Prevalence of Goiter and Associated Factors among Adolescents in Gazgibla woreda, North East Ethiopia

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In Partial Fulfillment of the Requirements for the Degree of

MASTERS IN GENERAL PUBLIC HEALTH

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I hereby certify that I have read and evaluated this thesis entitled prevalence of goiter and associated factors among adolescents in Gazgibla woreda, North East Ethiopia, prepared under my guidance by G/medhin G/michael. I recommend it to be submitted as fulfilling the thesis requirement.

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BIOGRAPHICAL SKETCH

My name is G/medhin G/michael. I was born inTigray Region, Central Zone, Ahferom Woreda in 1990. I have completed my elementary education at Dibdubo primary school from 1999-2006 and secondary and preparatory education at Enticho high school and preparatory school from 2007-2010. In 2011, I have joined Addis Ababa University and graduated in 2014 with Bachelor of Science in Midwifery. Then, I have employed in Amhara region and work for the last five years. In 2017, I have joined Haramaya University for postgraduate program in public health General Public Health.

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LIST OF ABBREVIATION AND ACRONYMS

AOR	Adjusted Odd Ratio
CI	Confidence Interval
COR	Crude Odd Ratio
EDHS	Ethiopia Demografic and Health Survey
EPHI	Ethiopian Public Health Institute
ICCIDD	International Council for Control of Iodine Deficiency Disorder
IDD	Iodine Deficiency Disorder
PPM	Part Per Million
SD	Standard Deviation
SPSS	Statistically Package for Social Sciences
TGR	Total Goiter Rate
TSH	Thyroid Stimulating Hormone
UNICEF	United Nations International Children's Emergency fund
UIE	Urinary Iodine Excretion
USI	Universal Salt Iodized
WHO	World Health Organization

ABSTRACT

Background: Iodine deficiency disorder, is one of the most prevalent micronutrient deficiencies globally. Ethiopia is a country with high prevalence of iodine deficiency disorder, which continue to affect a large number of the country's population. There was little evidence among adolescents particularly in North east Ethiopia. So it was necessary and timely to study this important issue in the adolescent age group.

Objective: The main objective of this study was to assess the prevalence of goiter and associated factor among adolescents in Gazgibla Woreda, North East Ethiopia, from August 5 to 30, 2019.

Method: A Community based cross sectional study design was conducted among 596 adolescents who were selected using stratified sampling technique. Data were collected using a pre-tested structured interviewer-administered questionnaire. Adolescents were examined for the presence or absence of goiter based on United Nation Children Funds, International Council for the control of Iodine Deficiency and the World Health Organization criteria. Iodine level of salt was measured by rapid test kit. Data were entered to EpiData version 3.1 and exported to SPSS version 22.0 for analysis. Bivariate and multivariate logistic regression model were fitted and Crude Odds Ratio (COR) and Adjusted Odds Ratio (AOR) with 95% confidence interval was compute to identify the associated factors. Level of significant was considered at P-value <0.05.

Results: A total of 576 adolescents were included in the analysis. The overall prevalence of goiter among adolescents was, 42.5% (CI: 38.4%, 46.7%). The prevalence of grade one goiter was 32.5% while grade two was 10%. Being female (AOR = 1.84, CI: 1.09, 3.14), family history of goiter (AOR=2.93, CI: 1.74, 4.95), cabbage consumption at least once per week (AOR = 5.69, CI: 2.67, 12.11), do not consume egg at all (AOR = 2.04, CI: 1.09, 3.84), and do not consume meat at all (AOR = 3.12, CI: 1.30, 7.53), time of iodized salt adding during cooking (AOR = 4.69, CI: 2.58, 8.52), and inadequate iodine level of house hold salt (AOR = 2.30, CI: 1.08, 4.89) were the factors associated with goiter among adolescents in Gazgibla woreda.

Conclussion: The total goiter prevalence rate was very high and severe public health problem in Gazgibla woreda. Being female, family history of goiter, iodine level of salt, time of add salt while cooking, cabbage, egg and meat consumption were significantly associated factors with goiter among adolesents.

Key words: Goiter, Associated factor, Adolescent, Gazgibla woreda, Ethiopia

1. INTRODUCTION

1.1. Background

Thyroid plays a critical role in regulating the metabolic processes of the body by producing thyroid hormone. This thyroid hormone has a valuable role in adjusting heart rate, blood pressure, growth, and breathing. Therefore, goiter is a condition where the gland becomes enlarged due to diseases or tumors **(**Conrad, 2016).

Iodine is an essential component for thyroid hormones production, thyroxin and triiodothyroxine hence, it has a critical role in supporting brain development, control of metabolic function, and reproduction and insufficient iodine levels in the blood lead to poor production of these hormones. This in turn affects development and functioning of the brain, muscles, heart, liver, and kidneys and results in iodine deficiency disorder that varies from a few months to several years (FMOH, 2004).

Goiter is an indicator of chronic iodine deficiency and a major public health problem in several areas of the world, especially in developing countries (WHO, 2007).

Globally, 30% of the world's population is affected with Iodine deficiency disorder, and likewise, more than 150,000 million people in Africa are affected by problems related with Iodine deficiency. Furthermore, every day, due to iodine deficiency, 50,000 infants are born with reduced mental capacity (FMOH, 2004; WHO, 2014).

Children and adolescents are the preferred group for inspection and palpation for goiter, the highest prevalence of goiter occurs during puberty and child bearing age. Different research indicates that the prevalence of goiter in children is an indicator of local iodine consumption (WHO, 2007; WHO, 2014; Andersson et al., 2005)**.**

Total goiter rate (TGR) is the main indicator to assess iodine deficiency disorder (IDD) prevalence, because total goiter prevalence value indicates the community or the population degree of Iodine deficiency. Based on joint UNICEF, WHO, ICCIDD recommendation, the cut off point for TGR is the addition of goiters, grade 1 and 2 divide by the total examined population, if the result is (0-4.9%), no Iodine deficiency disorder,(5-19.9%),mild iodine deficiency disorder, (20-29.9%) moderate iodine deficiency disorder, 30% and above severe iodine deficiency disorder (WHO, 2007; Thurnham, 2014).

A World health organization global data base study showed that the TGR of Africa was 28.3 (Andersson et al., 2005). A study conducted in Ethiopia Total goiter prevalence (weighted) was 35.8% in which 24.3 and 11.5% were palpable and visible goiter respectively. Goiter prevalence in four regional states namely Southern Nation Nationalities and People Region (SNNPR), Oromia, Benshangul-Gumuz and Tigray was greater than 30%, which is an indication of severe iodine deficiency (Cherinet et al., 2007).

Goitrogens are chemicals that are toxic to the thyroid, or that break down to produce toxic chemicals. Foods containing such chemicals include cassava, cabbage, and root vegetables such as Swedes and turnips. Cassava is a staple in Africa and tropical areas in the Pacific basin. It contains cyanogenic glycosides, which are a source of cyanide; the cyanide is converted in the body to thiocyanate, which inhibits the activity of thyroperoxidase, the enzyme responsible for the uptake of iodine by the thyroid gland. Therefore, high concentrations of cyanide considerably reduce the absorption of iodine and the gland progressively enlarged (hyperplasia of the gland). We can prevent the toxic chemicals of cassava by boiling in water before consumption (Thurnham, 2014).

Animal-source foods are the richest and most bio available source of most micronutrients. Seawater is a reliable source of iodine so seafood is a good source of dietary iodine. Thus fish and animal-source foods will be the richest sources of iodine. However, in parts of the developing world where iodized salt supplies maybe unreliable, dietary diversity is frequently poor and poverty restricts dietary choices. In Japan, the consumption of seaweed soup can supply 80 to 200 μg of iodine per day (Madhu et al., 2010; Thurnham, 2014).

However, iodine deficiency disorder is the easiest and cheapest of all disorder to prevent. The most effective solution for this problem is application of universal salt iodization (WHO, 2007; Cherinet et al., 2008; Andersson et al., 2005; Wei Zhao, 2014). Due to the severity of IDD in the nation, Ethiopia mandated that all salt for human consumption should be iodized since February 2011 (Dilnesaw, 2014). Iodized salt should be used on a daily basis in an iodine deficient environment and the daily requirement of iodine for children is 120 micrograms (FMOH, 2004). Iodine deficiency can be eliminated by daily consumption of iodized salt. So iodized salt is both a preventive and corrective measure for iodine deficiency and is the most effective, low cost, long-term solution to a major public health problem.

1.2. Statement of the problem

Iodine deficiency disorder, one of the most prevalent micronutrient deficiencies globally, is the main cause of potentially preventable mental retardation, goiter, miscarriage, still birth, premature birth, and increase child mortality. World Health Organization estimates that approximately 37% of school-age children, 285 million, and 1.88 billion people worldwide remain at risk of insufficient iodine intake and approximately a third of the world's population lives in areas with some iodine deficiency (Conrad, 2016; Anderson et al., 2004; Win AZ, 2016).

Even though Goiter is a major public health problem throughout the world, its prevalence in developing countries like Ethiopia is significantly alarming (WHO, 2007). According to researches, thirty present of the world's population lives in areas with iodine deficiency and are at risk of its complications. Likewise, more than 150 million Africans are affected by iodine deficiency related disorders.

According to the national survey conducted by the previous Ethiopian Nutrition Institute, in Ethiopia, every year, there are 50,000 prenatal deaths associated with iodine deficiency disorder. Furthermore, from every 100 Ethiopians 26 of them have goiter and another 62 are at risk of IDD (FMOH, 2004).

Children and adolescents are particularly vulnerable to iodine deficiency disorders (IDDs) because of puberty-related changes in thyroid function that may increase the need for iodine(WHO,2007; Elahi, 2005). The iodine deficiency during pregnancy and early childhood can result in impaired development of the brain and consequently in impaired mental function the consequences are pre natal death, a decrement of intelligent quotient up to 13.5 points, which has an immediate effect on child learning capacity and child health illness. Through the child's development, it can decreased academic achievement, decreased work capacity, lost hours of work, decreased family income, decreased national economy, increased health care costs, increased education cost (repetition of class) ,stigma associated with disability, increased number of unskilled workers ,increased number of unemployed, increased time for care. Therefore, iodine deficiency affects the social, economic and the development of the country as whole (WHO, 2007; Thurnham, 2014; Conrad 2016; Cherinet et al., 2008).

The magnitude of goiter is somewhat high in pregnant mother, in children and adolescents. Especially in highland of Ethiopia. Soils in the highlands are believed to be low in iodine because of soil bleaching by the flood due to rainfall in certain areas like Gazgibla woreda, goitrogine

food is easily available in the Community that may have contributed to the development of goiter, the quality of salt in the community is not well inspected if it contains adequate amounts of iodine. Previously universal salt iodization initiated beginning with a call to the Council of Ministers to re-enact legislation requiring the iodization of all salt used for consumption by humans, Supplementation of iodine oil capsule (In areas with lack of transportation and small salt producers are available), Health education (Create awareness about the consequences of iodine deficiency disorder, especially for high risk groups (infants, pregnant and lactating women),Set surveillance technique to monitor the distribution of adequately iodized salt in the community can be done to alleviate the problem. Magnitude of goiter among adolescent in Ethiopia, have not been well assessed. It was necessary and timely to study this important issue in the adolescent age group. Hence, this research was aimed to assess prevalence of goiter and its associated risk factors in Gazgibla Woreda, North East Ethiopia that was serve as a baseline data. And also which helps to take corrective actions to improve the health status of the community.

1.3. Significance of the study

The significance of the study is primarily for the health sector institutions of the Gazgibla Woreda and Waghimra Zonal administration. The study was a baseline for those officials how much their efforts are targeted in tackling the problem of goiter and how much their previous works have addressed the problem. Moreover, the study was expected to encourage conducting similar in-depth research across all the remaining woredas of the zonal administration so that the relevant government institutions and nongovernmental organization will have a clear understanding of the problem and revise their plans accordingly. Thus, it is hoping that the results of the study were help local Governments and NGOs in understanding the prevalence of goiter and its associated factors in the woreda and serve as an important tool for any possible intervention aimed at improving the IDD particular in the study district and Waghimra zone in general.

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1.4. Objectives of the Study

1.4.1. General objective

To assess the prevalence and associated factor of goiter among adolescents in Gazgibla Woreda, North East Ethiopia, from August 5 to 30, 2019.

1.4.2. Specific objectives

To measure the prevalence of goiter among adolescents of Gazgibla woreda.

To identify factors associated with goiter among adolescents of Gazgibla woreda.

