



COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

PREVALENCE OF MENSTRUAL IRREGULARITY AND ASSOCIATED FACTORS AMONG PREPARATORY SCHOOL GIRLS IN ADAMA TOWN, OROMIA REGION, ETHIOPIA.

By Kemer Negesso (BSc, Public Health)

A thesis submitted to the School of Graduate Studies of Addis Ababa
University in partial fulfillment of the requirements for the degree of Master
of Public Health (MPH) in Epidemiology and Biostatistics.

August, 2021.

Addis Ababa, Ethiopia

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Abbreviation and Acronyms

AAU	Addis Ababa University
ACTH	Adeno-corticotrophic hormone
AOR	Adjusted Odds ratio
BMI	Body Mass Index
COR	Crude Odds ratio
CRH	Corticotrophic releasing hormone
HPO	Hypothalamus Pituitary Ovarian Axis
DASS	Depression Anxiety and stress scaling
ETB	Ethiopian birr
FSH	Follicle stimulating hormone
LH	Luteinizing hormone
LDH	Low density lipoprotein
PMS	Premenstrual symptoms
SPSS	Statistical Package for the Social Sciences
USA	United States of America
WHO	World Health Organization

ABSTRACT

Background: Menstrual irregularity is a common gynecological problem among reproductive age women affecting not only their social activities and school attendance but also families, social and national economy as well. This problem for female students in developing countries who may face life-threatening condition is considered as minor health concern. Inconsistent and inconclusive findings on menstrual irregularity and its associated factors were indicated. Moreover, data on magnitude and factors associated with menstrual irregularity is scarce in Ethiopia.

Objectives: The aim of this study was to assess prevalence of menstrual irregularity and associated factors among preparatory school girls.

Methods: Institution-based, cross-sectional study was conducted among 367 female students in five selected schools from Nov. 20 to Dec.10, 2020, in Adama Town of Oromia Regional State in Ethiopia. Stratified random sampling technique was used to select study participant from both public and private schools. Data were collected using a pre-tested, structured self-administered questionnaire. Data were entered and analysed using SPSS version 25. Descriptive analysis was performed using frequency, percentage, mean and standard deviation. Chi-square test was used to determine the relationship between menstrual irregularity and categorical variables. Furthermore multivariable binary logistic regression was used to test the presence of association between Menstrual irregularity and all other independent variables like age at menarche, stress, BMI and sleep duration. Statistical significance was considered at $P < 0.05$.

Results: The age of respondents ranges from 15 to 22 years with a mean and standard deviation of 18.18 ± 1.44 . The average age (SD) at menarche was 13.16 ± 1.42 . The prevalence of menstrual irregularity was 26.5% with 95% CI of (21.9%, 31.5%). Statistically significant association was observed between outcome variable (menstrual irregularity) and categorical explanatory variables, such as: BMI, in both teenager and young adult students, ($X^2_{df=3} = 19.73$, $p < 0.001$ and $X^2_{df=3} = 8.5$, $p < 0.05$) respectively, age at menarche, ($X^2_{df=2} = 11.9$, $p < 0.05$), sleep duration, ($X^2_{df=2} = 15.2$, $p < 0.001$), and stress ($X^2_{df=3} = 29.5$, $p < 0.001$).

The most important factors statistically significantly associated with menstrual irregularity include, school type (AOR=2.01, 95%CI: 1.03,3.94), educational status of mother (primary education (AOR=0.14, 95%CI: 0.05,0.39) & secondary education (AOR=0.37, 95%CI: 0.14,0.99), early age at menarche (AOR=1.95, 95%CI: 1.03,3.69), short period (AOR=3.34, 95%CI: 1.56,7.16), long period (AOR=4.23, 95%CI: 1.48,12.03), scanty period (AOR=0.35, 95%CI: 0.18,0.65), sleeping <7hr (AOR=2.18, 95%CI: 1.14,4.18), and stress (moderate stress, AOR=4.1, 95%CI: 1.64,10.04), severe/extremely severe stress (AOR=4.62, 95%CI: 1.57,13.56).

Conclusion:The prevalence of menstrual irregularity among preparatory school girls in Adama Town was found to be high compared with studies conducted in different parts of the world. Menstrual irregularity was more common with private school students, early age at menarche, short and long duration of menstrual flow, sleeping less than seven hour per day, having moderate, severe or extremely severe level of stress and being overweight or obese. Whereas having mother followed primary and secondary level of education and having scanty amount of menstrual flow were found to be protective factors for the occurrence of menstrual irregularity.

Recommendation:It should be recommended to create awareness and provide health education to the students regarding menstruation, what regular and irregular menstrual cycle means and the factors that leads to menstrual irregularity.

1. Introduction

1.1. Background

Menstruation is a woman's monthly bleeding from the uterus that begins about 14 days after ovulation periodically caused endometrial breakdown (1- 4). Menarche is the first menstruation cycle that occur between the ages of 10-16 years or early adolescence in the middle of puberty before entering the reproductive period (1- 4). Menstrual cycle is defined as the distance between the first days of menstruation with the first day of the next menstruation (1, 3, & 5). Menstrual disorders are common gynecological problems among female students and major source of anxiety to them and their family (5 & 6). Menstrual cycle regularity is considered as an important factor for women's health. A regular menstrual cycle indicates a normal sex hormone profile and reproductive organ functioning, whereas irregular cycles with abnormal variations in length of menstrual periods imply insufficient or dysfunctional sex hormones (9).

Previous studies have shown a high prevalence of menstrual irregularity among female students around the world which ranges from 20.1% to 59% as reported by studies in Indonesia and Saudi Arabia on 2017 and 2012 respectively (1 and 10). In Africa the prevalence ranges from 13% to 47% as showed by study on female students in Ghana and Egypt on 2013 and 2015 respectively (11 & 12). In Ethiopia the prevalence ranges from 14.6% to 46.2% as reported by studies in Debre Berhan and Bahirdar University on 2014 and 2017 respectively (13 & 14). Studies in different parts of the world reported that there are different risk factors associated with menstrual irregularity such as cigarette smoking, age at menarche, being overweight or obese and stress (1, 2, 9& 24). The most influential factor in the irregularity of the menstrual cycle is hormonal imbalance. Due to life style changes, nutritional status and other factors, there is a variation in the health status of girls leading to the hormonal changes and thus causing menstrual irregularity(7).

1.2. Statement of the problem

Menstrual cycle irregularity is prevalent worldwide in female students, which has been reported to be 24% to 74%, which indicates the problem is escalating in both developing and developed world (1-4, 17, 18, 26, 36). It was reported 25% in Thailand, 74% in Palestine and 24% in Egypt (16,18& 19). But, in Ethiopia, mainly in our study area, studies specifically conducted on the magnitude of the problem is very scarce.

