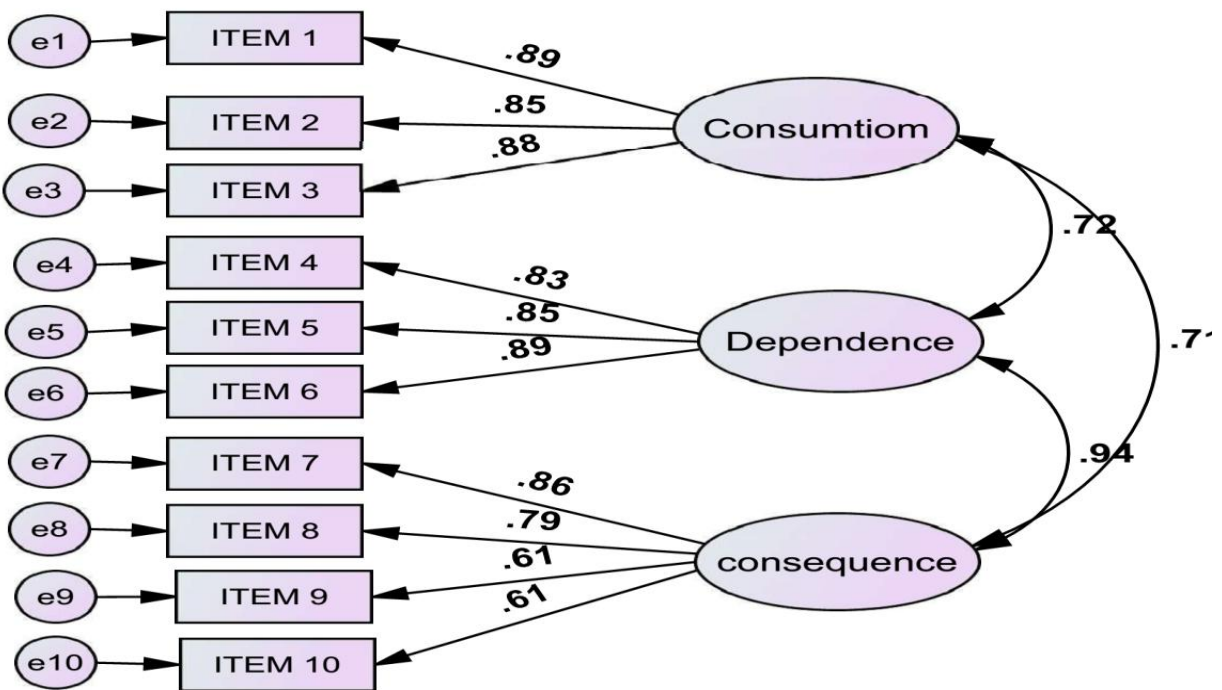


Figure 7: Three factor Model of AUDIT with corresponding factor loading of items.

Table 8: Fit indices for alternating models of AUDIT, Estimated correlation among factors and internal consistency for each sub scale.

Indices of Model Fit	Factor 1	Factor 2	Factor 3
Chi square	249.91	133.75	123.82
Degree of freedom	35	34	32
P value	.00	.00	.00
CFI	.81	.92	.92
TLI	.82	.92	.93
RMSEA	.13	.08	.07
PNFI	.51	.55	.54
PCFI	.52	.57	.52
Estimated Correlations among Factors			
Factor 1	1	-	-
Factor 2	.73	1	-
Factor 3	.71	.94	1
Cronbach's alpha for each subscale			
Factor 1 Model	.90	-	-
Factor 2 Model	.82	.90	
Factor 3 Model	.82	.87	.81

CHAPTER SIX: DISCUSSION

This study was tried to demonstrate the psychometric properties of AUDIT to detect alcohol use disorder for Amharic speaking medical outpatients. This result ascertained that AUDIT has an excellent internal consistency with Cronbach's α of 0.90, which indicated as a whole the scale has suitably represented the proposed construct. The finding was consistent with a systematic review of AUDIT that appeared in 2002 and after, yielded a comparable median reliability coefficient of 0.83, ranged from 0.75 to 0.97(26). However the reliability found in this study is higher than the study done in Persia (Cronbach's α = 0.77) and Malaysia (Cronbach's α = 0.82)(30,32). The difference may be due to small sample size (N=70 and N=52) respectively for Persia and Malaysia. High cronbach's alpha coefficient for each subscale of AUDIT's two and three factors model in this study were consistent to findings of previous research published in Brazil, Australia (38,52).