2. LITERATURE REVIEW

2.1. Prevalence of goiter

Worldwide, the total goiter prevalence (TGP) in the general population is estimated to be 15.8%, that is varying between 4.7% in America to 28.3% in Africa (Andersson et al., 2005). A findings from western parts of Germany (23.9%) and finding from Tanzania which is 25% of TGP in 6–18 years of school children (Assey et al., 2009; Farahati et al., 2006).

Different studies in the world showed that prevalence of goiter in South Africa (25.5%) , southern Blue Nile area of Sudan (22.3%) ,Sudan (38.8%), India (20.5%)), Rajasthan (11.4%) (Elnour et al., 2000; Misra,2007; Gaitan et al., 1990; Jooste and Kriek,1997; Singh,2010). But it was lower than a study done on schoolchildren in Islamabad which was 71.6%, a research conducted in Enda-Mehoni district in Tigray, Ethiopia which was71.4% and a study done among ten villages from four ad-ministrative regions of Ethiopia with a gross prevalence of goiter among school children of 53.3% (Ali TZ., 1999; Teklay and Aregai ,2006; Cherinet, 2007).

A research conducted in 2005 in ten regional state of Ethiopia, total goiter rate was 39.9 %. The highest TGR (56.2%) was found in the South Nation Nationality People Regional State, followed by 42.0% in Oromia, 40.5% in Benshangul Gumuz, 29.1% in Amhara (Negalign et al., 2004; Cherinet et al., 2008). Similarly, the study condacted in Shebe Senbo (59.1%) Anchar district, eastern Ethiopia (51.8%), Wolaita and Dawro zones, southern Ethiopia (48.9%) and Burie/Womberma districts (54%) revealed the prevalence of goiter (Yinebeb et al., 2012; Muzemil et al, 2019; Shimelash et al., 2017; Aweke et al., 2010).

A study done in North West Ethiopia found that prevalence of goiter was 37.6% (Molla et al., 2014). In terms of the WHO, UNICEF and ICCIDD criteria for assessing the severity of IDD using Ethiopia which was 39.9% (95%CI: 38.6%, 41.2%) and in Sudan (38.8%) (Cherinet et al., 2008; Gaitan et al., 1990).

The study conduct in Beni Shangul Gumuz region (2014), Jimma zone (2014), West Gojjam (2010), North west Ethiopia (2012) and Chole district of Arsi zone on school age children investigate that a total goiter prevalence rate 26.3%, 59.1%, 54%, 37.6% and 36.6% respectively (Molla et al., 2014; Tesfaye et al., 2014; Aweke et al., 2010; Yinebeb et al., 2012; Abera and Takele, 2019).

2.2. Factors associated with goiter

2.2.1 Socio demographic factors

Sex: An analysis carried out in 2012 on the relationship between goiter and gender found out as the prevalence of goiter was greater for females than males, 54% and 46% respectively (Malboosbaf et al., 2013). Likewise, a study done Jodhpur district of Rajasthan India goiter prevalence in male and female was found to be 7.4 % and 15.7% respectively (Madhu et al., 2010). Similarly, several studies conducted in Ethiopia also supported the above finding. A study done south western Ethiopia reported the prevalence of goiter was higher in females, (35.0%) than in males (19.7%), southern Ethiopia was more higher among females (70.0%) compared to males (46.4%), north west Ethiopia was higher among females (54.8%), than among males (45.2%,) Goba town ,south east Ethiopia was high among females (53.6%) than (47.3%) and west gojam zone was higher among females than (60.3%) males (45.7%) (Negalign et al., 2004; Eskinder et al., 2014; Molla et al., 2014; Habtamu et al., 2015; Aweke et al., 2010).

A study done in southern Ethiopia investigated that Females were significantly affected (60.9%) as compared to males among school students. And on the other hand, it is contradicted with findings from western part of Germany and Islamabad reported that males were more likely affected than females (Shimelash et al., 2017; Farahati et al., 2006; Ali TZ et al., 1999).

Age: The result for the relation between age and goiter is inconsistent across researches. While some studies show as the magnitude of the goiter increases with age, others claim otherwise. For instance, according to a study conducted in costal district of Karnataka India prevalence of goiter was increasing with the growing age (Veena G. et al., 2015). A study conducted in goba town, an increase in age has significant association with the increase in goiter prevalence. Similarly, a study conducted in Northwest Ethiopia also indicated as there is a 1.24 times increased risk of developing goiter in children (Molla et al., 2014; Habtamu et al., 2015). In contrary study conducted in Gojjam shows decrease in goiter with an increase in age, hence, goiter prevalence is high in younger age group than their older counterpart as age increases goiter rate decreased in women (Aweke et al., 2010).

Educational and Occupational status parents: A study conducted in coastal district of Karnataka India education of the father and occupation of the mother were found to be significantly associated with goiter (Veena G. et al., 2015).

A study done in Leku town, Southern Ethiopia revealed that children whose mothers did not attend formal education were nearly three times more likely to develop goiter (Desalegn & Dawit, 2017). And also a study conducted in eastern Ethiopia found that children whose fathers did not attend formal education were 1.87 times more likely to have a goiter. An occurrence of goiter in children associated with maternal occupation and maternal education (Zegeye et al., 2017; Desalegn & Dawit, 2017).

Family history: family history has its contribution for goiter prevalence, malnutrition is inter cycle from generation to generation that is why pregnant mothers who live in iodine deficiency area must be supplement with iodine capsule to break the cycle (Stagnaro- Green et al., 2012). A study in Germany reported that, Patients with goiter had showed a significantly higher proportion of parents or siblings with goiter. Children from parents' with goiter showed a 2.7 fold increased risk of developing goiter (Dertia et al., 1981). Also a study in North West Ethiopia found that family history of goiter was significantly associated with family history. Children having goiter in first degree relative were 3.18 times more likely to develop goiter when compared with those who had no goiter (Molla et al., 2014).

Income of house holed: A study conducted in Shebe Senbo district, South west Ethiopia showed that high goiter prevalence, 66.7% was observed in children whose parent's monthly income was between 500-1000 birr, and the lowest 23.8% was observed in children whose parent's monthly income was > 1500 Birr (Yinebebet al., 2012). A study done in Leku town, Southern Ethiopia showed that the odds of goiter was two times higher among children whose family monthly income was below ≤ 1000 Ethiopian birr 43) compared with family monthly income of >3000 Ethiopian birr (Desalegn, & Dawit, 2017).

2.2.2. Environmental factors

Study done in five regional states of Ethiopia (Amhara, Oromiya, Tigray, SNNP and Benshangul-Gumuz) found that both children and mothers living in high lands are significantly affected by iodine deficiency disorder than those in lowlands (Cherinet et al.,2008). A study conducted in Ethiopia found that prevalence of goiter was greatest in areas at altitudes ≥ 2000 meter, with a

mean incidence 33.9% compared with 19.20% incidence in areas at altitudes < 2000 meter in Ethiopia but a study conducted in North West Ethiopia found that altitude was not significantly associated with goiter (Tebeb, 1993; Molla et al., 2014).

2.2.3. Goitrogenic foods

Astudy codacted in southern Ethiopia found that children who consumed common Goitrogens such as cabbage and cassava had higher odds of developing goiter (Eskinder et al., 2014). Different study in the world found cassava is the main cause of goiter(Chandra et al., 2008). A study conducted in sub-Saharan Africa and southern Ethiopia, Cassava consumption was identified as independent predictors of goiter (Sidibe H, 2007; Shimelash et al., 2017).

Cabbage is one of vegetable Goitrogenic, prevalence of goiter, 76.7% was observed among children who consumed cabbage every day but, Children who had never used cabbage in their diet had the lowest prevalence, 41.7% of goiter it is shown that significant association existed between the frequency of cabbage intake and development of goiter and Astudy condacted in eastern Ethiopia found that the occurrence of goiter was 7.74 times higher among children who consume cabbage at least once a week (Yinebeb et al., 2012; Muzemil et al, 2019).

Similarly Different studies condacted conducted in different parts of the country like in Goba Town, in, and Chole district shown that consumption of cabbage had significant association in development of goiter (Habtamu et al, 2015; Abera and Takele, 2019). Millet &sorghum are Phytate and phenolic compounds interfere with mineral absorption and Goitrogens block iodine utilization (Thurnham, 2014).

2.2.4. Dietary factor

A study done in North West Ethiopia reported fish consumption at least once per month was 58.4% time's protective for goiter than never taking fish at all. Animal-source foods are the richest and most bio available source of most micronutrients Foods of marine origin have higher iodine content because marine plants and animals concentrate iodine from seawater (Molla et al., 2014; Thurman, 2014; Juliane Wicht JSRP, 2008; Hussein et al., 2012).

A study conducted in eastern Ethiopia found that the occurrence of goiter was 3.65 times higher among children who do not consume milk at all, compared to those who consume three times and above a week. Similarly, children who do not consume egg were 3.16 times more likely to develop goiter than their counter parts (Muzemil et al,2019).

Similarly other studies done in different part of Ethiopia revealed that not consumption of egg and milk had significant association in development of goiter (Desalegn and Dawit, 2017; Kebede and Adnew, 2015; Eskinder et al., 2014; Abera and takele,2019).

2.2.5. Utilization, knowledge, and iodine level of salt

Several study done in the world showed non iodine utilization is the main cause of goiter. According to World Health Organization global database compiled from 1993-2003 analyzed that 285 million school age student were estimated to have in sufficient iodine intake, as a result 15.8% population have goiter in the world (Andersson et al., 2005). Meta-analysis conducted in china after two decades of universal salt iodization program reported that prevalence of goiter was 22.8% and decreased to 12.6% (Wei Zhao et al., 2014). Study done in Rajasthan proportion of households consuming adequate iodized salt was only 18.5% (Madhu et al., 2010).

The accessibility of adequate (>15 ppm) iodized studies condacted in different part of Ethiopia I,e.Northwest Ethiopia and Goba town which were 29% and 29.9%, respectively (Molla,et al. , 2014; Habtamu, et al., 2015). And also the findings of Ethiopian Demographic and Health Survey(EDHS) 2011 which reported 15% of the households' access iodized salt, Anchar district 8.4% and study done in Chole districts, Arsi zone which reports 2.9% of the hose hold access to adequate iodized salt (EDHS, 2011; Abera and takele, 2019; Muzemil et al, 2019).

A study done in eastern Ethiopia found that the odds of goiter was 2.09 times higher among children whose families do not use iodized salt. Likewise, children whose families salt with inadequate levels of iodine (<15 ppm) were 2.77 times more likely to have goiter (Muzemil et al,2019). Similarily studies codacted in different parts of ethiopia showed that iodine level of salt have a siginificant association in development of goiter (Desalegn and Dawit, 2017; Abebe Z et al., 2017; Molla, et al., 2014).

Study done in North West Ethiopia showed that, the main reasons given for not having adequately iodized salt were lack of knowledge about the benefit of iodized salt (73.1%). Study conducted at the same area as of the above stated that 74.8% of participants know about the usefulness of iodized salt and consequence of IDD, three quarters (74.8%) of them had poor knowledge (Molla et al., 2014).

2.3 .Conceptual Framework: On the bases of the literature review a set of conceptual frame work is formulated about predictors of goiter. It is designed to show the influence of independent and dependent variables. The framework consist independent variables that are socio demographic characters, iodine level of salt, environmental factor, utilization of iodized salt, dietary factors, goitrogenic factors and knowledge of adolescents.