Menstrual irregularity has a major impact on female student's quality of life, daily activities and school performance. In Thailand, study conducted on 2014 reported menstrual irregularity affects activity such as poor class room concentration in 48.2%, limit their daily activity in 69.9% and school absenteeism in 8.2% students (16). The physical and emotional discomfort during menstruation caused 209 (85.65%) of 244 respondents to miss school every month in which 136 (40.71%) of 390 respondents claimed to remain absent for whole day, 132 (39.52%) remained absent for half day, whereas 66 girls (19.76%) had to take leave from college for more than a day according to result of study conducted in India on 2014 (20). Generally it has negative social, and psychological impacts on female students, but despite its high prevalence and associated ill-effect, this condition is often considered as normal physiology and ignored by most of the girls and only few of them needs to consult physician as showed by study in Nigeria on 2013 (3).

Although studies in different parts of the world reported nutritional status as a risk factor for menstrual irregularity, information regarding other factors like life style, behavioral, menstrual and stress factor is not assessed adequately (1, 2, 4, 5, & 22). In African countries though there are few published studies which revealed the association between nutritional status and menstrual irregularity, data regarding other factors are still limited (22). In our country most of published studies conducted on menstrual disorder showed the magnitude of dysmenorrhea, premenstrual symptoms and associated factors, but none of them studied specifically on magnitude of menstrual irregularity and associated factors specially in late adolescent age female students (13 & 14).

Even though most of the studies have demonstrated an association between menstrual irregularity and nutritional status, this relationship is still controversial (2, 3,& 21). Some studies documented that overweight and obesity not associated with menstrual irregularity (2, 3, & 21). Understanding the magnitude of menstrual irregularity and its associated factors is important point in developing appropriate management and preventive strategies. Therefore, considering the inconsistency in previous studies and lack of adequate published research in Ethiopia, present study aimed to assess magnitude of menstrua irregularity and its associated factors including age at menarche, body mass index (BMI), stress, physical activity and sleep duration and others on menstrual cycle of preparatory school girls in Adama, so as to fulfill the gaps.

1.3. Significance of the study

The finding of this study will be an important tool for different settings. It may give information regarding magnitude of menstrual irregularity and its associated factors for the policymakers to develop evidence-based intervention so as to control the impact of menstrual irregularity to female students in the country. Furthermore, it will benefit the students and public at large by identifying factors associated with menstrual irregularity, which will help the family and health care professionals to provide reproductive health counseling timely. Moreover, it will be used as a baseline data for researchers who are interested to conduct further studies on similar or related title, especially for those in the area of reproductive health, physiology, anatomy, public health, and other related disciplines.

2. Literature review

2.1. Overview of menstrual cycle

The terms menstruation and menses are derived from the Latin menses (month), which in turn relates to the Greek mene (moon) and to the roots of the English word month reflecting the fact that the moon also takes close to 28 days to revolve around the Earth(22). Menstruation is defined as a woman's monthly bleeding from the uterus that begins about 14 days after ovulation periodically caused endometrial breakdown (1- 4). Menarche is the first menstruation in the range of 10-16 years or early adolescence in the middle of puberty before entering the reproductive period (1, 3, 8,&17). The age of menarche is determined by general health, genetics, socio-economic and nutritional factors (17).

Menstrual cycle is the distance between the first days of menstruation with the first day of the next menstruation (1). It is important as female reproductive function, which prepares the female body for conception and pregnancy (2). The range for the onset of menstrual cycle is 21 to 35 days. The accepted average length is 28 days. The length of the menstrual flow is 1-8 days and the average length is 5 days. Amount to flow is from 10ml to 80 ml in range and the average is 30ml (2).Menstrual cycle is regulated by the complex interaction of hormones: luteinizing hormone, follicle-stimulating hormone, and the female sex hormones estrogen and progesterone. The cycle begins with menstrual bleeding (menstruation), which marks the first day of the follicular phase.

When the follicular phase begins, levels of estrogen and progesterone are low. As a result, the top layers of endometrium break down and are shed, and menstrual bleeding occurs. About this time, the follicle-stimulating hormone (FSH) level increases slightly, stimulating the development of several follicles in the ovaries. Each follicle contains an egg. Later in this phase, as the FSH level decreases, only one follicle continues to develop. This follicle produces estrogen. During the luteal phase, luteinizing hormone (LH) and follicle-stimulating hormone levels decrease. The ruptured follicle closes after releasing the egg and forms a corpus luteum, which produces progesterone. During most of this phase, the estrogen level is high. Progesterone and estrogen cause the lining of the uterus to thicken more, to prepare for possible fertilization.

If the egg is not fertilized, the corpus luteum degenerates and no longer produces progesterone, the estrogen level decreases, the top layers of the lining break down and are shed, and menstrual bleeding occurs (the start of a new menstrual cycle).

2.2. Magnitude of menstrual irregularity

By late adolescence menstrual disorders are a common presentation and around 75% of girls experience some problems associated with menstruation(8). Studies in different parts of the world showed recently there was an escalation of menstrual irregularity in both developing and developed countries (1-4, 17, 18 & 26). According to different studies menstrual cycle is considered regular, if it is within the range of 21–35 and irregular if it is beyond the defined ranges (2, 5, & 8). Survey in US indicated that the prevalence of menstrual irregularities has been reported to range between 8% and 18% in obese girls (7).A cross-sectional study conducted in Indonesia on 2016 on 144 female students found that 29(20.1%) students had irregular menstrual cycle (1).Similar study carried out on 401 secondary school girls on 2014 showed that 96 (24%) students had irregular cycle (2).

In Thailand the study among 339 secondary school students between 15 and 19 years of age, the prevalence of menstrual irregularity was 25% (85/339) and the study also showed that it affected students' activity such as poor studying concentration in 41 (48.2%) students and limit daily activities in 59 (69.9%) students and school absenteeism in 7 (8.2%) students (16). 35.7%(61) students had irregular cycles reported by a cross-sectional study among 171 female students on 2017 in Duwakot (5). In Palestine study on 956 female students on 2018 showed the majority (74.1%) of the participants reported that their menstrual cycle was not regular in the past six months, 211(22.1%) of students had cycle less than 21 and greater than 35 days (18). A study conducted in India on 2016 among adolescent students reported menstrual irregularities were found that 106 (40.8%) girls had mild menstrual irregularities and 33 (12.7%) students had moderate menstrual irregularities (7).