The ROC of AUDIT has shown an area under curve of 0.94 (95% CI .91-.96) which was similar with a Japanese validation study of Fujii et al among medical outpatients found AUROC of 0.97(14). Chishinga et al was also found comparable AUROC of 0.96 among Zambian HIV and TB patients(24). This implies that the tool has high degree of performance to distinguish AUDs among medical outpatients. However, it was higher than the study done in Russia (AUROC = 0.80) (29). This may be due to the difference of gold standard reference tool (CIDI) used in this study.

The result recorded excellent diagnostic properties at an optimal cutoff point of 8 which is similar with initially recommended cutoff point by the tool inventors (7). Similar cutoff point were also reported in Persian and Russian version of AUDIT (29,30). The cutoff point in this study were slightly less than the study in Nepal which reported an optimal cutoff score of 9 for both sexes(15). This might be due to the difference in gold standard tool which was structural clinical interview diagnosis (SCID vs MINI) and cultural difference in drinking habit.

This study provided different cutoff score among gender with 10 for males and 8 for females. Reinert and Allen in their systematic review supported the need of different cutoff score for males and females and suggested as cutoff value is lower in females than in males(27). The

suggested cutoff value for both sexes in this study is in agreement with the study done in Korea among medical outpatients(28).

The result recorded satisfactorily high sensitivities, specificities and NPV for both sexes but moderate PPV 72.6% for males and 70.2% for females. This indicates that those who screened positive about one third of patients were actually false positive cases. The estimated value of PPV in this study was poorer than Nepal study (90.3% for males and 80.1% for females)(15). In contrast, many previous researches published in different setting reported as AUDIT had lower value of PPV with satisfactory other diagnostic parameters. Chang-Gi Kim et al reported lower PPV (73.85% for males and 58.06% for females) of Korean outpatients and Perula de Torres et al were also reported 53% of PPV for Spanish patients with adequate sensitivity, specificity and NPV(15,36). The result of this study is agreed with the studies mentioned above.

The AUDIT developers were originally structured the items into three dimensions: alcohol consumption (items 1-3), alcohol dependence (items 4-6) and hazardous drinking (items 7-10)(7). However, the principal component analysis of this study clearly demonstrated two factors: the first labeled as alcohol consumption and the latter alcohol related problem which contained dependence and hazardous drinking items together. Further analyses of internal structure of AUDIT for the one, two and three dimensions model were determined by CFA. The result of CFA were corroborated the presence of two factor model which was revealed from PCA. These two factor structure model is consistent to findings of previous studies performed in Tanzania, Zambia and Malaysia(24,32,45). In addition, a systematic review examined seven studies on factorial structure of AUDIT arrived at a conclusion that the two factor model was preferable(26).

The findings were demonstrated that the one factor model provided poor model fit indices in all parameters compared with two and three factor model. The superiority of two and three factor model in this study was supported by recent studies done in Uganda and United Kingdom (46,47). This implies that the first three items of AUDIT could able distinctly measure alcohol consumption than the latter items. Though one factor model provided a poor model fit, the findings empirically support that the one dimension had excellent internal consistency and adequate factor loading for each item. Medina-Mora and Lima et al suggested as poor model for

one factor structure does not detract the application of single-factor structure of AUDIT items to quantify a global assessment of AUDs(38).

6.1. Limitations of the Study

- This study was examined only medical outpatients who visited one referral Hospital. Hence, the result may differ in other clinical setting like primary health care. In addition, generalizability of the result to other Amharic speaking patients should be taken in caution since the language by itself is varied in wording and cultural acceptability across the country.
- Interview technique was applied to respondents in where their attendants were with them. This might result in social desirability bias. Self-administered technique is recommended once semantic validity has been done. However, this approach could not be applicable in low literacy population group.
- Since AUDIT & MINI interview were administered within short period interval, the second interview may be affected by the recall bias of the first interview. However, this bias in the study was lessened by shifting the order of the interview to half of the respondents.