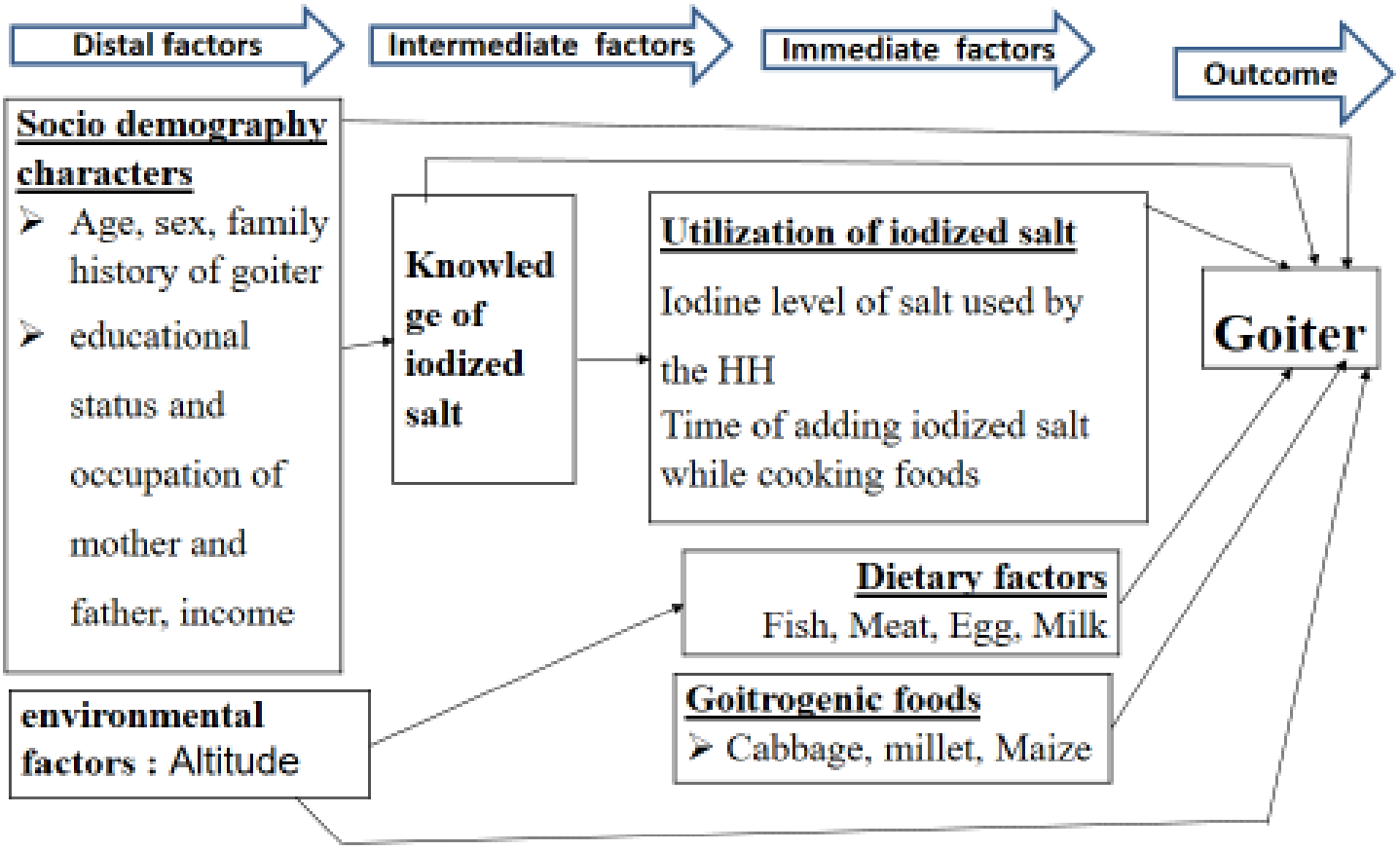

Figure 1: Conceptual frame work showing the relationships of different variables with goiter.

Source: the source of conceptual frame work was from different literature review.

3. METHODS

3.1. Study Area and Period

The study was conducted in Gazgibla woreda among Adolesecents. Gazgibla woreda is one of the eight woredas of the Waghimra zone found in Amhara region. Covering a land area of 108,133.679 hectares. It has 21 kebeles (one urban kebele and 20 rural kebeles. Topographically the woreda lies on an elevation ranging from 1500 to 4000 m above sea level. The zone has two agro-ecological zones. Dega (cold climate) (38%) and Woina dega (temperate climate) (62%). Asketema town is the administrative center of the woreda. It is located at a distance of 561 km from the Regional state capital city Bahirdar, 887 Km from Addis Ababa and 42 Km from Sekota town. According to 2018 report the woreda has total population of 88,044(43142males and 44902 females) and total households of 20,475. The livelihood of the population is based on agriculture, mainly crop producing subsistence farming. The study was conducted from August 5 to 30, 2019.

3.2. Study Design

A community based quantitative cross-sectional study design was used.

3.3. Population

3.3.1. Source population

All adolescents aged 10-19 years living in Gazgibla woreda.

3.3.2. Study population

All adolescents aged 10-19 years living in the selected kebeles of Gazgibla woreda.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion criteria: Adolescents (aged 10-19 years) with their mothers/cargiver's living in the selected households.

3.4.2. Exclusion criteria: Adolescents with serious physical or mental illness and adolescents who had lived in the study area for less than six months were excluded from the study.

3.5. Sample Size Determination

The required sample size of the study was determined by single population proportion formula for cross-sectional study. Taking the prevalence of goiter was 37.6%% from a study done in North West Ethiopia (Molla Mesele, et al, 2014*)*. To obtain maximum sample size at 95 % level of confidence and a maximum discrepancy of ± 5 % between the sample and the population. Adding 10% non-response rate, the total sample size was 596.

$$N = \frac{(Z\alpha/2)^2 * pq}{(W^2)}$$

$$N = \frac{(1.96)^2 * 0.376 * 0.624}{(0.05)^2}$$

n= 361 because the sampling technique is stratified, Design effect of 1.5 used n=542 with 10% non-response rate n=596

For Objective 2: Sample size was calculated by double proportion formula using EPI INFO statistical software program considering CI= 95%, power =80%.

Table 1:- The sample sizes calculations for factors associated with goiter among adolescents in Gazgibla woreda, north east Ethiopia, 2019.

Variables	Outcome in…		Sample size	References
	Exposed	non exposed		
Sex of the child	45.3 %	28.8 %	308	(Molla Mesele, et al, 2014).)
Family history of goiter	57.3 %	28.6%	120	(Molla Mesele, et al, 2014).)
Iodine level of salt	54.2%	26.5 %	127	(Muzemil et al,2019)
Educational status of fathers	55.4%	39.6%	347	(Muzemil et al,2019)

By comparing the two sample sizes calculated above, the sample size of goiter prevalence was greater than sample size calculated from prevalence of Sex, iodine level of salt, educational status of father and family history, then the sample size was 361 multiply by design effect 1.5 it became 542 and adding 10% non-respondent rate, total sample size was 596 adolescents.

3.6. Sampling techniques

The sampling procedure was stratified sampling method (stratified in to rural and urban kebele). The woreda has 21 kebeles. Six kebeles (five from 20 rural kebeles and one from urban kebeles) were selected by simple random sampling technique using lottery method. All the kebeles were found at altitude >1500m. Then, in the selected kebeles using the list of the household (obtained from registration books (family folders) of health extension workers in the selected kebeles) number as sampling frame, and a total of household with eligible adolescents 5980 households of which 988 from meskelo, 1194 from asketema, 760 from miyo, 885 from bela, 1142 from debre weila and 1011 from zarota, systematic random sampling technique was applied to reach individual households from each selected kebeles. In each kebeles a number of households with proportional to size was allocated. In case, there was more than one 10-19 years children in the same household, only one index adolescent was selected by lottery method to collect information on the adolescent's health characteristics. Intervals (Kth) for selecting households was determined by dividing the number of households with the sample size allocated for each kebeles. After determining the Kth interval, the first household was selected randomly. The next households were identified systematically on wards by adding cumulatively Kth intervals to the first selected household kebele of the district was selected.

Once the study kebeles were identified, 596 households were selected by using Proportional allocation to size.

$ni = n \times Ni / N$

Where, n is required sample size; Ni was total households in each six selected kebeles; N was total households in the six selected kebeles; Using the above formula, the number of selected households were Meskelo =98 Asketema =119, Miyo = 76, Bela = 88, Debre weila =114 and Zarota =101. Finally the required sample size was found, 596.

For example, Meskelo kebele $(596 \times 988)/5980=98$ (**Figure. 2**)

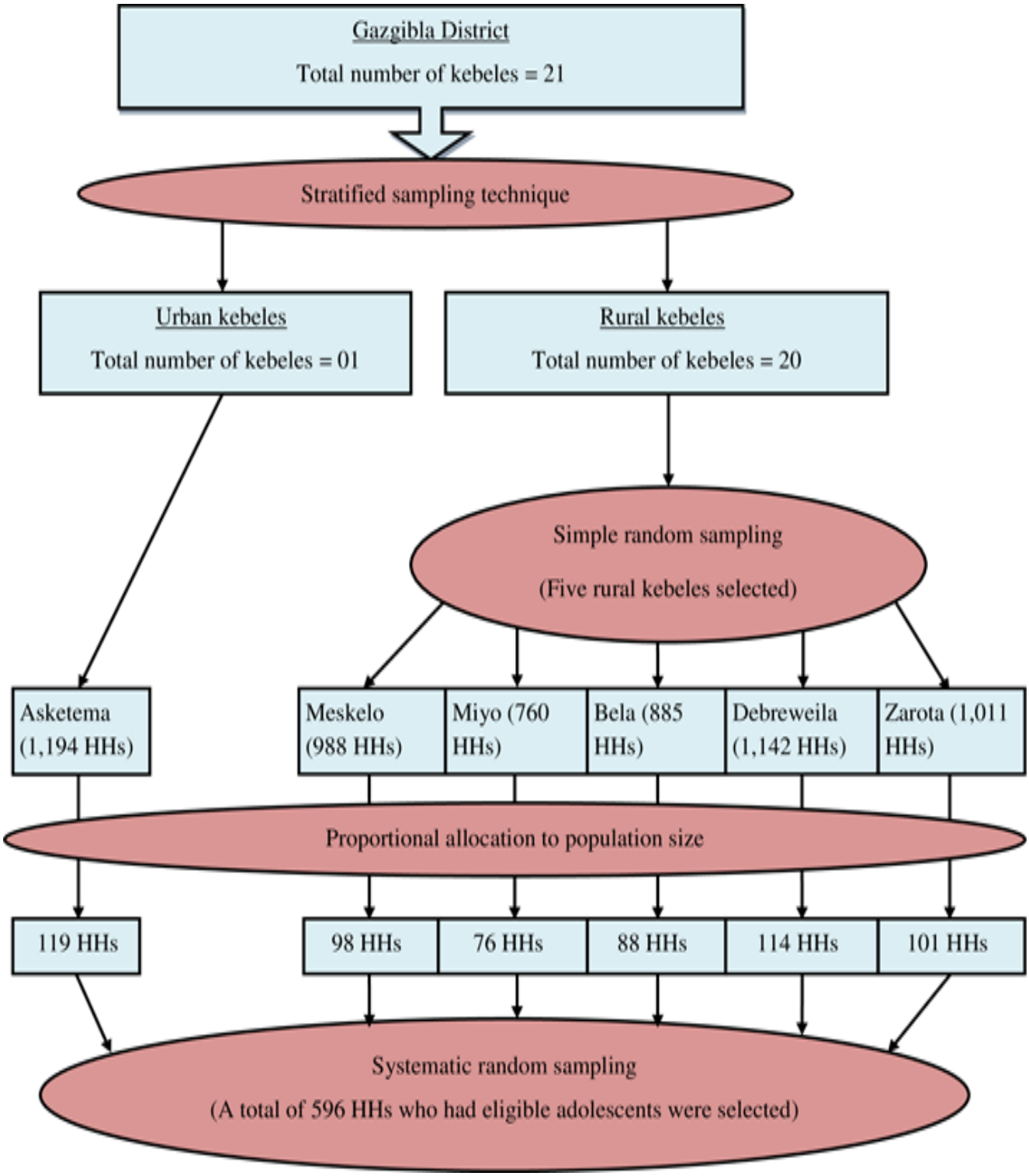

Figure 2: The schematic presentation of the sampling procedure employed to select adolescent aged 10-19 years in Gazgibla woreda, 2019.

3.7. Data Collection Methods

3.7.1. Data collection tool and Procedure

The data collection was collected using structured interviewer-administered questionnaire. The questionnaire was prepared in English and was translated from English to Amharic because mainly the local language of the community was Amharic and re-translated back to English to ensure consistency. Before undertaking the data collection the instrument was tested taking 5% (29) of the sample size in Diwna and Degola kebeles which were not included in the selected kebeles to ensure it's for validity and feasibility of the questionnaires based on the finding, minor modifications of questions, wordings, phrases and time required to interview a respondent was made eligible for feasibility of the questionnaires. After pre-test, the reliability of the questionnaire was cheeked cronbach's batch alpha. The pre-tested data was not be included in the main data. The interview was conducted by six diploma nurses. Two day training was given to data collectors by the investigator. During data collection when the selected houses were found locked next time the house was revisited two times. Altitude of the selected kebele was recorded by asking of agriculture office.

In the selected household adolescents of the recommended age were clinically examined for the enlargement of thyroid (goiter) by six emergency surgeons divided in to two groups to minimize inter-individual variability using palpation method as per recommendations. Values of physical examination of goiter was considered as acceptable by the nutral emergency surgeon. The health professionals who do the goiter examinations were recruited from Tefera hailu memorial hospital Amdwork hospital. Goiter grading was done as per recommendation of WHO/UNICEF. The gland classified as grade 0: Normal (No palpable or no visible), Grade 1: goiter palpable, in normal position and Grade 2: goiter visible in normal position (WHO, 2007) and total goiter prevalence (TGP) was measured by the sum of Grade 1 and Grade 2. General safety procedures during diagnosis were applied. The other quantifiable indicators like urinary iodine excreation (UIE) method and thyroid stimulating hormon (TSH) was not be considered in the study because they are costly and inaccessible in our settings.