In Nigeria study conducted on 2013 revealed that out of 169 students participated in the study it was reported, irregular menstrual cycle was found in 21(12.4%) respondents, which showed its peak at the age group of 17-19(33.3%) (3). The study in Egypt on 2017, showed that 63 (23.4%) students had irregular cycles (19). In Ethiopia, a study conducted in Bahir Dar University on 470 students on 2014 and Debre Markos town among 539 students on 2016 reported that 217 (46.2%) and 128 (25%) students respectively had irregular menstrual cycle (12 &17).

2.3. Factors associated with menstrual irregularity

2.3.1. Socio-demographic factors

Regularity of the menstrual cycle is related to a woman's reproductive health. Having regular menstrual cycle is a sign that important parts of female reproductive organs are working normally. It is one indicator of hormones that coordinates and regulates menstruation are in balance and proper functioning. Whereas irregular cycles with abnormal variations in length of menstrual periods indicates there is imbalance, insufficient or improper functioning of sex hormones (9). Knowing factors that disturb the regularity of menstrual cycle plays a crucial role in early identification and prevention of the problem. Some studies reported that socio-demographic factors have an impact on regularity of menstrual cycle. It has been reported that these factors include age, educational status of participants and their family and family history of menstrual irregularity (9, 25, 26, 46 & 53).

2.3.2. Nutritional, behavioral and reproductive factors

Nutritional factors (overweight and obesity), behavioral factors (high intensity exercise, smoking, alcohol drinking), sleep duration, mental stress and reproductive factors (age at menarche and the use of hormonal medication) are reported to be related to menstrual irregularity. It has been consistently reported that, females general physiology and function were related to an irregular menstrual cycle due to changes in hormone levels associated with lifestyle factors (2, & 24). One of the most important factors that contribute to menstrual irregularity is body weight, more specifically body fat content (2). Due to life style changes and dietary patterns, there is a variation in the health status of adolescent girls leading to the hormonal changes and thus causing menstrual irregularities (4).

Different studies from 2010 to 2018, conducted on adolescent female students aged 15-22 years around the world also reported different risk factors related to menstrual irregularity such as age, family history, physical activity, early and late menarche, low and high BMI, smoking, and psychological disturbance (25, 26, 27, & 28). On 2016 a cross-sectional study on Korean women revealed that age, BMI, marital status, age at menarche, and smoking habits were significantly associated with menstrual cycle irregularity (24). Similar study in Korea on 2017 also reported age, stress, body mass index, depressive mood and education level were significant factors associated with irregular menstrual cycles (9). Of these factors, perceived stress is the most significant factor associated with increased irregular menstrual cycle. However, how much of these factors contributes to menstrual irregularity were not reported adequately.

Even though different sex hormones contribute a lot in affecting regularity of menstrual cycle, studies have suggested having high BMI may cause an absence of menstruation, irregular menstruation, heavy or long menstruation and painful menstruation (50). The cause of menstrual cycle irregularity is increase amount of body fat followed by increasing estrogen in the blood. Excess adipose tissue may affect level of androgens and estrogens through several pathways: it may provide a reservoir for lipid-soluble steroid, and it may affect the relationship between hormones and sex-hormone-binding globulin. High estrogen level will provide a negative feedback to GnRh secretion. The increasing amount of estrogen in the blood caused estrogen production in theca cells. Theca cells produce androgens and respond to LH by increasing the number of LDL receptors that play a role in introduction of cholesterol into cells. When androgens diffuse into granulosa cells and fat tissue, again more estrogen is formed. Then in obese girls excess androgen and excess estrogen, will lead to disorders of ovarian function and abnormal menstrual cycle (1). Different study reported that irregular menstruation is worsened by high BMI significantly. Girls affected by menstrual irregularity were overweight or obese (59). Study in Indonesia on 2017 reported, of 9.4% overweight students 5.8% and from 5% obese students 3.5% had irregular cycle, which showed the tendency of irregular cycle was more in overweight and obese students (5).

The finding of a prospective study in young Indian women over a period of two years on 2014 showed that 33% subjects who were overweight and 65% of subjects who were obese, were found to have irregular menstrual cycles (23). The study done in Egypt which aimed to evaluate the relationship between menstrual cycle irregularity and BMI among secondary school students on 2016 showed that the highest prevalence of irregular menstruation was in overweight (51.4%) and obese students (65.9%) (22). But these results are still controversial as there are studies which reported there is no association between overweight/obesity and menstrual irregularity (2, 3 & 21).

The age of menarche is determined by general health, genetic, socio-economic and nutritional factors. The mean age of menarche is typically between 12 and 13 years. The initial cycles after menarche are often irregular with a particularly greater interval between first and second cycle (2). The relationship between the start of menarche and menstrual cycle regularity suggest feedback mechanism that may affect girls across their lifespan. Early menarcheal age is known to be a critical impact for many health disorders. Girls who experienced early menarche tend to be more obese in adulthood life. It has been suggested that girls who undergo menarche early may have irregular menstrual cycle (51). Though most studies found, that mostly early age at menarche associated with menarche, there are studies which reported that late menarche is also associated with regularity of menstrual cycle. But some study reported there is no evidence of any independent influence of age at menarche on menstrual irregularity (41& 42). Having the first menstruation at an early age and at late age contributes to 15% and 25.8% of menstrual irregularity respectively as reported by study in Korea in 2016 (24).

Psychological stress can also result in dysfunction of normal menstrual cycle. It affects the hypothalamic-pituitary gonadal (HPG) axis, leading to disruption in proper secretion of ovarian hormones and irregular menstruation. Under stressful condition, corticotrophic releasing hormone (CRH) is released from hypothalamus and it stimulates the release of adeno-corticotrophic hormone (ACTH) from pituitary gland, then cortisone will be secreted and it inhibit release of LH by pituitary gland and estrogen by the ovaries which leads to interruption of menstrual cycle as reported by study in Korea on 2017(27).

One theory explained that mechanism through which stress affects the menstrual cycle involves the HPA axis. This theory suggests that a reduction in the HPA axis activity leads to the menstrual irregularity and menopause. When stress level is high, the HPA axis activity is interrupted. Thus girls who suffering from considerable stress may experience more irregularities in menstruation than those who are not under stress. Study in Korea showed that mental health status like stress seems to be more important factors affecting irregular menstrual cycle (9). Mental stress contributes to menstrual irregularity in 44.3% of female students as reported by cross-sectional study in China on 2019 (32).