CHAPTER: CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

To the best of the researcher knowledge, this study is the first validation study of AUDIT among Ethiopian populations speaking Amharic language. The result exhibited as AUDIT can be used as reliable and valid tool to detect AUDs in a busy medical outpatient setting. Diagnostic performance of AUDIT against MINI provided an AUROC of 0.94. An optimal cutoff score is ≥ 8 for females and ≥ 10 for males. At this cutoff point the tool provides satisfactory sensitivity, specificity and NPV but modest PPV for both sexes. Principal component analysis resulted in two factor structure, where the first labeled as alcohol consumption (item1-3) and the latter referred alcohol related problem (item4-10) which contained dependence and hazardous drinking items together. Confirmatory factor analyses were also ascertained superiority of two factor model than one and three factor models. The correlation between each subscales of two factor model was acceptable. Though one factor model had poor model fit indices, high item loading of each item and its excellent internal consistency would make the structure applicable for global assessment of AUDs.

5.2. Recommendations

The following recommendations are forward to the concerned stakeholders.

- **To medical outpatient clinicians:** Comorbidity of AUDs among medical outpatients has to be taken into consideration and screening of AUDs with AUDIT is recommended to all patients.
- **To Dessie Referral Hospital:** Advocacy and training of AUDIT screening tool for clinicians working in medical outpatient clinic is recommended. Through this quality of service and integration of inter departments will be guaranteed.
- **For Future Researchers:** The finding of this study is recommended to use as a validated tool to researchers who are interested in AUDs in medical setting. Furthermore, validation of AUDIT across different language and setting is an eligible area to be studied in the future.

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ANNEX I: DATA COLLECTION INSTRUMENTS

Part I: Questionnaire in English version

JIMMA UNIVERSITY INSTITUTE OF MEDICINE

DEPARTMENT OF PSYCHIATRY

Informed consent

_____, I am a research assistant working with Mr. Yohannes Hailu, graduate student of mental health. The aim of this study is to assess the reliability and validity of Alcohol Use Disorder Identification Test (AUDIT) screening tool among medical outpatients at DRH. Your truthfully participation in answering these questionnaires will give us reliable result and show us our real status and help to make intervention; hence we request to participate honestly. After you completed the interview with me, my colleague will ask you with other questionnaire. Your involvement in responding questionnaires and every aspect of the study are completely voluntary. You may pass over any question that you prefer not to answer but we would appreciate your cooperation. You may also ask me to clarify questions if you don't understand them or can stop the interview at any time. Your withdrawal from the study will not affect the care you get from the hospital. Finally, all the information that you provide for the study is kept completely confidential. Your responses to our questions are identified only by number, never by name.

Do you agree to participate in the study? 1. Yes 2. No

If 'yes' continue to the next page

Thank you for your participation

Name of data collector _____ signature _____ date _____

Name of supervisor _____ signature _____ date _____

Part I: Questions related to the socio demographic characteristics of the patient

Sr.No	Questions	Response and categories	Code
101	Age of the patient (in years)		
102	Sex of the patient	1. Male 2. Female	
103	Marital status	1. Single 2. Married 3. Divorced 4. Widowed	
104	Education status	1. Uneducated 2. Able to read and write 3. primary(1-8) 4. secondary(9-12) 5. tertiary(+12)	
105	Occupation	1. Employed 2. Farmer 3. Merchant 4. House Wife 5. Daily laborer 6. Student 7. Unemployed	
106	Residency	1. Urban 2. Rural	

Part 2: AUDIT screening tool

The Alcohol Use Disorders Identification Test: Interview Version

Read questions as written. Record answers carefully. Begin the AUDIT by saying “Now I am going to ask you some questions about your use of alcoholic beverages during this past year.” Explain what is meant by “alcoholic beverages” by using local examples of beer, wine, Tej, etc. Code answers in terms of “standard drinks”. Place the correct answer number in the box at the right