Salt at household level was measured by rapid test kit. The data collector delivered one or two drops of the solution on a small salt sample (one teaspoon is adequate). The intensity of the blue color which develops indicates the salt iodine level. Finally the results was

expressed in parts per million (ppm), iodine level of salt (sufficient >15ppm, medium <15ppm and no iodine 0 ppm) (WHO, 2007).

3.8. Study Variables

3.8.1. Dependent Variable

- Goiter among adolescents

3.8.2. Independent Variables

- **Socio demographic factors:** Age, sex, family history of goiter educational status of mother and father, mothers/fathers occupation, and income.
- **Goitrogenic factors:** maize, millet and cabbage.
- **Dietary factor:** fish ,milk ,meat and Egg
- **Environmental factors:** altitude high and low
- **Knowledge of mother's/caregiver's of adolescents on iodized salt**
- **Utilization of iodized salt**: Iodine level of salt used by the house hold and time of adding iodized salt while cooking foods.

3.9: Operational Definitions

Adolescents: 10-19 years old children

- **Grade 0** : No palpable or visible goiter when the neck is in the normal position,
- **Grade 1** : Goiter that is palpable but not visible when the neck is in the normal position,
- **Grade2**: Swelling in the neck that is clearly visible when the neck is in a normal position (WHO, 2007).

In this study, the presence of goiter was considered:-

- **Absent**: if no palpable or visible goiter (Grade 0).
- **Present**: when the child has Grade 1 or grade 2 goiter or both.

- ❖ If the result of goiter was:-
  - ✓ **0-4.9%** : no Iodine deficiency disorder,
  - ✓ **5-19.9%:** mild iodine deficiency disorder,
  - ✓ **20-29.9%:** moderate iodine deficiency disorder,
  - ✓ **30% and above**: severe iodine deficiency disorder (WHO, 2007)
- ❖ Iodine content of salt
  - ✓ **Sufficient** >15ppm(Blue color)
  - ✓ **Medium**: 1-15 ppm(white blue color)
  - ✓ **No iodine**: 0 ppm. (White color) (WHO, 2007).

3.10. Data Quality Control

Data quality was checked during questionnaire designing, data collection, and data entry. Questionnaire was prepared by considering the objective of the study, logically sequenced, and free of scientific and technical terms and pretested. The data collectors and supervisors were trainees on the objectives of the study and data quality to minimize inter-individual variability. The collected data was checked by the principal investigator and assigned supervisors on daily basis for any incompleteness and/or consistency. If any incompleteness and/or inconsistency appear, correction was made by going back to the adolescents or by taking the appropriate measure.

Data collectors were supervised closely by the supervisors and the principal investigator. During data collection time, a clear introduction that explains the purpose and objectives of the study was provided to respondents. Completeness of each questionnaire were checked by the principal investigator and the supervisors on daily basis. Double data entry was done by two data clerks and consistency of the entered data was cross checked by comparing the two separately entered data on EpiData. Finally, multivariable logistic regration analysis was run in the binary logistic regression model to control the confounding factors**.**

3.11. Data Processing and Analysis

After data collection, data were edited and cleaned; each questionnaire was checked for completeness and coded. Double Data were entered into computer using EpiData version 3.1 and then exported into SPSS statistical software version 22 for analysis. Descriptive statistical analysis such as simple frequencies and measures of central tendency was used to describe the characteristics of participants. Then the information was presented using frequencies, tables and figures.

Bivariable logistic regression analysis and COR with 95% CI was computed to identify independent variables that are significantly associated with outcome variable. Then, Variables in bivariable logistic regression analysis whose p value less than 0.25 ($p<0.25$) were included in multivariable logistic regression analysis not to miss associated factors. Then investigate independent predictors by controlling for possible confounders. The included independent variables were tested for multicollinearity using Variance Inflation Factor (VIF), and no significant (VIF > 10) collinearity was detected. And also Multi co-linearity test was carried out to see the correlation between independent variables using standard error and no significance those with standard error of > 2. Model goodness-of-fit was checked byHosmer and Lemeshow test, and the final model was well fitted with the included variables (pvalue= 0.35). Finally AOR along with 95% CI was estimated to identify factors associated with goiter using multivariate analysis in the binary logistic regression and Level of statistical significance was declared at p-value< 0.05.

3.12. Ethical Considerations

Ethical clearance was first secured from Haramaya University, College of Health and Medical Sciences Institutional Health Research Ethics Review Committee (IHRERC.Then, official Written letters were obtained from Waghimra zone health department and Gazgibla woreda Health office. An informed, voluntary, written and signed consent were obtained from each adolescent 19 years and mother /care giver of 10-18 years adolescent's to participate or not to participate in the study and for their willingness on use of their responses and measurement findings for the study. In line with this, oral assent was obtained from the Adolescents themselves before palpation of their thyroid gland a thumbprint or signature was used on the consent form. Those who sign written

consent was only participated in the study and confidentiality of response was maintained throughout the research process by giving code for participant. The entire study participants were informed that data was kept private and confidential and used only for research purpose. The participants were also assured that they had the right to refuse or withdraw if they were not comfortable at any time. Personal privacy and cultural norms were respected. Those adolescents who were identified as having goiter were referred to health institutions to get appropriate treatment and support.

3.13. Dissemination of Result

First, the study will be presented to the community of Haramaya University on open defense of public health researches and defended. Then the finding of the study will be submitted to Haramaya University, and then the copies of the report will be given to waghimra zone health department, Gazgibla health office, Gazgibla administration, wag himra zone female affaires and NGOs working on nutrition. Attempt will be made to present on national and international conference and workshops. Besides, publication on peer-reviewed journal will be considered.

4. RESULTS

4.1. Socio-demographic characteristics of study participants

Of the total 596 sample size, a complete response was obtained from 576, which makes 96.6% response rate. Majority of the adolescents, 398 (69.1%) were between the ages of 15 and 19 years. The mean(± SD)age of the study participants was 15.29 years (±2.424) and 458 (79.5%) were residents of rural areas.

From the total study participants, 291 (50.5%) were females. Four hundred seventy two (81.9%) of mothers/caregivers were unable to read and write, 322(55.9 %) were house wives by occupation. Were as the majority of the adolescents' fathers, 401 (76.1%) were unable to read and write and 487 (92.4%) were farmers by occupation. Two hundred six (35.8%) of the adolescents were from households with average monthly income 8001-1600 ETB, and 253 (43.9%) had family history of goiter (Table 2).

Table 2: Socio-demographic characteristics of the adolescents and their mothers/caregivers in Gazgibla woreda, North East Ethiopia, 2019 (n=576).

Variables	Catagories	Frequency	Percentage
Age of the adolescent	10-14 years	178	30.9
	15-19 years	398	69.1
Sex of adolescent	Male	285	49.5
	Female	291	50.5
Residence	Rural	458	79.5
	Urban	118	20.5
Education status of mothers	Unable to read and write	472	81.9
	Able to read and write	86	14.9
	Primary education	10	1.8
	Secondary education	2	0.4
	above secondary	6	1.0
Occupational status of mothers	House wife	322	55.9
	Farmer	213	37.0
	Civil servant	7	1.2
	Merchant	19	3.3
	Others*	15	2.6
Education status of father (n=527)	Unable to read and write	401	76.1
	Able to read and write	109	20.7
	Primary education	7	1.3
	Secondary education	4	0.8
	above secondary	6	1.1
Occupation of fathers (n=527)	Farmer	487	92.4
	Civil servant	12	2.3
	Merchant	18	3.4
	Others*	10	1.9
Income per months	<=400	147	25.5
	401-800	161	28
	801-1600	206	35.8
	1601-3000	62	10.7
	<=400	147	25.5
Family history of goiter	Yes	253	43.9
	NO	323	56.1

* Others: Daily laborer, private worker.

4.2. Dietary habit of adolescents

Out of 576 adolescents, 261 (45.3%) of them consumed millet and 35.8% of them consumed it at least once a month. But maize was rarely consumed in the area, 23 (4%) only. Cabbage was consumed, 125 (21.7%) at least once per week and 255 (43.4%) at least once per month by the adolescents. Among dairy products egg, meat and milk were consumed by 249 (43.4%), 110 (19.1%) and 199 (34.5%) of the adolescents, respectively. However none of the respondents consume fish at all (Table.3).

Table 3: Dietary intake of Adolescents in Gazgibla woreda, North East Ethiopia, 2019 (n=576).

Variables	Catagories	Frequency	Percentage
Frequency of maize consumption	At least once per week	5	0.9
	At least once per month	18	3.1
	Never	553	96
Frequency of millet consumption	At least once per day	11	1.9
	At least once per week	44	7.6
	At least once per month	206	35.8
	Never	315	54.7
Frequency of cabbage consumption	At least once per week	125	21.7
	At least once per month	255	44.3
	Never	196	34
Frequency of egg consumption	At least once per week	24	4.3
	At least once per month	225	39.1
	Never	327	56.6
Frequency of meat consumption	At least once per month	110	19.1
	Never	466	80.9
Frequency of milk consumption	At least once per week	6	1.0
	At least once per month	193	33.5
	Never	377	65.5
Frequency of fish consumption	Never	576	100

4.3. Awarness and utilization of iodized salt by mothers/caregivers of adolescents

In this study, 485 mothers (84.2%) were aware of iodized salt and 91 (15.8%) of the respondents were consumed non-iodized type (commonly known as rock salt) and 285 (49.5%) used iodized salt .Among iodized salt users in their home, 292 (50.7%) of them used it always, while the rest has been used it sometimes and not at all. Theree hundred fortiy five (50.7%) of mothers/caregivers usually add iodized salt at the end of cooking foods were as 180 (31.2%) of them add iodized salt during cooking (Table 4).

Table 4: Knowledge and Utilization of iodized salt of adolescent's mothers /care givers on iodized salt Adolescents in Gazgibla woreda, North East Ethiopia,2019 (n=576).

Variables	Catagories	Frequency	Percent
Do know iodized salt	Yes	485	84.2
	No	91	15.8
What type of salt frequently used	Packed(iodized salts)	285	49.5
	Coarse not packed(not iodized salt	91	15.8
	Both	200	34.7
How often you use iodized salt	Always	292	50.7
	Some times	193	33.5
	Not use	91	15.8
Time to add iodized salt while cooking foods	During cooking	180	31.2
	After cooking	345	59.9
	I do not know	51	8.9

4.4. Iodine level of salt used by the house holed

Among household salt samples, iodine concentration varied from 0 ppm to 30 ppm by using rapid test kits. The iodine rapid test result showed that 244 (42.4%) of the sampled household salts were inadequate levels of iodine (1–15 ppm) (Figure.3).

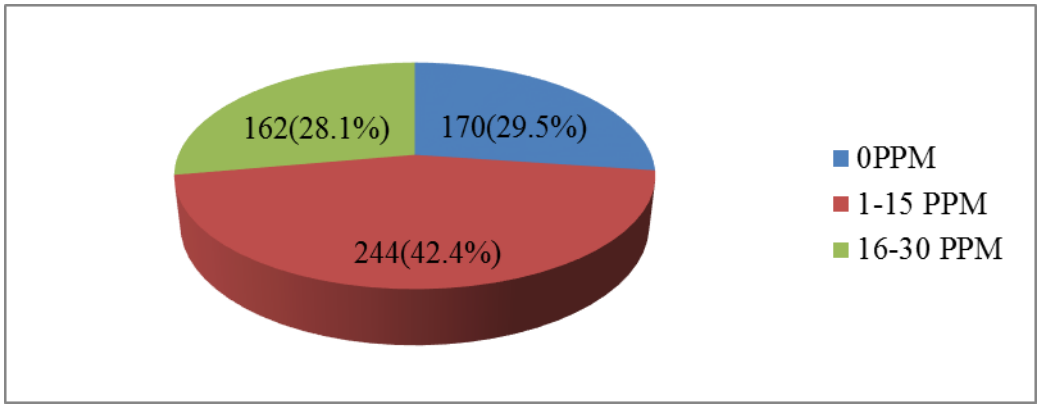

Figure 3: Iodine level of salt used by the house hold in Gazgibla woreda, North East Ethiopia, 2019 (n=576).

4.5. Environmental Factors

Table 5. Altitude of the kebeles in Gazgibla woreda, Waghimra Zone, North East Ethiopia, 2019 (n=576).