With regard to sleep duration, only few studies revealed its association with menstrual cycle irregularity. Sleep-wake pattern and menstrual cycle are both essential rhythmic physiological activities for girls, which have important effects on their health. It is also essential in the effective performance of various daily tasks. Approximately a third of adolescents experience sleep disturbances [27], and only one in 10 adolescents is estimated to sleep more than 8 h, as recommended by the National Sleep Foundation (34). On the other hand different factors like, exposure to screen light including television watching and computer gaming after school employment, striving for good grades, socializing, electronic exposure, and academic stress are some of the reason for sleep problem in adults (34). Sleep quality and patterns contribute to successful academic achievement and holistic quality of life. Sleep disturbance not only impairs memory consolidation, emotional regulation, and other daytime functioning aspects, but also affects regulation of hormones and leads to menstrual irregularity (9).

Previous study have found that short sleep duration can significantly increase the risk of irregular menstrual cycle (60). Those who sleep less than 5hr per day had menstrual irregularity in 38%, as compared to those students who sleep more than 8hr per day (12%) as reported by another study in Korea on 2017 (33). However, there is limited literature looking in to the impact of sleep on menstrual problem in female students. Other study reported that those who drink alcohol had menstrual irregularity in 13.2% as compared to those who didn't, participants who smoke cigarette had menstrual irregularity in 18% and 20.2% of those who had menstrual irregularity, smokes more than 10 cigarette per day (26).

Many of the risk factors listed above leads to menstrual irregularity through disturbing the hormones which regulates menstrual cycle. High intensity physical activity or exercise can cause release of stress hormone and these stress hormone interfere with brain production of the reproductive hormone necessary to keep the menstrual cycle flowing. Other behavioral factor like drinking alcohol can cause irregular menstrual cycle by temporarily increasing level of estrogen and testosterone, which may hinder normal hormonal fluctuation that are necessary for ovulation, as a result period becomes irregular (See Fig. 1).

Conceptual framework

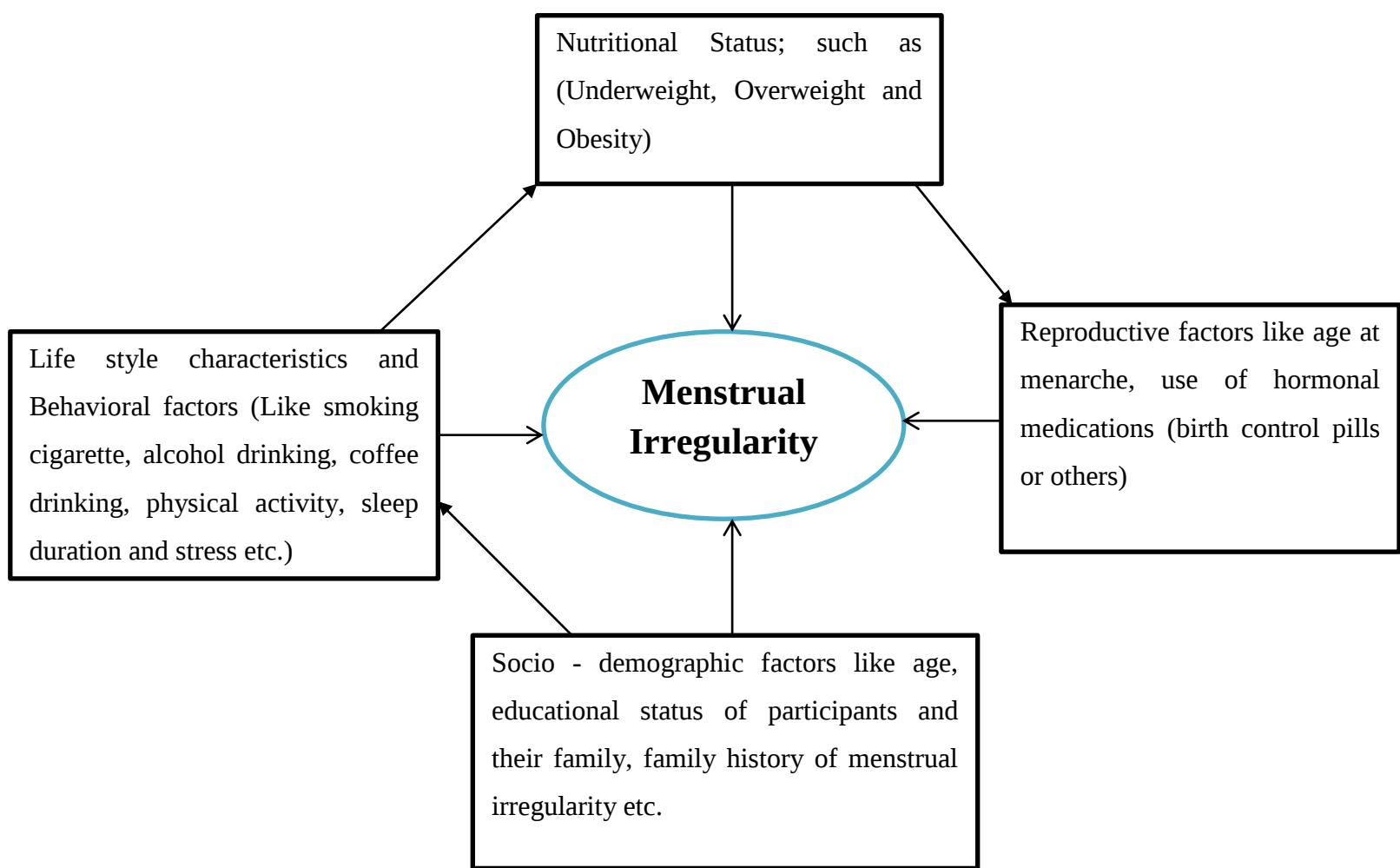


Fig. 1. Conceptual framework developed for menstrual irregularity and associated factors from literatures, 2020.

3. Objectives

3.1. General objective

To assess prevalence of menstrual irregularity and associated factors among preparatory school girls in Adama Town, Oromia Region, Ethiopia, 2020.

3.2. Specific objectives

1. To assess prevalence of menstrual irregularity among preparatory schools girls in Adama Town, Oromia Region, Ethiopia, 2020.
2. To identify factors associated with menstrual irregularity among preparatory schools girls in Adama Town, Oromia Region, Ethiopia, 2020.