<p>1. How often do you have a drink containing alcohol?</p> <p>(0) Never [Skip to Qs 9-10]</p> <p>(1) Monthly or less</p> <p>(2) 2 to 4 times a month</p> <p>(3) 2 to 3 times a week</p> <p>(4) 4 or more times a week</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div>	<p>6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?</p> <p>(0) Never</p> <p>(1) Less than monthly</p> <p>(2) Monthly</p> <p>(3) Weekly</p> <p>(4) Daily or almost daily</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div>
<p>2. How many drinks containing alcohol do you have on a typical day when you are drinking? (Consider to add all types of cups of beverage like like Brille, bottle, Araqe termus).</p> <p>(0) 1 or 2</p> <p>(1) 3 or 4</p> <p>(2) 5 or 6</p> <p>(3) 7, 8, or 9</p> <p>(4) 10 or more</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div>	<p>7. How often during the last year have you had a feeling of guilt or remorse after drinking?</p> <p>(0) Never</p> <p>(1) Less than monthly</p> <p>(2) Monthly</p> <p>(3) Weekly</p> <p>(4) Daily or almost daily</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div>
<p>3. How often do you have six or more drinks on one occasion? (Consider to add all types of cups of beverage like like Brille, bottle, Araqe termus).</p> <p>(0) Never</p> <p>(1) Less than monthly</p> <p>(2) Monthly</p> <p>(3) Weekly</p> <p>(4) Daily or almost daily</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div> <p>Skip to Questions 9 and 10 if Total Score for Questions 2 and 3 = 0</p>	<p>8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?</p> <p>(0) Never</p> <p>(1) Less than monthly</p> <p>(2) Monthly</p> <p>(3) Weekly</p> <p>(4) Daily or almost daily</p> <div style="text-align: right; border: 1px solid black; width: 50px; height: 50px; margin-left: auto;"></div>

<p>4. How often during the last year have you found that you were not able to stop drinking once you had started?</p> <p>(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily</p> <div style="text-align: right;"><input type="text"/></div>	<p>9. Have you or someone else been injured as a result of your drinking?</p> <p>(0) No (2) Yes, but not in the last year (4) Yes, during the last year</p> <div style="text-align: right;"><input type="text"/></div>
<p>5. How often during the last year have you failed to do what was normally expected from you because of drinking?</p> <p>(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily</p> <div style="text-align: right;"><input type="text"/></div>	<p>10. Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?</p> <p>(0) No (2) Yes, but not in the last year (4) Yes, during the last year</p> <div style="text-align: right;"><input type="text"/></div>
<p>RECORD TOTAL ITEMS HERE</p> <div style="text-align: right;"><input type="text"/></div>	

Part 3: Mini Neuropsychiatric Interview (MINI) Version 7.0 for AUDs based on DSM V

		0	1	
V300	In the past 12 months, have you had three or more alcoholic drinks within a 3 hour period on 3 or more occasions?			
V301	During the times when you drank alcohol, did you end up drinking more than you planned when you started?	No	Yes	
V302	Have you tried to stop or reduce alcohol but failed?	No	Yes	
V303	On the days that you drank, did you spend substantial time obtaining alcohol, drinking, or recovering from the effects of alcohol?	No	Yes	
V304	Did you feel urge or strong desire to drink alcohol?	No	Yes	
V305	Did you spend less time working, enjoying hobbies, or being with others because of your drinking?	No	Yes	
V306	Did you continue drink even though you're drinking caused problems with your family or other people?	No	Yes	
V307	Were you intoxicated more than once in any situation where you were physically at risk for example, driving a car, riding a motor bike, using a machinery etc.	No	Yes	
V308	Have you continued to dink even though you knew that the drinking caused you health or mental problem?	No	Yes	
V309	Did you reduce or stop important social, occupational and recreational activities because of your drinking?	No	Yes	
V310	Did you need to drink more in order to get the same effect that you got when you first started drinking?	No	Yes	
V311	When you cut down on drinking, did your hands shake; did you sweat or feel agitated? Did you drink to avoid those symptom or to avoid being hangover, for example "the shakes", sweating or agitation?	No	Yes	