Variables	Frequency	Percent
Altitude of the area		
1500-2000 meter	118	20.5
2001-2500 meter	314	54.5
>2500 meter	144	25.0

4.6. Prevalence of goiter among adolescents

The overall prevalence of goiter among adolescents was 245 (42.5%, CI: 38.4%, 46.7%) (figure.4). And also Prevalence of goiter among rural adolescents was 197 (43%) was and 48 (40.7%) among urban adolescents.

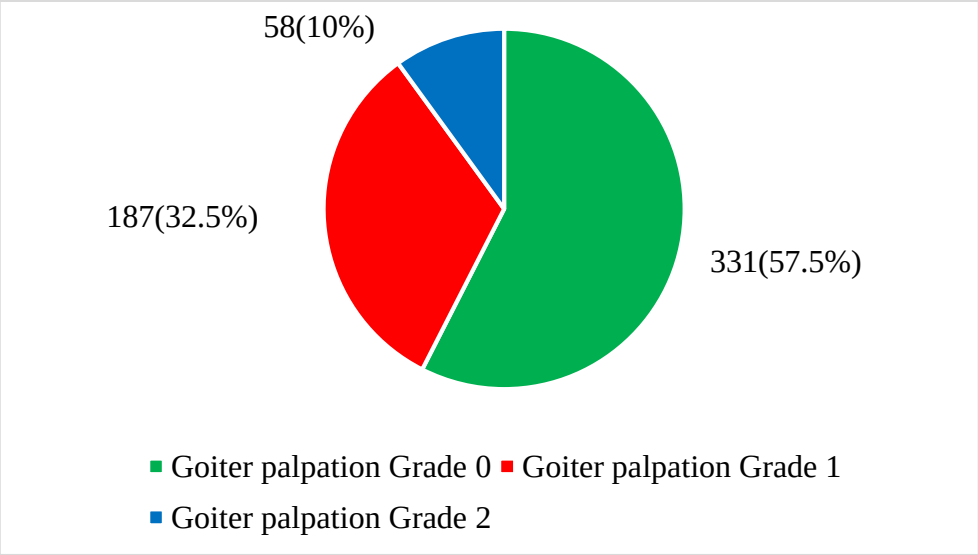

Figure 4: Physical examination of goiter by palpation and inspection of neck for adolescent in Gazgibla woreda, North East Ethiopia, 2019 (n=576).

4.7. Factors associated with goiter among adolescents

Bivariable and multivariable analysis were done in the binary logistic regression to identify factors associated with goiter. Accordingly, in Bivariable logistic regression analysis the age of adolescent, sex of adolescent, fathers educational level, fathers occupational status, family history of goiter, consumption of millet, cabbage, egg, meat and milk, frequancy of type of salt used, knowledge of iodized salt, time of adding iodized salt while cooking foods and iodine level of salt were significantly associated with Goiter at P-value <0.25 (Table. 5).

Table 6: Factors associated with goiter among adolescents in Gazgibla Woreda, North East Ethiopia, August 2019 (n = 576).

Independent	Catagories	Goiter among adolescents	COR (95% CI)	P-va

variables		YES	No		lue
Age of adolescents	10-14	64(36%)	114(64%)	1.00	
	15-19	181(45.5%)	217(54.5%)	1.48 (1.032, 2.14)	0.03
Sex of adolescents	Male	97(34%)	188(66%)	1.00	
	Female	148(50.9%)	143(49.1%)	2.01 (1.43,2.81)	0.00
Educational status	Noformal education	238(42.7%)	320(57.3%)	1.16(0.45, 3.06)	0.75
of mother	Formal education	7(38.9%)	11(61.1%)	1.00	
	Civil servant	2(28.6%)	5(71.4%)	1.00	
Occupational	Farmer	80(37.6%)	133(62.4%)	1.50(0.29,7.93)	0.63
status of mother	House wife	145(45%)	177(55%)	2.05(0.39,10.71)	0.40
	Merchant	9(47.4%)	10(52.6%)	2.25(0.35,14.61)	0.40
	Others	9(60%)	6(40%)	3.75(0.54,26.05)	0.27
Educational status	No formal education	221(43.3%)	289(66.7%)	3.56 (1.01, 12.57)	0.05
of fathers (n=527)	Formal education	3(17.6%)	14(82.3%)	1.00	
Occupational	Civil servant	2(16.7%)	10(83.3%)	1.00	
status of father	Farmer	207(42.5%)	280(57.5%)	3.69(0.80,17.05)	0.09
(n=527)	Merchant	9(50%)	9(50%)	5.00(0.85,29.57)	0.08
	Others	6(60%)	4(40%)	7.50(1.04,54.12)	0.05
	<=400	58(39.5%)	89(60.5%)	0.96(0.53,1.77)	0.91
Income per month	401-800	78(48.4%)	83(51.6%)	1.39(0.77,2.52)	0.28
	801-1600	84(40.8%)	122(59.2%)	1.02(0.57,1.82)	0.95
	1601-3000	25(40.3%)	37(59.7%)	1.00	
Family history of	Yes	154(60.9%	99(39.1%)	3.96(2.8,5.63)	0.00
goiter	No	91(28.2%)	232(71.8%	1.00	
Frequency of	At least once per week	3(60%)	2(40%)	2.06 (0.34,12.43)	0.43
maize	At least once per	9(50%)	9(50%)	1.37 (0.54,3.51)	0.51
consumption	month				
	Never	233(42.1%)	320(57.9%)	1.00	

Table: 6.continued.

Frequency of	At least once per day	7(63.6%)	4(36.4%)	2.00 (0.57, 6.97)	0.28
millet	At least once per week	22(50%)	22(50%)	1.14 (0.61,2.15)	0.68

consumption	At least once per month	69(33.5%)	137(66.5%)	0.57 (0.40,0.83)	0.00
	Never	147(46.7%)	168(53.3%)	1.00	
Frequency of cabbage consumption	At least once per week	80(64%)	45(36%)	4.55 (2.82,7.37)	0.00
	At least once per month	110(43 %)	145(66.9%)	1.94 (1.31,2.9)	0.00
	Never	55(28.1%)	141(71.9%)	1.00	
Frequency of egg consumption	Yes	70(28.1%)	179(71.9%)	1.00	
	No	175(35.5%)	152(64.5%)	2.94 (2.07,4.18)	0.00
Frequency of meat consumption	Yes	15(13.6%)	95(86.4%)	1.00	
	No	230(49.4%)	236(50.6%)	6.17(3.48,10.96)	0.00
Frequency of milk consumption	Yes	43(21.6%)	156(78.4%)	1.00	
	No	202(53.6%)	175(46.4%)	4.18 (2.83, 6.21)	0.00
Knowledge of iodized salt	Yes	187(38.6%)	298(61.4%)	1.00	
	No	58(63.7%)	33(36.3%)	2.80(1.76,4.46)	0.00
Frequency of iodized salt used	Always	42(14.4%)	250(85.6%)	1.00	
	Some times	144(74.6%	49(23.4%)	17.49 (0.05,0.16)	0.00
	Not used	59(64.8%)	32(35.2%)	10.97 (0.93,2.73)	0.09
Time of adding iodized salt while cooking	After cooking	74(21.4%)	271(78.6%	1.00	
	During cooking	137(76.1%	43(23.9%)	11.66(7.60,17.91)	0.00
	I do not know	34(66.7%)	17(33.3%)	7.32 (3.88,13.84)	0.00
Iodine level of salt	0-15 ppm	223(53.9%)	191(46.1%)	7.43 (4.56,12.12)	0.00
	>15 ppm	22(13.9%)	140(86.1%)	1.00	
Altitude of the area	1500-2000 meter	48(40.7%)	70(59.3%)	1.00	
	2001-2500 meter	147(46.8%)	167(53.2%	1.28 (0.84,1.97)	0.27
	>2500 meter	50(34.7%)	94(65.3%)	0.77 (0.47,1.28)	0.32

COR: Crude Odds Ratios CI: Confidence Interval

However in multivariable logistic regression analysis sex of adolescent, family history of goiter, frequency of cabbage, egg, meat consumption, time of adding iodized salt while

cooking foods and level of iodized salt were significantly associated with goiter at P-value <0.05.

Further more, Female adolescents were 1.84 times more likely to have a goiter (AOR = 1.84, CI: 1.09, 3.14) than their counter parts. The odds of goiter was 2.93 times higher among adolescents whose families had history of goiter (AOR = 2.93, CI: 1.74, 4.95). The occurrence of goiter was 2.04 times higher among adolescents who do not consume egg at all, compared to those who consume (AOR = 2.04, CI: (1.09, 3.84). Similarly, adolescents who do not consume meat were 3.12 times more likely to develop goiter (AOR = 3.12, CI: 1.30, 7.53). On the other hand, the occurrence of goiter was 5.69 times higher among adolescents who consume cabbage at least once a week than adolescents who do not consume at all (AOR = 5.69, CI: 2.67, 12.11) (Table 6).

The occurrence of goiter was 4.69 more likely among adolescents whose families added iodized salt during cooking compared to whose families added iodized salt after cooking (AOR=4.69, CI: 2.58, 8.52). Likewise, adolescents whose families salt with inadequate levels of iodine (0-15 ppm) were 2.30 times more likely to have goiter compared to whose families with adequate level of iodine (>15 ppm) (AOR = 2.30, CI: 1.08, 4.89) (Table 6).

Table 7: Factors Associated with Goiter among adolescents in Gazgibla Woreda, North east Ethiopia, August 2019 (n = 576).

Independent variables	Goiter among adolescents	COR (95% CI)	AOR (95% CI)

	Yes	NO		
Age of adolescent				
10-14	64(36%)	114(64%)		1.00
15-19	181(45.5%)	217(54.5%)	1.48 (1.032, 2.14)*	1.34 (0.76, 2.37)
Sex of adolescents				
Male	97(34%)	188(66%)	1.00	1.00
Female	148(50.9%)	143(49.1%)	2.01 (1.43,2.81)**	1.84(1.09,3.14)*
Educational status of fathers (n=527)				
No formal education	221(43.3%)	289(66.7%)	3.56 (1.01, 12.57)*	12.29 (0.3, 5.06)
Formal education	3(17.6%)	14(82.3%)	1.00	1.00
Occupational status of father (n=527)				
Civil servant	2(16.7%)	10(83.3%)	1.00	1.00
Farmer	207(43%)	280(57%)	3.69(0.80,17.05)	0.03(0.00,1.77)
Merchant	9(50%)	9(50%)	5.00(0.85,29.57)	0.11(0.00,8.2)
Others	6(60%)	4(40%)	7.50(1.04,54.12)	0.13(0.01,2.9)
Family history of goiter				
Yes	154(60.9%	99(39.1%)	3.96(2.8,5.63)**	2.93 (1.74,4.95)**
No	91(28.2%)	232(71.8%	1.00	1.00
Frequency of millet consumption				
At least once per day	7(63.6%)	4(36.4%)	2.00 (0.57, 6.97)	1.38 (0.17, 11.25)
At least once per week	22(50%)	22(50%)	1.14 (0.61,2.15)	1.45 (0.53, 3.96)
At least once per month	69(33.5%)	137(66.5%)	0.57 (0.40,0.83)*	0.88(0.50, 1.56)
Never	147(46.7%	168(53.3%)	1.00	1.00

Table: 7. Continued.

Frequency of cabbage consum				
At least once per week	80(64%)	45(36%)	4.55 (2.82,7.37)**	5.69(2.67,12.11)**
At least once per month	110(43 %)	145(66.9%)	1.94 (1.31,2.9)*	2.02 (1.10, 3.70)*
Never	55(28.1%)	141(71.9%)	1.00	1.00
Frequency of egg consumption				
Yes	70(28.1%)	179(71.9%)	1.00	1.00
No	175(35.5%	152(64.5%)	2.94 (2.07,4.18)**	2.04(1.09,3.84)*
Frequency of meat consumption				
No	15(13.6%)	95(86.4%)	1.00	1.00
Yes	230(49.4%)	236(50.6%)	6.17(3.48,10.96)**	3.12(1.30,7.53)*
Frequency of milk consume				
Yes	43(21.6%)	156(78.4%)	1.00	1.00
No	202(53.6%)	175(46.4%)	4.18 (2.83, 6.21)**	1.03 (0.63, 2.72)
Knowledge about iodized salt				
Yes	187(38.6%)	298(61.4%)	1.00	1.00
No	58(63.7%)	33(36.3%)	2.80(1.76,4.46)**	0.41 (0.03, 6.04)
Frequency of iodized salt used				
Always	42(14.4%)	250(85.6%	1.00	1.00
Some times	144(74.6%	49(23.4%)	17.49(0.05,0.16)**	1.55 (0.49, 6.47)
Not used	59(64.8%)	32(35.2%)	10.97 (0.93,2.73)	2.45(0.44,4.23)
Time of adding iodized salt				
After cooking	74(21.4%)	271(78.6%)	1.00	1.00
During cooking	137(76.1%	43(23.9%)	11.66(7.60,17.9)**	4.69 (2.58,8.52)**
I do not know	34(66.7%)	17(33.3%)	7.32(3.88,13.84)**	3.28(1.11,9.72)*
Iodine level of salt				
0-15 ppm	223(53.9%)	191(46.1%)	7.43(4.56,12.12)**	2.30 (1.08, 4.89)*
>15 ppm	22(13.9%)	140(86.1%)	1.00	1.00

***Statistically significant at p-value = 0.05–0.01, **Statically significant at p-value <0.01**

COR: Crude Odds Ratios CI: Confidence Interval AOR: Adjusted Odds Ratio

5. DISCUSSION

The findings of this study assessed the prevalence and associated factors of goiter among Adolescents. Accordingly, The prevalence of goiter in this study was 42.5%, (CI: 38.4%, 46.7%). The prevalence of grade one goiter was 32.5%, (CI: 28.6%, 36.3%) while grade two was 10%, 9 CI: 7.6%, 12.7%). According to WHO classification, the prevalence of goiter in the study area is very high (WHO,2007). Prevalence of goiter among rural adolescents was 43% was and 40.7% among urban adolescents. This might be due to inadequate level of iodine in the salt and consumption of iodine poor foods. Being female, family history of goiter, iodine level of house hold salt, time of adding iodized salt while cooking, frequency of cabbage, egg and meat consumption were identified as independent predictors of goiter among adolescents.