4. Material and Methods

4.1. Study area

The study was conducted in Adama, a city in central Oromia region of Ethiopia. It forms a special zone of Oromia and is surrounded by East-shewa Zone. It is located at 8.54°N 39.27°E at an elevation of 1712 meters, 99 km southeast of Addis Ababa, capital city of Ethiopia. The city is located between the base of an escarpment to the west, and the Great Rift Valley to the east, with an area of 29.86 square kilometers. Based on the 2007 population and housing Census, this city has a total population of 220,212 of whom 108,872 are men and 111,340 women. It has a total of 6 sub-cities (Kifle-Ketema). There were 7 health centers in Adama, out of which 2 are private, 1 public hospital and 4 private hospitals. Health service coverage is around 74%. There were 9 preparatory schools (grade 11-12) in Adama, out of these, 4 are public (Hawas, Goro, Bole and Oda preparatory school) and 5 are private (Excel, Nafyad, Mako-Bili, Sanjo and Marryland preparatory school). Serving a total of 11,155 students in 2013EC., of which 5,649 are female. The number of students to section ratio for grade 11-12 was 60 in Adama and the nation figure is 57 students to one section. The study was conducted from Nov.20 to Dec. 10, 2020.

4.2. Study design and period

Institution-based cross-sectional study was conducted to assess prevalence of menstrual irregularity and associated factors among preparatory school girls, from Nov. 20 to Dec. 10, 2020, in Adama.

4.3. Source population

All preparatory school girls in Adama, who were enrolled in grade 11 -12 during academic year of 2013Ec. Was considered as source population.

4.4. Study population

Selected girls who were attending regular (day time) class in randomly selected schools during academic year of 2013 Ec was considered as study population.

4.5. Inclusion criteria

Regular (day time) female students who were present in the school on the day of the administration of the questionnaire and who have started menstruation or already reached menarche and willing to participate in the study were included.

4.6. Exclusion criteria

Those students who were taking hormonal medication and who were pregnant or lactating was excluded.

4.7. Sample size calculation

For this study sample size was calculated for each specific objectives and then the largest sample was taken as a final sample size. To calculate sample size for the first specific objective which was to assess magnitude of menstrual irregularity, P-value was taken from previous study in Amhara region (27), and single population proportion formula was applied. For the second objective which was to identify associated factors we have calculated using Epi info through feeding proportion of outcome variable among unexposed and exposed, which was taken from previous studies and the calculated sample size is displayed in the table below.

$$n = \frac{Z^2_{\alpha/2} p(1-p)}{d^2}$$

Where: $Z_{\alpha/2}$ = The Z- score corresponding to the 95% confidence level which is 1.96.

P = is the proportion of girls who have menstrual cycle disorder (menstrual irregularity)

d= is the degree of precision

1. Sample size calculation for the first specific objective

Assumption for calculating the sample size:

- Confidence level = 95%
- 5 % degree of precision

P = 25% (taken from previous study conducted in Amhara region, Ethiopia)

Substituting the values in the formula above sample size becomes, $n = 288$

2. Sample size calculation for the second objective (selected associated factors) using Epi-info assuming two-sided confidence level = 95%, power = 80% and ratio = 1

	P ₁ = proportion among unexposed	P ₂ = proportion among exposed	n = sample size
1. Overweight or obesity	41.7%	65.9%	148
2. Stress	21%	44%	146
3. Cigarette smoking	85.2%	10.3%	18
4. Alcohol drinking	11%	23%	308
5. Sleep duration	25%	40%	330

Therefore, the largest sample size becomes n = 330, and since our source population was less than 10,000 we used adjustment formula, $n_{adj} = n / 1+n/N = 330/ 1+330/5649 = 312$. With15% non-response rate, the final sample size becomes n= 367

4.8. Sampling techniques

A stratified random sampling technique was used to collect the data. First preparatory school was stratified in to public and private schools. Then, from the total 9 school (public = 4 and private = 5) available in the town, we have selected 5 schools (2-from public and 3-from private) randomly, assuming that selecting more than half of the schools available was representative of the rest (Fig. 2). Then we have considered the number of sections in each school and selected 35% of the total sections randomly. We didn’t sample participants from the all available sections due to COVID-19 and to select students participated in the study, we have considered total number of students and female to male ratio in each sections from registrer in each school. Then the needed sample was selected using lottery method, based on proportional allocation of sample size determined for each school.

Private schools :The 3 randomly selected private school were, Nafyad, Mako Bili and Senjo. In Nafyad preparatory school there are a total of 24 sections, out of which 8 sections are selected randomly. There are 35 students in each section and the overall female to male ratio is 54/46. From each selected section, 9 students were sampled to fulfill the total sample required from th school. The same technique was applied for the rest of the schools. Mako Bili preparatory school (total sections = 15, 25 students per section, F:M = 60/40, 12 students per section sampled). Senjo preparatory school (total sections = 18, 25 students per section, F:M = 58/42, 11 students sampled) (Fig. 2).

Public schools: The two randomly selected public shool were, Goro and Hawas preparatory school. Goro preparatory school (total sections = 41, 25 students per section, F:M = 60/40, 5 students per section selected). Hawas preparatory school (total sections = 35, 25 students per section, F:M = 58/42, 6 students selected) (Fig. 2).