Part II. Questionnaire in Amharic Version

ክፍል 1: የ ማህበራዊ፣ ስነ ህዝባዊ እና ግላዊ መረጃ መጠይቅ

ተራቁ	መጠይቆች		መልስ
101	ዕድሜ(በአመት)		
102	ፆታ	<ol style="list-style-type: none"> 1. ወንድ 2. ሴት 	
103	የትዳር ሁኔታ	<ol style="list-style-type: none"> 1. ያላገባ/ች 2. ያገባ/ች 3. የፈታ/ች 4. የትዳር አጋር በሞት የተለየ/ች 	
104	የትምህርት ደረጃ	<ol style="list-style-type: none"> 1. መጀመሪያ ትምህርት ያልተማረ 2. ማኅበራዊ መግቢያ የሚቻል 3. አንደኛ ደረጃ (1-8) 4. ሁለተኛ ደረጃ(9-12) 5. ከፍተኛ ትምህርት (+12) 	
105	የስራ ሁኔታ	<ol style="list-style-type: none"> 1. የመንግስት ቅጥረኛ 2. አርሶ አደር 3. ነጋዴ 4. የቤት አሰጣጥ 5. የቀን ስራተኛ 6. ተማሪ 7. ለጊዜው ስራ የሌለው 	
106	የመኖሪያ ቦታ	<ol style="list-style-type: none"> 1. ከተማ 2. ገበያ 	

ክፍል 2: AUDIT መጠይቅ

ኮድ _____ ቀን _____

ተ.ቁ		ወጠው አሰጣጥ					ነጥብ
		0	1	2	3	4	
V201	አልኮልና ትያላቸውን መጠኖች በየሰንት ጊዜ ይጠጣሉ?	በፍፁም (ጥያቄ 9 ተሻግሮ)	በየ ወሩ ወይም ከወር ባነሰ	በወር ከ2-4 ጊዜ	በሳምንት ከ2-3 ጊዜ	በሳምንት 4 ጊዜ ወይም ከዚያ በላይ	
V202	በአንድ መደብ ምን ዓይነት ቀን በሚጠበቅ ቀን በአማካኝ ምን ያህል መላኪያ ይጠጣሉ?	1-2	3-4	5-6	7-9	10+	
V203	በአንድ አጋጣሚ ትንሹ ወይም ከዚያ በላይ መላኪያ አልኮል መጠጥ በየሰንት ጊዜ ይጠጣሉ?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V204	ባለፈው ዓመት አንዴ መጠጣት ከጀመሩ በኋላ ለምን ያህል ጊዜ መጠጥ ለማቆም ወስነው ወሳይሳካልዎ ቀርቷል?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V205	ባለፈው ዓመት ወስጥ መጠጥ በመጠጣት ምክንያት ከእርስዎ የሚጠበቁ ስራዎችን ማከናወን አለመቻል በየሰንት ጊዜ አጋጥሞት ያወቃል?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V206	ባለፈው ዓመት ወስጥ በጣም በመጠጣት ምክንያት በማግስቱ የዕለት ስራዎን ለማከናወን ሲሉ በጠቀሱት የአልኮል መጠጥ በየሰንት ጊዜ አስፈልጎት ያወቃል?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V207	ባለፈው ዓመት ወስጥ አልኮል በመጠጣት ምክንያት የመፀፅ ራስዎን የመወቀስ ስሜት ምን ያህል ጊዜ ተሰምትዎት ያወቃል?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V208	ባለፈው አንድ ዓመት በመጠጣት ምክንያት በአለቱ የተፈጠረ ወን ማስታወስ አለመቻል በየሰንት ጊዜ አጋጥሞት ያወቃል?	በፍፁም	ከአንድ ወር በታች	በየ ወሩ	በየ ሳምንት ቱ	በየ ቀኑ/ ከዚያ ባነሰ	
V209	አልኮል በመጠጣት ምክንያት ራስዎ ወይም ሌላ ሰው ላይ ጉዳት ደርሶ ያወቃል?	አያወቅም		ከአንድ ዓመት በፊት		በአንድ ዓመት ወስጥ	
V10	ጓደኛ፣ ዘመድ ወይም ህክምና ስለእርስዎ መጠጣት አሳስቦት ወይም መጠጣት አንዲያቆሙ መከራዎት ያወቃል?	አያወቅም		ከአንድ ዓመት በፊት		በአንድ ዓመት ወስጥ	
ጠቅላላ ነጥብ							