Our estimated prevalence was in line with the national prevalence (39.9%), systematic review and meta-analysis (40.5%) and a study done in Sudan (38.8%) (Cherinet et al., 2008; Getenet, 2019; Gaitan et al., 1990). But the prevalence of goiter among adolescent in this was found to higher than finding from Tanzania which is 25% of Total Goiter Prevalene (TGP) in 6–18 years of children, South Africa (25.5%), southern Blue Nile area of Sudan (22.3%) , India (20.5%)) and Rajasthan (11.4%) (Elnour et al., 2000; Misra, 2007; Jooste and Kriek, 1997; Singh, 2010). Similarly, the prevalence of goiter in this study was higher than a study conducted in Beni Shangul Gumuz region (26.3%), North west Ethiopia (37.6%) and Chole district of Arsi zone (36.6%) (Tesfaye et al., 2014; Molla et al., 2014; Abera and Takele, 2019). Possible reason for the variations from place to place could be the density of grass and altitude of the area. Our study was conducted in an over-grazed and mountainous environment highly exposed to iodine deficiency due to frequent erosion of soil from flood, heavy rain and wind that make soils and drinking water iodine depleted. Crops grown in these soils will be low in iodine, and adolescents consuming food grown in these soils become iodine deficient and will develop goiter.

In the current study the prevalence of goiter was lower than a study done in Islamabad which was (71.6%), Enda-Mehoni district in Tigray (71.7%) and a study done among ten villages from four ad-ministrative regions of Ethiopia with a gross prevalence of goiter among school children of 53.3% (Ali TZ., 1999; Teklay and Aregai, 2006; Cherinet, 2007). Similarly, the

study reports from Shebe Senbo (59.1%) Anchar district, eastern Ethiopia (51.8%), Wolaita and Dawro zones, southern Ethiopia (48.9%) and Burie/Womberma districts (54%) revealed higher prevalence of goiter than this study (Yinebeb et al., 2012; Muzemil et al, 2019; Shimelash et al., 2017; Aweke et al., 2010). These all variations might be due to socio-demographic, and socio-economic. In addition, the variations might also be due to differences in altitude, feeding habits, access to iodized salt and iodine rich foods.

In the current study the odds of occurrence goiter among female adolescents were 1.84 more likely compared to their counter parts. This finding is supported by studies in Sub-Saharan Africa, southern Ethiopia, northern Ethiopia, Debre tabor towen, systematic review and meta analaysis in Ethiopia which states that females were significantly affected as compared to males (Sidibe, 2007; Teklay and Aregai, 2006; Shimelash et al., 2017; Dawit and Worku, 2019;Getenet ,2019). And on the other hand, it is contradicted with findings from western part of Germany and Islamabad reported that males were more likely affected than females. (Farahati et al., 2006; Ali TZ et al., 1999). These sex differences in goiter prevalence may be due to differences between the sexes in levels of the hormones and sex steroids that affect thyroid function. This may be due to the fact that iodine requirement for female are higher than males especially at the beginning of pubertal age which starts about 2 years earlier than males.

In the current study adolescents whose family had history of goiter were about 2.93 times more likely to have goiter compared to their counterparts. This finding is in agreement with the study that was done in North West Ethiopia Children having goiter in first degree relative were 3.18 times more likely to develop goiter when compared with those who had no goiter (Molla et al., 2014). And also agree with a study in Germany reported that, Patients with goiter had showed a significantly higher proportion of parents or siblings with goiter and Children from parents' with goiter showed a 2.7 fold increased risk of developing goiter (Dertia et al., 1981). Similary different studies supported that family history of goiter was significanty associated with occurance of goiter (Takele et al., 2003; ICCIDD, 2009; Cherinet, et al, 2007; Delange, 2007; Abera and Takele, 2019; Getenet, 2019). This could be due to the fact that malnutrition has inter-generational cycles. And also this could be explained in terms of a number of environmental and dietary factors associated with iodine

deficiency that are inter-generational due to either poverty or low coverage of national salt iodization program.

Adolescents who consumed cabbage at least once in a week were 5.69 time to develop goiter than those who had not consume at all. It was also consistent with findings of similar other studies that were conducted previously in different parts of the country like in Goba Town, in Shebbe Senbo district, Jimma zone, Anchar district and Chole district (Habtamu et al, 2015; Yinebeb et al., 2012; Abera and Takele, 2019; Muzemil et al, 2019). The possible explanation for this could be due to cabbage being a natural goitrogenic food that contains thiocyanate and isothiocyanate, which inhibit thyroid iodide transport and can decrease the iodine absorption and utilization in our body. The inhibited thyroid iodide transport in our body, may result in the iodine deficiency and enlargement of thyroid gland (goiter).

On the other hands in the current study adolescents who were do not consuming eggs were 2.04 times more likely to develop goiter comparing who consume egg. This was consistent with other studies (Desalegn and Dawit ,2017; Kebede and Adnew ,2015; Eskinder et al.,2014; Abera and takele,2019; Muzemil et al, 2019). Animal-source foods are the richest and most bio available source of iodine. And also the occurrence of goiter were 3.12 more likely among adolescents not consuming meats. This could be explained as eggs, meat and dairy products are good sources of iodine(Thurnham, 2014).

The Federal Democratic Republic of Ethiopia (FDRE) passed a mandatory salt regulation and monitoring requiring all salt meant for human consumption to be iodized since March 2011 (EPHI, 2014). However, our study findings indicated that only 28.1% of the families of adolescents who participated in this study had sufficient levels of iodine in their salt (> 15 ppm). The accessibility of adequate (>15 ppm) iodized salt in this study was supported by studeis conducted in Northwest Ethiopia and Goba town which were 29% and 29.9%, respectively [Molla,et al.,2014; Habtamu, et al.,2015.) The finding of our study was higher than the findings of Ethiopian Demographic and Health Survey or EDHS 2011 which reported 15% of the households' access iodized salt , Anchar district 8.4% and study in done Chole districts ,Arsi zone which reports 2.9% of the hose hold access to adequate iodized salt (EDHS,2011; Abera and takele, 2019; Muzemil et al, 2019). But the finding of our study was

lower than the findings which reported 89% of the household salts are iodized (EDHS, 2016 ; EPHI, 2016).

In our study the occurrence of goiter were 2.30 time more likely among adolescents whose families used inadequate iodized salt (0-15 ppm) compared with whose families used adequate iodized salt. This is supported by other different studies (Desalegn and Dawit ,2017; Abebe Z et al .,2017; Molla, et al., 2014; Muzemil et al, 2019). This could be due to in terms of low coverage of iodization of salt to the community, knowledge on iodized salt which might be improved through an efficient universal salt iodization national program with due emphasis to the most iodine deficient districts like gazgibla woreda. Likewise, adolescents whose families added iodized salt during cooking foods were 4.69 more likely to develop goiter comparing with their counterparts. This coud be due to chemical changes that occur with rapid evaporation of iodine (Gidey, 2015).

As recommended by the WHO, 90% of the households in a population should have access to use salt that contains the iodine level of > 15 ppm for the effective elimination of iodine deficiency disorder or goiter (WHO,2007; WHO,2014). Additionally, the proportion of people who are consuming food items that contain adequate iodine in our study area was law. Which could have resulted in the observed high prevalence of goiter among adolescents.

Strength and limitations of the study

The strength of the study is physical examination of goiter was done by professional Emergency surgeon. However, since the study is cross-sectional, it might not show the temporal relation between the independent and dependent variables. Due to financial limitation for lab investigation like urine iodine excretion, blood test for thyroid stimulating hormone was not done in the study. Further more, Observer bias both in grading of goiter and determination of salt iodine level by rapid test kit were limitations of this study. And also Inspection and palpation method might face measurement bias. There is a possibility that some of the responses might suffer from recall bias since the questions for the dietary habits were based on recall.

6. CONCLUSSION

In general, prevalence of goiter was very high and a serious public health concern in Gazgibla woreda. Moreover, 29.5% of the salt samples were non-iodized and 42.4% of salt samples were inadequate iodine level of house holed salt. Additionally, the proportion of people who are consuming food items that contain adequate iodine in our study area was law. Which could have resulted in the observed high prevalence of goiter among adolescents.

Generally, the occurrence of goiter was affected by being female, family history of goiter, frequency of cabbage consumption, frequency of egg and meat consumption, inadequate iodine level of house holed salt and time of adding iodized salt while cooking were associated factors of goiter among adolescents.

7. RECOMMENDATION

Based on the findings obtained the following recommendations are forwarded to concerned bodies as specific as possible.

For zonal and woreda health department

- Coordinate with stake holder working on nutrition
- Disseminating messages to increase the awareness of the community on how to prevent goiter through the consumption of iodized salt, and iodine rich foods.
- Create awareness on iodized rich foods and strengthen the promotion of iodized salt to the community by cooperating with stake holder like religious fathers, community leaders, religious leaders, health developmental army and health extension workers
- And through effective universal salt iodization program in the community are believed to play significant role in break intergenerational cycles of iodine deficiency disorder, decreasing prevalence of goiter and its associated health effects in the community.
- Finally, periodic assessment of iodine content in house hold salts, accessible and the availability in the market through a regular monitoring system for ensuring the recommended content of iodized salt to the community can have paramount importance as a solution.

For woreda administration

- Should establishing sustainable source and availabilityof iodized salt in the market
- Control non iodized salt from open market and establish farmer association on exchange of iodized salt.

For health extension workers and for health service provider

- It is important that health education of iodine deficiency disorder
- The benefits, utilization of iodized salt and iodine rich foods

For researcher

- Further research is recommended by other study design and investigate the iodine content of water, urine iodine excretion to find the factors.

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9. ANNEXES

ANNEX I: - PARTICIPANT INFORMATION SHEET AND INFORMED VOLUNTARY CONSENT FORM FOR (adolescents 18-19 age years old)

Good morning my name is M/r/s ——————— I am working as a data collector for the study being conducted in this school by Ato G/mebhin G/Michael Berhe who is studying for his Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

The study/project: to assess prevalence of goiter and associated factors among adolescent 10-19 years, at Gazgibla woreda, Waghimra zone, north East, Ethiopia 2019.

Purpose/aim of the study; the main aim of this study is to write a thesis as a partial requirement for the fulfillment of a master's degree in General Public health for the principal investigator. Moreover, the result of the study will be used as evidence and input to plan on iodine deficiency disorder based on findings from the study the institution, Gazgibla woreda health office, governmental and non-governmental organizations working on iodine deficiency disorder.

Procedure and duration: the information will be collected by using structured questionnaires with closed-ended questions filled by data collectors. And also adolescent physical examination for goiter and one teaspoon of salt from your house hold will be used to test for iodine content of the salt. The filling of questioners takes 20-25 minutes, so I kindly request you to spare me this time for the review.

Risks and benefits: The risk of being participants in this study minimal, but only taking your time. Findings from this research will reveal important information for the institutions, health office of town and for health planners.

Confidentiality: The information that will be provided from participant will be confidential. There will be no information that will identify you and your house holed in particular. The findings of the study will be general for the study community and will not reflect anything particularly of individual. The questioners will be coded to exclude showing names.