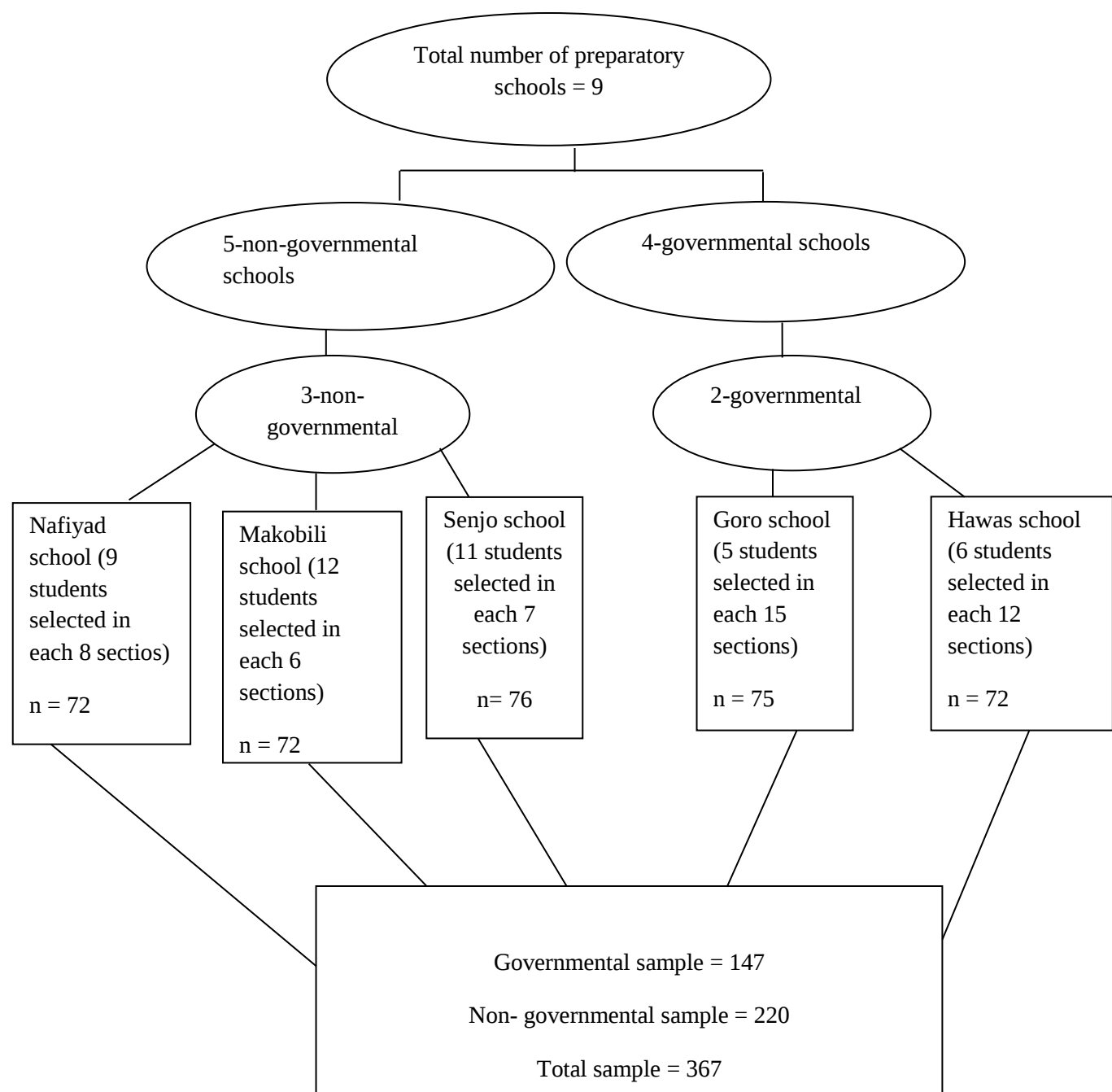


Fig.2. Schematic Representation of sampling procedures

4.9. Variable of interest

4.9.1. Dependent variables

- ✓ Menstrual irregularity

4.9.2. Independent variables

- ✓ Nutritional status (underweight, normal, overweight/obesed)
- ✓ Socio-demographic variables (age, school type and family education etc.)
- ✓ Age at menarche
- ✓ Stress
- ✓ Coffee consumption
- ✓ Alcohol drinking
- ✓ Cigarette smoking
- ✓ Physical activity (High intensity)
- ✓ Sleep duration
- ✓ Family history of menstrual irregularity

4.10. Operational definition

Menarche: The onset of menstruation for the first time (1-4).

Age at menarche:is the age at which the participants start their first menstruation and for the purpose of this study its categorized as: (1, 13, 35& 59).

Earlymenarche : ≤ 12

Medium/averagemenarche : 13-14

Late/Delayed menarche : ≥ 15

Regular menstrual cycle: is menstruation that occurs in interval of 21-35 days (2, 11,24, 29 & 30).

Irregular menstrual cycle: is menstruation that occurs in less than 21 days or more than 35 days (2, 11,24, 29 & 30).

Measurements of amount of menstrual blood flow per a day are: Scanty (1-2 pads/day), Moderate (3-5 pads/day), Heavy (>5 pads/day) (1,27, 29& 53).

Measurement of duration of menstrual blood flow per a day are: Normal (3-7 days), Short period (1-2 days), Long period (>7 days) (1, 27, 29& 53).

Body mass index: is one of nutritional index which is calculated by dividing weight to height square and categorized as: (WHO).

For teenager students (z-score)

Normal = (-2SD to +1SD)

Underweight = ($< -2SD$)

Overweight = ($>+1SD$)

Obesed = ($>+2SD$)

For young adult students (WHO)

Normal = 18.5-24.9

Under weight = < 18.5

Overweight = 25-29.9

Obesed = ≥ 30

Sleep duration is categorized in to three categories based on National Sleep Foundation recommendation of sleep time as follows:

Short sleep duration: Sleeping less than seven hour of sleep per night

Normal (Optimal) sleep duration : Sleeping between seven to nine hour of sleep per night

Long sleep duration : Sleeping more than nine hour of sleep per night

Regular physical activity: High intensity physical activity is considered as regular if respondents perform it for more than or equal to 3 days per week for ≥ 20 minute (**WHO**)

Irregular physical activity: if it is performed for less than 3 days per week

Alcohol drinking: For the perpose of this study we only measured the frequency of alcohol drinking and categorize them as follows:

Non drinker: those students answered never for having drink containing alcohol

Slight drinker: those who drink ≤ 1 time a month or 2-4 times a month

Moderate drinker: those who drink 2-3 times a week

Heavy drinker: those who drink 4 or more times a week

Cigarette smoker: someone who smokes cigarette either daily or occasionally (WHO).

- A daily smoker is someone who smoke at least once a day
- An occasional smoker is someone who smokes, but not everyday

Stress: according to DASS-21, if the respondent scores 15 and above (Lovibond, S.H. & Lovibond, P.F (1995). Manual for the Depression Anxiety & Stress Scales.(2nd Ed.)Sydney: Psychology Foundation).

We assessed stress based on Depression, Anxiety and Stress Scale – 21 items (DASS-21), wich is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. The tool contains a total of 21 questions which is divided in to three, 7 question for assessing depression, 7 question for assessing anxiety and 7 question for assessing stress.

For the porpose of this study we have used 7 items for assessing stress and the recommended cut-off scores for conventional severity labels is categorized as follows:

Normal = 0-14

Severe = 26-33

Mild = 15-18

Extremely severe = ≥ 34

Moderate 19-25

4.11. Survey instrument and data collection

We adopted structured data collection tools from similar studies (3, 8, 11, 24& 31). Self-administered questionnaire was prepared by local languages participants can understand clearly, Amharic and Afan oromo languages. It has four parts, the first containing questions on socio-demography information, such as:age, school type, religion, educational status of mother and father, family history of menstrual irregularity, fathers' and mothers occupation. The second part address life style and behavioral factors, like: high intensity physical activity, alcohol drinking, coffee drinking, and smoking, sleep duration and stress questions. We have included informarion regarding mensturation, such as: age at menarche, contraceptive use, duration, amount and frequency of menstruation and pain during menstruation on the third part. The final part was measuring weight and height of participants.