ተ.ቁ		ወጠኑ አሰጣጥ		ነጥብ
		0	1	
V300	ባለፉት 12 ወራት አልኮልን ት ያላቸዉ መጠጦችን ሶስት ጊዜና ከዚያ በላይ በሶስት ሰዓት ጊዜ ወስጥ እና ከሶስት አጋጣሚዎች በላይ ጠጥተዉ ያወቃሉ?	አያ ወቅም	ያ ወቃል	
V301	አልኮል በሚጠጠብት ጊዜ መጅመይ ያደገዎት ለጠጣሉ ብለዎ ካሰቡት መጠን በላይ ጠጥተዉ ያወቃሉ?	አያ ወቅም	ያ ወቃል	
V302	የ አልኮል መጠጥ መጠጥነትን ለመቀነስ ስምሆን ለማቆም ሞክረዉ ሳይሳካልዎ ቀርቷል?	አያ ወቅም	ያ ወቃል	
V303	አልኮልን በሚጠጠብት ጊዜያት አልኮል ለማግኘት፣ ለመጠጥና መጠጠካደረሰብዎ ጭ ለማግኘት ምብዙ ጊዜ ያጠፉ ነበር?	አላጠፋም	አጠፋለሁ	
V304	አልኮልን ለመጠጥ ከፍተኛ የሆነ የ መገፋፋት ስሜት አጋጥሞት ያወቃል?	አያ ወቅም	አዎን	
V305	አልኮል በመጠጥ የሚጠጠብ ጊዜ ከሌሎች ሰዎች ጋር ለመገናኘት፣ ስራዎን ለመስራትና ለመዘናናት በቂ ጊዜ እንዳይኖርዎት አድርጓል?	አላደረገም	አዎን	
V306	አልኮል በመጠጥ ምክንያት በቤተሰብዎም ሆነ በሌሎች ሰዎች ላይ ችግር ቢደርስም እነኩን መጠጥ መጠጥዎን ቀጥለዎበታል?	አልቀጠልኩም	አዎን	
V307	ለአካል ጉዳት አደጋ በሚጋልጡት ግባሮች ለምሳሌ መኪና በማሸከርከር፣ ሞተር ሳይክል በመንዳት እና ማሸኛችን በማንቀሳቀስ ላይ እያሉ ከአንድ ጊዜ በላይ ሰክረዉ ያወቃሉ?	አላወቅም	አወቃለሁ	
V308	የ አልኮል መጠጥ መጠጥዎ በጠጃነትዎ ወይም በአዕምሮዎ ላይ ጉዳት ማድረሱን አያወቁ መጠጥዎን ቀጥለዋል?	አልቀጠልኩም	አዎን	
V309	አልኮል በመጠጥ ምክንያት አስፈላጊ የሆኑ ስራዎችን፣ ማህበራዊ ተሳትፎዎችን እና ደስታ የሚሰጡ ገሮችን እንዲቀንሱ ወይም እንዲቆሙ አድርጓል?	አላደረገም	አዎን	
V310	ለ መጅመይ ጊዜ መጠጥ ሲጀምሩ ይሰማዎት የነበረዉን ስሜት ለማግኘት ሲሉ ብዙ መጠጥ አስፈልጎታል?	አስፈልጎኝ አያ ወቅም	ያ ወቃል	
V311	አልኮል መጠጥ ሲያቆሙ ወይም መጠኑን ሲቀንሱ የ እጅ መንቀጥቀጥ፣ ማለብ፣ ማለብ፣ ማለብ፣ እንቅልፍ ማጥነት እና መቅበዝበዝ አጋጥሞት ያወቃል፡፡ እንደዚህ አይነት ስሜት እንዳይሰማዎ በማለት መጠጥዎን ቀጥለዋል፡፡	አጋጥሞኝ ያወቃል	አያ ወቅም	