Rights: Giving permission for this study is fully voluntary. You have the right to participate or not for this study. If you decide not to participate in the study, you have the right to terminate the study at any time if you consider something related to the study is wrong.

Contact address: If there are any questions or enquires any time about the study or procedures, please contact in this address: G/medhin G/Michael (gmedhin80@gmail.com). Or mobile 0921718834; as well as contact address of the responsible institution; Institutional Health Research Ethics review Committee; Office phone: +0254662011 or P.O. Box 235, Harar, Ethiopia.

Declaration of informed voluntary consent: I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature).

Name of participant_____ Signature _____Date_____

Name of data collector_____ Signature _____Date_____

N.B

This is signed face to face in the presence of the data collector.

Please provide a copy of this signed consent to the participant.

Thank you for your cooperation.

ANNEX II: - PARTICIPANT INFORMATION SHEET AND INFORMED VOLUNTARY CONSENT FORM FOR (mothers or care givers of adolescent 10-17 years old)

Good morning my name is M/r/s ——————— I am working as a data collector for the study being conducted in this school by Ato G/mebhin G/Michael Berhe who is studying for his Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

The study/project: to assess prevalence of goiter and associated factors among adolescent 10-19 years, at Gazgibla woreda, Waghimra zone, north East, Ethiopia 2019.

Purpose/aim of the study; the main aim of this study is to write a thesis as a partial requirement for the fulfillment of a master's degree in General Public health for the principal investigator. Moreover, the result of the study will be used as evidence and input to plan on iodine deficiency disorder based on findings from the study the institution, Gazgibla woreda health office, governmental and non-governmental organizations working on iodine deficiency disorder.

Procedure and duration: the information will be collected by using structured questionnaires with closed-ended questions filled by data collectors. And also adolescent physical examination for goiter and one teaspoon of salt from your house hold will be used to test for iodine content of the salt. The filling of questioners takes 20-25 minutes, so I kindly request your son's/daughter's to spare me this time for the review.

Risks and benefits: The risk of being participate in this study minimal, but only taking your son's/daughter's time. Findings from this research will reveal important information for the institutions, health office of town and for health planners.

Confidentiality: The information that will be provided from the participant will be confidential. There will be no information that will identify the participant and your house holed in particular. The findings of the study will be general for the study community and will not reflect anything particularly of individual. The questioners will be coded to exclude showing names.

Rights: Giving permission for this study is fully voluntary. The participant has the right to participate or not for this study. If He/she does not decide to participate in the study, He/she has the right to terminate the study at any time if He/she considers something related to the study is wrong.

Contact address: If there are any questions or enquires any time about the study or procedures, please contact in this address: G/medhin G/Michael (gmedhin80@gmail.com). Or mobile 0921718834; as well as contact address of the responsible institution; Institutional Health Research Ethics review Committee; Office phone: +0254662011 or P.O. Box 235, Harar, Ethiopia.

Declaration of informed voluntary consent: I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that the participant has the right to withdraw from the study at any time or not to answer any question that He/she does not want. Therefore, I declare my voluntary consent on the behalf of my child to allow this study to be conducted with my initials (signature) as indicated below.

Name of mothers /care givers_____ Signature _____Date_____

Name of data collector_____ Signature _____Date_____

N.B

This is signed face to face in the presence of the data collector.

Please provide a copy of this signed consent to the participant.

Thank you for your cooperation.

Annex III: English Version of the Questionnaire

01. Id number of Questionnaire_____ 02. Woreda_____ 03. Kebele _____

I. Socio demographic Characteristics of adolescents in Gazgibla woreda

S.no	Question	responses	Skip to Q
Q.101	Age	_____ Year	
Q.102	Sex	1. Male 2. Female	
Q.103	Educational status mother/caregiver	1.Unable to read and write 2.Able to read and write 3.Primary education 4.Secondary education 5. above secondary	
Q.104	Occupation of mother/caregiver	1. Housewife 2. Farmer 3. civil servants 4. Merchant 5. others/specify-------	
Q.105	Educational status of father (if married)	1.Unable to read write 2.Able to read write 3.Primary education 4.Secondary education 5.above secondary	

Q.106	Occupation of father (if married)	1.Farmer 2. civil servant 3. merchant 4. others/specify-----	
Q.107	Number of children in the age of 10-19 years in the HHs	**1**. One 2. Two 3. Three 4. above 3	
Q.108	Income per months of the house hold	----------ET.Birr	
Q.109	Does any other member of the household has goiter?	1.yes 2.No	

II. Dietary habits of adolescent and consumption of Goitrogenic food in Gazgibla woreda.

S.no	Question	response	Skip to Q
Q.201	How frequently did you consume maize?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	
Q.202	How frequently did you consume millet?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	
Q.203	How frequently did you consume cabbage?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	

Q.204	How frequently did you consume egg?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	
Q.205	How frequently did you consume meat?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	
Q.206	How frequently did you consume milk?	. At least once per day 2. At least once per week 3. At least once per month 4. Never	
Q.207	How frequently did you consume fish?	1. At least once per day 2. At least once per week 3. At least once per month 4. Never	

III. **Knowledge and Utilization of iodized salt in households of adolescent on iodized salt of adolescent's mothers /care givers Gazgibla woreda**.

Ser,No	**Question**	**Response**	**Skip to Q**
Q.301	Do you know about iodized salt?	1.Yes 2.No	
Q.302	What type of salt frequently used?	1. packed/iodized salt 2. coarse not packed (non-iodized) 3. both	
Q.303	How often you use iodized salt in your home?	1. Always 2. Some times 3. Not use	

Q.304	Time to add iodized salt while cooking?	1. During cooking 2. After cooking 3. 3.I do not know	

IV. Amount of iodine level in the salt

Ser,No	Question	Response	Skip to Q
Q.401	Salt iodine level	1. 0 ppm 2. 1-15 ppm 3. 16-30 ppm	

V .Physical examination of goiter by palpation and inspection of neck for adolescents

Ser, No	Examination	Result
Q.501	Goiter palpation	1. Grade 0 2. Grade 1 3. Grade 2

Name of data collector_____ Signature _____Date_____

Name of supervisor_____ signature _____ Date _____

Thank you!

Annex IV: Altitude of the area

1.Altitude of the area	1.< 1500 meter 1. 1500-2000 meter 2. 2001-2500 meter 4.>2500 meter	

Annex V: በአማርኛ የተዘጋጀ የተሳታፊዎች መልእክት እና በፍቀቃደኝነት የተመሰረተ ውል የያዘ ቅጽ (መረጃ በመስጠት 18-19 አመት የሞላቸው ህጻናት የሚነበብ)

ስሜ……እባላለሁ፡፡ አሁን እየሰራሁኝ ያለሁት በዚህ ማህበረሰብ ለሚደረገው ጥናት መረጃ ሰብሳቢ ሆኜ ለአቶ ገ/መድህን ገ/ሚካኤል በሐረማያ ዩኒቨርሲቲ በማህበረሰብ ጤና አጠባበቅ በማስተርስ ደረጃ ለመመረቅያ የሚሆን ጥናት ለማካሔድ ነው፡፡ ስለዚህ እንዴት ተሳታፊ መሆን እንደቻሉና ስለጥናቱ በተመለከተ ማብራሪያ እንድሰጥዎት የተወሰነ ጊዜ እንዲሰጡኝ በአክብሮት እጠይቃለሁ፡፡

የጥናቱ ርዕስ፡ በጋዝጊብላ ወረዳ የእንቅርት ዳሰሳ እና ምክኒያቸው እድሜያቸዉ ከ10-19 እድሜ ላይ ባሉ ህጻናት ላይ ማጥናት፡፡

የጥናቱዓላማ፡ የዚህ ጥናት አላማ በጋዝጊብላ ወረዳ እድሜያቸዉ ከ10-19 ዓመት ባለ ህጻናት የእንቅርት መጠን እና ምክንያቶቹን በማዎቅ የተገኘዉን ዉጤት ለመንግሰት እና ለሚመለከታቸዉ ባለድርሻ አካላት ማሳወቅ ነው፡፡፡፡ ከዚህ በተጨማሪም ለዋና አጥኚው የማስተርስ ትምህርቱን ለማጠናቀቅና የመመረቅያ Îሁፍ ለማዘጋጀት ይጠቅመዋል፡፡

የጥናቱሂደትናግዜ፡ ለጥናቱ የሚያገለግሉና መረጃ ሊሰጡ የሚችሉ ጥያቄዎች ተዘጋጅ ተዋል፡፡ እነዚህ ጥያቄዎች ጠቅላላ 22 ሲሆኑ በቃለ ምልልስ ጥያቄዎቹን ለመመለስ በግምት 20-25 ደቂቃ ይፈጃል፡፡ በተጨማሪም የህጻናት አካላዊ የእንቅርት ምርመራ እና አንድ የሻሂ ማንኪያ ጨው በውስጥ ያለው የአዮዲን መጠን ለማውቅ ለምርመራ እጠቀማለሁ፡፡ ስለዚህ አሁንም በድጋሚ ጊዜዎት እንዲሰጡኝ በአክብሮት እጠይቃለሁ፡

ጉዳትና ጥቅም፡ በዚህ ጥናት በመሳተፍዎ ከሚወስደው ጊዜ በስተቀር የሚደርስቦት ጉዳት በጣም አነስተኛ ነው፡፡ በዚህ ጥናት በመሳተፍዎ የሚያገኙት ቀጥተኛ ጥቅም የለም ነገር ግን የእርስዎ በጥናቱ ላይ መሳተፍ በጋዝጊባላ ወረዳ እድሜያቸዉ ከ10-19ዓመት ባለ ህጻናት የእንቅርት መጠን እና ምክንያቶቹን በማዎቅ የማህበረሰቡን ችግር በመፍታት እገዛ ይደረጋል እና ከጥናቱ የተገኙት ጠቃሚ መረጃዎች ስለጤና እና ጤናን በተመለከተ ለሚያቅዱ የሚመለከታቸው ባለድርሻ አካላት ይጠቅማቸዋል፡፡

ምስጢርአጠባበቅ፡ የሚሰጡን መረጃ ሁሉ ምስጢርነቱ የተጠበቀነው፡፤ ለዚሁም አርሶዎን የሚገልጽ ምንም ነገር የለም፡፡ ለምሳሌ የእርሶ ስም መጠይቁ ላይ አይፃፍም:: የጥናቱ ውጤት ለግለሰብ ወይም ደግሞ ለቤቴሰብ ሳይሆን አጠቃላይ ነው፡ :

የተሳታፊው መብት፡ በዚህ ጥናት ለመሳተፍ ሙሉ ፈቃደኝነት ያስፈልጋል፡፡ በዚህ ጥናት የመሳተፍ ወይም ያለመሳተፍ ሙሉ መብት አለዎት፡፡ ላለመሳተፍ ከፈለጉ ደግሞ በማንኛውም ጊዜ በመሀል ራስዎን ከጥናቱ ማግለል(ማቋረጥ) ይችላሉ፡፡ ካቋረጥኩኝ ጥቅም ይጎልብኛል ብለው አያስቡ፡ ፡መመለስ የማይፈልጉትን ማንኛውም ጥያቄ አለመመለስ መብቶ ነው፡፡

አድራሻ፡ ስለጥናቱ አካሄድ ወይም ስለጥናቱ መጠይቅ ወይም ደግሞ ጥናቱን በተመለከተ ማንኛውም ጥያቄ ካሎት የሚከተሉትን አድራሻ ይጠቀሙ፡፡

ገ/መድህን ገ/ሚካኤል፡ ሞባይል-(+251)-921-718834፣ ኢሜይል-gmedhin80@gmail.com

ተቋማዊ የጤና ምርምር ስነ-ምግባር ግምገማ ኮሚቴ፡ ስልክ-0254662011፣ ፖ.ሳ.ቁ-235 ሀረር

በፈቃደኝነት ላይ የተመሰረተ የስምምነት ማረጋገጫ፡ የተሳታፊውን መረጃ ፎርም አንብቤዋለሁ ወይም ተነቦልኛል፡፡ የጥናቱ ዓላማ፤ ያለውን ጉዳትና ጥቅም ፤ምስጢር አጠባበቅ የመሳተፍ እና ያለመሳተፍ መብት እንዲሁም ችግር ካለ ከማን ጋር መገኛኘት እንዳለብኝ ሁሉ ተገልጾልኛል፤ ጥያቄ ካለኝ ደግሞ እንድጠይቅ እድል ተሰጥቶኝ በመሀል ደግሞ ጥናቱን ለማቆም ከፈለኩኝ በማንኛውም ጊዜ ከጥናቱ /ከተሳታፊነት/ መውጣት እንደምችል በመጨረሻም መመለስ የማልፈልገውን ጥያቄ አለመመለስ መብቱ እንዳለኝ ከተረዳሁኝ በኋላ በሙሉ ፈቃደኝነት በዚህ ጥናት ለመሳተፍ የወሰንኩኝ መሆኔን ከዚህ በታች በተቀመጠው ፊርማዬ አረጋግጣለሁ፡፡

የተሳታፊ ስም …… ፊርማ …… ቀን……...