We collected the data by distributing the pre-tested, structured Amharic and Afan Oromo version questionnaire to each respondent after we got informed written consent and voluntariness from each respondent. Explanation on the objective of the study, relevance of the study and how to fill the questionnaire to the study subject was given before they filled the questionnaire. Further elaboration was given on questions by data collector or facilitator as needed. Data were collected from Nov. 20 to Dec. 10, 2020 by five biology teachers of the students and supervised by two Masters of Public Health students. The questionnaire was distributed to every participant and collected on the same day to ensure confidentiality and prevent information contamination.

Information regarding age at menarche was reported from the question, at what age did you have your first menstrual period? And the response was classified as: early, medium and late. Sleep duration was self-reported from the following question: How many hours do you sleep on average per day? And then the choice was classified in to three categories: < 7hr, 7-9hr, and > 9hr. Stress was assessed based on DASS-21 questions, the tool includes a total of 21 questions divided in to three items, 7-questions for assessing depression, 7-questions for anxiety and the rest 7 questions for assessing stress. For the purpose of these study we have used 7-questions (self-reported) for assessing stress, with four possible responses: 0 - for the question did not apply to the students at all, 1- applied to some degree, 2- applied to considerable degree, 3- applied very much.

Then the number in each sub-scale summed and multiplied by 2, then the final score was categorized in to recommended cut-off scores for conventional severity labels as normal, mild, moderate and severe/extremely severe. Height and weight were assessed on the same day after students completed the questionnaire by trained examiners using standardized techniques and equipment. weight was measured in kilogram, with light clothe using a standard portable weighing scale and checks on the scale was made routinely before recording the weight of each girl. Height was taken in meters using portable stadiometer and it was recorded to the nearest one cm to avoid possible error. Then BMI was calculated as each participants weight (kg) divided by height squared (m^2).

4.12. Data quality management

Data quality was maintained by using carefully designed questionnaire through standardizing, translating from English to Amharic and Afan oromo and back to English, as well as, pretesting for relevant modification. We provided one day training for data collectors/facilitators and supervisors in understanding the objective of the study, the overall steps and procedures of data collection and proper data handling, and ways of approaching the respondents. Before actual data collection pretest was performed on 40 female students to check the soundness of data collection tool and to determine the time for data collection in Exel preparatory school, Adama Town. Data collectors and supervisors was given necessary introduction and instruction to the students and gave clarification on the questions or any problem that was raised during data collection. The supervisor checked the activities of each data collectors (like explaining the objective and relevance of the study, clarifying questions, measuring weight and height) and all the filled questionnaires for its completion, clarity, and proper identification of the respondents. Principal investigator closely monitored the data collection process.

4.13. Data entry and analysis

The data was entered and cleaned in Epi-data software version 3.1 and exported to SPSS (Statistical Package for Social Sciences) version 25 for analysis. Descriptive analysis was performed using frequency, percentage, mean and standard deviation based on the type of variables. We used texts and tables for data presentation. Chi-square test was used to determine the relationship between menstrual irregularity and categorical variables. Furthermore binary logistic regression was computed to determine association between menstrual irregularity and explanatory variables such as: school type, educational status of participant mother, age at menarche, duration of menstrual flow, sleep duration, psychological stress and nutritional status (BMI). First, bivariate analysis was computed for each predictor variable. Then, all predictor variables with $P < 0.25$ was included in the multivariable analysis and expressed by adjusted odds ratio (AOR). Statistical significant difference was considered at $P < 0.05$ with 95% CI. Efforts were made to assess whether the necessary assumptions for the application of multiple logistic regression were fulfilled. For this, the Hosmer and Lemeshow's goodness-of-fit test was considered. A good-fit as measured by Hosmer and Lemeshow's test was yield a large P-value.

4.14. Ethical consideration

Ethical clearance was received from Addis Ababa University School of Public Health, Research and Ethical Review committee. And also support letter was received from Addis Ababa University School of Public Health. School directors and directress were informed on the objectives of the study and their agreement was received before data collection. The students were informed about the purpose of the study, their right to refuse and assurance of confidentiality. Then informed written consent was obtained from each student. Strict confidentiality was maintained by omitting their names and addresses on the questionnaires. The students was also informed of their full right to skip or ignore any questions or terminate their participation at any stage.

5. Results

From the total of 367 students sampled for this study, analysis was based on 344 students giving a response rate of 93.7%. Nine participants were not voluntary to participate and 14 questionnaire were found to be incomplete and excluded from the analysis.

5.1. Sociodemographic characteristics of respondents

The study was conducted among 133(38.7%) public and 211(61.3%) private preparatory school students. Their age was in the range of 15 to 22 years with mean age of 18.18 ± 1.44 years. From the total respondents, 283 (82.3%) were in the age range of 15-19 years (Table 1). One hundred fourty (40.7%) of the study participants were followers of Orthodox religion. Only 24(7%) of students were married. Around 93 (27%) of study participants mother followed primary level of education and 111 (32.3%) had family history of menstrual irregularity.

Table 1.Socio demographic characteristics of preparatory school girls in Adama Town, Oromia, Ethiopia, 2021.

Variables	Category	Frequency (n=344)	Percent (%)
Age in years	15-19	283	82.3
	20-22	61	17.7
School	Public	133	38.7
	Private	211	61.3
Religion	Orthodox	140	40.7
	Muslim	135	39.2
	Protestant	62	18
	Catholic	3	0.9
	Others	4	1.2
Marital Status	Single	316	91.9
	Married	24	7
	Divorced	4	1.2
Educational status of mother	Can't read and write	40	11.6
	Read and write	66	19.2
	Primary education	93	27
	Secondary education	89	25.9
	Diplome and more	56	16.3
Family history of menstrual irregularity	Yes	111	32.3
	No	124	36
	I don't know	109	31.7
Father occupation	Government employee	214	62.2
	Private employee	107	31.1
	Merchant	12	3.5
	Farmer	11	3.2

Mother occupation	House wife	168	48.8
	Merchant	73	21.2
	Government employee	50	14.5
	Private employee	53	15.4

5.2. Life style, behavioral and nutritional characteristics of students

Table 2 summarizes the life style, behavioral and nutritional characteristics of the study participants. Of the total respondents 273 (79.45%) reported that they did not consume alcohol. Of 71 respondents who consumed alcohol, 38 (11%) had drink containing alcohol $\leq$ 1 times a month, 30 (8.7%) had 2-4 times a month and 3 (0.9%) had 2-3 times week. Of 131(38.1%) students consumed coffee, 115(33.4%) drunk 1-3 cups of coffee per day. Regarding high intensity physical activity it was found that 79(23%) engaged in regular physical activity and 88(25.5%) had irregular physical activity. None of the respondents had smoked cigarette. Of 61 youth students 12(19.7%) had BMI of $< 18.5\text{kg/m}^2$, 39(63.9%) had within range of $18.5\text{kg/m}^2 - 24.9\text{kg/m}^2$, 7(11.5%) had within range of $25\text{kg/m}^2 - 29.9\text{kg/m}^2$ and 3(4.9%) had $\geq 30\text{kg/m}^2$. Among 283 teenager students 21(7.4%) had BMI of $< -2\text{SD}$, 209(73.9%) had within range of -2SD to $+1\text{SD}$, 43(15.2%) had $> +1\text{SD}$ and 10(3.5%) students had BMI of $>+2\text{SD}$.