የመረጃ ሰብሳቢ ስም …… ፊርማ …… ቀን……

Annex VI: በአማርኛ የተዘጋጀ የተሳታፊዎች መልእክት እና በፍቀቃደኝነት የተመሰረተ ውል የያዘ ቅጽ (መረጃ በመስጠት ከ10-17 አመት ህጻን ላላቸው ቤተሰቦች የሚነበብ)

ስሜ……እባላለሁ፡፡ አሁን እየሰራሁኝ ያለሁት በዚህ ማህበረሰብ ለሚደረገው ጥናት መረጃ ሰብሳቢ ሆኜ ለአቶ ገ/መድህን ገ/ሚካኤል በሐረማያ ዩኒቨርሲቲ በማህበረሰብ ጤና አጠባበቅ በማስተርስ ደረጃ ለመመረቅያ የሚሆን ጥናት ለማካሔድ ነው፡፡ ስለዚህ እንዴት ተሳታፊ መሆን እንደቻሉና ስለጥናቱ በተመለከተ ማብራሪያ እንድሰጥዎት የተወሰነ ጊዜ እንዲሰጡኝ በአክብሮት እጠይቃለሁ፡፡

የጥናቱ ርዕስ፡ በጋዝጊብላ ወረዳ የእንቅርት ዳሰሳ እና ምክኒያቸው እድሜያቸዉ ከ10-19 እድሜ ላይ ባሉ ህጻናት ላይ ማጥናት፡፡

የጥናቱዓላማ፡ የዚህ ጥናት አላማ በጋዝጊብላ ወረዳ እድሜያቸዉ ከ10-19 ዓመት ባለ ህጻናት የእንቅርት መጠን እና ምክንያቶቹን በማዎቅ የተገኘዉን ዉጤት ለመንግሰት እና ለሚመለከታቸዉ ባለድርሻ አካላት ማሳወቅ ነው፡፡፡፡ ከዚህ በተጨማሪም ለዋና አጥኚው የማስተርስ ትምህርቱን ለማጠናቀቅና የመመረቅያ Îሁፍ ለማዘጋጀት ይጠቅመዋል፡፡

የጥናቱሂደትናግዜ፡ ለጥናቱ የሚያገለግሉና መረጃ ሊሰጡ የሚችሉ ጥያቄዎች ተዘጋጅተዋል እነዚህ ጥያቄዎች ጠቅላላ 22 ሲሆኑ በቃለ ምልልስ ጥያቄዎቹን ለመመለስ በግምት 20-25 ደቂቃ ይፈጃል፡፡በተጨማሪም የህጻናት አካላዊ የእንቅርት ምርመራ እና አንድ የሻሂ ማንኪያ ጨው በውስጥ ያለው የአዮዲን መጠን ለማውቅ ለምርመራ እጠቀማለሁ፡፡ ስለዚህ አሁንም በድጋሚ የልጅዎትን ጊዜ እንዲሰጡኝ በአክብሮት እጠይቃለሁ፡፡

ጉዳትና ጥቅም፡ በዚህ ጥናት በመሳተፍ ከሚወስደው ጊዜ በስተቀር የሚደርሰው ጉዳት በጣም አነስተኛ ነው፡፡ በዚህ ጥናት በመሳተፍዎ የሚያገኙት ቀጥተኛ ጥቅም የለም ነገር ግን የልጅዋትን በጥናቱ ላይ መሳተፍ በጋዝጊባላ ወረዳ እድሜያቸዉ ከ10-19ዓመት ባለ ህጻናት የእንቅርት መጠን እና ምክንያቶቹን በማዎቅ የማህበረሰቡን ችግር በመፍታት እገዛ ይደረጋል እና ከጥናቱ የተገኙት ጠቃሚ መረጃዎች ስለጤና እና ጤናን በተመለከተ ለሚያቅዱ የሚመለከታቸው ባለድርሻ አካላት ይጠቅማቸዋል፡፡

ምስጢርአጠባበቅ፡ የሚሰጡን መረጃ ሁሉ ምስጢርነቱ የተጠበቀነው፡፤ ለዚሁም የጥናቱ የተሳታፊ ወይም የቤት ቁጥር የሚገልጽ ምንም ነገር የለም፡፡ ለምሳሌ የጥናቱ የተሳታፊው ስም መጠይቁ ላይ አይፃፍም:: የጥናቱ ውጤት ለግለሰብ ወይም ደግሞ ለቤቴሳብ ሳይሆን አጠቃላይ ነው፡፡

የተሳታፊው መብት፡ በዚህ ጥናት ለመሳተፍ ሙሉ ፈቃደኝነት ያስፈልጋል፡፡ በዚህ ጥናት የመሳተፍ ወይም ያለመሳተፍ ሙሉ መብት አለዎት፡፡ የጥናቱ ተሳታፊ ላለመሳተፍ ከፈለጉ ደግሞ በማንኛውም ጊዜ በመሀል ራስዎን ከጥናቱ ማግለል(ማቋረጥ) ይችላሉ፡፡ ካቋረጥኩኝ ጥቅም ይጎልብኛል ብለው አያስቡ፡ ፡ የጥናቱ ተሳታፊ መመለስ የማይፈልጉትን ማንኛውም ጥያቄ አለመመለስ መብቶ ነው፡፡

አድራሻ፡ ስለጥናቱ አካሄድ ወይም ስለጥናቱ መጠይቅ ወይም ደግሞ ጥናቱን በተመለከተ ማንኛውም ጥያቄ ካሎት የሚከተሉትን አድራሻ ይጠቀሙ፡፡

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ተቋማዊ የጤና ምርምር ስነ-ምግባር ግምገማ ኮሚቴ፡ ስልክ-0254662011፣ ፖ.ሳ.ቁ-235 ሀረር

በፈቃደኝነት ላይ የተመሰረተ የስምምነት ማረጋገጫ፡ የተሳታፊውን መረጃ ፎርም አንብቤዋለሁ ወይም ተነቦልኛል፡፡ የጥናቱ ዓላማ፤ ያለውን ጉዳትና ጥቅም ፤ምስጢር አጠባበቅ የመሳተፍ እና ያለመሳተፍ መብት እንዲሁም ችግር ካለ ከማን ጋር መገኛኘት እንዳለብኝ ሁሉ ተገልጾልኛል፤ ጥያቄ ካለኝ ደግሞ እንድጠይቅ እድል ተሰጥቶኝ በመሀል ደግሞ ጥናቱን ለማቆም ከፈለኩኝ በማንኛውም ጊዜ ከጥናቱ /ከተሳታፊነት/ መውጣት እንደምችል በመጨረሻም መመለስ የማልፈልገውን ጥያቄ አለመመለስ መብቱ እንዳለኝ ከተረዳሁኝ በኋላ በልጇ ስም በሙሉ ፈቃደኝነት በዚህ ጥናት ለመሳተፍ የወሰንኩኝ መሆኔን ከዚህ በታች በተቀመጠው ፊርማዬ አረጋግጣለሁ፡፡

የእናት/የአሳዳጊ ስም …… ፊርማ …… ቀን……

የመረጃ ሰብሳቢ ስም …… ፊርማ …… ቀን……

Annex VII**: በአማርኛ የተዘጋጀ መጠይቅ**

የመጠይቅ መለያ ቁጥር_____ 02. ወረዳ_____ 03. ቀበሌ_____

ክፍል አንድ፡ የማህበራዊ እና ስነ ህዝብ በመረጃ መጠይቅ

ተ.ቁ	**ጥያቄ**	**ምላሽ**
101	እድሜ	---------- ዓመት
102	ጾታ	1. ወንድ 2. ሴት
103	የእናትየዋ የትምህርት ደረጃ	1. ያልተማረ 2. ማንበብ እና መጻፍ የሚችል 3. 1ኛ ደረጃ ያጠናቀቀ 4. 2ኛ ደረጃ ያጠናቀቀ 5. ኮሌጅ/ዩኒቨርሲቲ ያጠናቀቀ
104	የእናትየዋ የስራ ዓይነት	1. የቤት እመቤት 2.ገበሬ 3. የመንግስት ሰራተኛ 4. የግል ሥራ 5. ሌላ (ይገለጽ)_____
105	የባለቤትዎ የትምህርት ደረጃ (ባለትዳር ከሆኑ)	1. ያልተማረ 2. ማንበብ እና መጻፍ የሚችል 3. 1ኛ ደረጃ ያጠናቀቀ 4. 2ኛ ደረጃ ያጠናቀቀ 5. ኮሌጅ/ዩኒቨርሲቲ ያጠናቀቀ
106	የባለቤትዎ የስራ ድርሻ	1.ገበሬ

	(ባለትዳር ከሆኑ)	2. የመንግስት ሰራተኛ 3. የግል ሥራ 4. ሌላ (ይገለጽ)_____
107	በቤት ውስጥ ከ10-19 ዓመት ስንት ልጆች አሉ	1. አንድ 2. ሁለት 3. ሶስት 4. ከሶስት በላይ
108	የቤተሰብ አማካይ ወርሃዊ ገቢ	---------- የኢትዮጵያ ብር
109	ከቤተሰብ ውስጥ እንቅርት ያለበት ሰው አለ	1-አዎ 2-አይ

ክፍል ሁለት፡ በማህበረሰቡ ውስጥ የተለመዱ ምግቦች ዳሰሳ በጋዝጊብላ ወረዳ

ተ.ቁ	ጥያቄ	ምላሽ	ይለፉ
201	በቆሎ ምን ያክል ጊዜ ተመግበሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንትአንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
202	ማሽላ ምን ያክል ጊዜ ተመግበሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንትአንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
203	ጥቅል ጎመን ምን ያክል ጊዜ ተመግበሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ	

		2. ቢያንስ በሳምንትአንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
204	ምን ያክል ጊዜ እንቁላል ተመግበሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንትአንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
205	ስጋ ምን ያክል ጊዜ ተመገቢያለሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንት አንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
206	ወተት ምን ያክል ጊዜ ተመገቢያለሽ ታውቂያለሽ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንት አንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	
207	ዓሳ ምን ያክል ጊዜ ተመግበሽ ታውቂያለሽ ?	1. ቢያንስ በቀን አንድ ጊዜ 2. ቢያንስ በሳምንት አንድ ጊዜ 3. ቢያንስ በወር አንድ ጊዜ 4. የለም	

ክፍል ሶስት፡ የአዮዲን ጨው አጠቃቀም እና ግንዛቤ በተመለከተ

ተ.ቁ	ጥያቄ	ምላሽ	ይለፍ
301	ስለአዮዲን ጨው ግንዛቤ አለሽ?	1.አዎ 2.አይ	

302	የምትጠቀሙት የጨው አይነት ምንድን ነው?	11.የታሸገ/አዮዲን ያለበት 2.ያልታሸገ /አዮዲን የሌለበት 3..ሁለቱም	
303	አዮዲን ያለበት ጨው ምን ያህል ግዜ ትጠቀማላችሁ?	1.ሁሉ ግዜ 2.አልፎ አልፎ 3.አልጠቀምም	
304	አዮዲን ያለበት ጨው መቼ ወጥ ላይ ትጠቀሙታላችሁ?	1.በመሃል 2.በተመጨረሻ አላውቅም	

ክፍል አራት. በጨዉ ዉስጥ ያለው የአዮዲን መጠን

ተ.ቁ	**ምርመራ**	**ውጤት**	ይለፍ
401	በጨዉ ዉስጥ ያለው የአዮዲን መጠን	1. 0 ppm 2. 1-15 ppm 3. 16-30 ppm	

ክፍል አምስት፡ በእንጥት ላይ የሚደረግ እንቅርት መለያ አካላዊ ምርመራ

ተ.ቁ	ምርመራ	ውጤት	ይለፍ
501	የእንቅርት ምርመራ	1. ደረጃ ዜሮ 2. ደረጃ አንድ 3. ደረጃ ሁለት	

አመሰግናለሁ::

የመረጃ ሰብሳቢ ስም _____ ፊርማ _____ ቀን _____

የተቆጣጣሪ ስም _____ ፊርማ _____ ቀን _____

Annex VIII፡ **የቀበሌው አማካይ ከፍታ**

1.የቀበሌው አማካይ ከፍታ	1. < 1500 ሜትር 2. 1500-2000ሜትር 3. 2001-2500 ሜትር 4. >2500 ሜትር	