Table 2. Life style, behavioral and nutritional characteristics of preparatory school girls in Adama town, Oromia, Ethiopia, 2021.

Variables	Category	Frequency (n=344)	Percent (%)
How often does student had Drink containing alcohol?	Never	273	79.4
	< or = 1 times a month	38	11
	2-4 times a month	30	8.7
	2-3 times a week	3	0.9
Alcohol drinking Frequency category	Non-drinkers	273	79.4
	Slight-drinkers	68	19.7
	Moderate-drinkers	3	0.9
Coffee consumption	Not at all	213	61.9
	1-3 cup of coffee	115	33.4
	> or = 4 cup of coffee	16	4.7
Physical activity	Not at all	177	51.5
	Regularly	79	23
	Irregularly	88	25.5
Cigarette smoking	Yes	0	0
	No	344	100
Sleep per day	7-9 hour	171	49.7
	<7 hour	127	36.9
	>9 hour	46	13.4

Stress	Normal	237	68.9
	Mild	51	14.8
	Moderate	35	10.2
	Severe or extremely severe	21	6.1
BMI for young adult (kg/m ²)	Normal (18.5 to 24.9)	39	63.9
	Underweight (< 18.5)	12	19.7
	Overweight (25-29.9)	7	11.5
	Obesed (≥ 30)	3	4.9
BMI for teenagers (z-score)	Normal (-2SD to +1SD)	209	73.9
	Underweight (< -2SD)	21	7.4
	Overweight (>+1SD)	43	15.2
	Obesed (>+2SD)	10	3.5

5.3. Reproductive characteristics and menstrual patterns of respondents

The mean age at menarche was 13.16 ± 1.42 years with range of 10 to 16 years. About 185(53.8%) of the respondents experienced menarche in the age range of 13 to 14years. About 91 (26.5%) of the total respondent had irregular menstrual cycle, of wich 62(18.1%) had cycle length less than 21 days and 29 (8.4%) had cycle length of more than 35 days. Around 265 (77%) of students had duration of bleeding between 3-7 days and 138(40.2%) had normal amount of menstrual bleeding. Of 344 total respondents 216 (62.8%) participants experienced pain during mensturation (Table 3).

Table 3.Reproductive characteristics and menstrual patterns of preparatory school girls in Adama town, Oromia, Ethiopia, 2021.

Variables	Category	Frequency (n=344)	Percent (100%)
Age at menarche	Normal	185	53.8
	Early	106	30.8
	Late	53	15.4
Menstrual cycle regularity	Regular	253	73.5
	Irregular	91	26.5
Duration of menstrual period	Normal period (3-7 days)	265	77
	Short period (1-2 days)	56	16.3
	Long period (>7 days)	23	6.7

Amount of menstrual period			
	Normal period (3-5 sanitary pad/day)	138	40.2
	Scanty period (1-2 sanitary pad/day)	189	54.9
	Heavy period (>5 sanitary pad/day)	17	4.9
Dysmenorrhea (pain durin mensturation)			
	Yes	216	62.8
	No	128	37.2

5.4. Factors associated with menstrual cycleirregularity

In order to determine factors associated with menstrual irregularity chi-square test, binary logistic regression and multivariable logistic regression was done with assumptions. Pearson chi-square test revealed that there were ststistically significant association between outcome variable (menstrual irregularity) and some categorical explanatory variables, such as: BMI, in both teenager and young adult students, ($X^2df = 3= 19.73$, $p<0.001$ and $X^2df= 3= 8.5$, $p<0.05$) respectively, but the assumption of chi-square test for young adult students was not met and Fisher exact test was done and revealed p-value of 0.032, which also shows significant association between menstrual irregularity and obesity (Table 4), Age at menarche, ($X^2df = 2 = 11.9$, $p<0.05$), sleep duration, ($X^2df = 2 = 15.2$, $p<0.001$), and stress ($X^2df = 3 = 29.5$, $p<0.001$).

Table 4.Association between Body Mass Index and menstrual irregularity among teenager and young adult preparatory school girls in Adama Town, Oromia, Ethiopia, 2021.

Age		Variables		<u>Regularity of menstrual cycle</u>				X ²	df	p-value
				<u>Regular</u>		<u>Irregular</u>				
				Count	Percent	Count	Percent			
15-19	BMI (z-score)					19.73	3	<0.001*		
	Normal	170	81.3%	39	18.7%					
	Underweight	15	71.4%	6	28.6%					
	Overweight	24	55.8%	19	44.2%					
	Obesed	4	40%	6	60%					
20-22	BMI (WHO)					8.5	3	0.037		
	Normal	28	71.8%	11	28.2%					
	Underweight	9	75%	3	25%					
	Overweight	3	42.9%	4	57.1%					
	Obesed	0	0.0%	3	100%					

Binary logistic regression revealed the crude analysis of association between mesnstrual irregularity and each explanatory variables with their COR and 95% CI as shown below. Educational status of mother, early age at menarche, having short (1-2 days) and long period (> 7 days), short sleep duration (< 7hr), having moderate, severe or extremely severe forms of stress and having scanty period (1-2 sanitary pad per day) were found to be factors statistically significantly associated with menstrual irregularity.

Students who experienced their first menstruration at early age were 2.4 times at risk of developing menstrual irregularity as copared to those who had experienced at normal age, COR (95%CI), 2.4(1.4, 4.1). Those who responded to have short and long period were 2.9 and 4.2 times at risk of menstrual irregularity as compared to those who have normal duration of period, COR(95%CI), 2.9(1.6, 5.3) and 4.2(1.7, 9.9). Participants who slept <7hr were 2.6 times at risk of developing menstrual irregularity as compared to those who sleep 7-9hr, COR(95%CI), 2.6(1.6, 4.4). Students who experienced moderate and severe or extremely svere form of stress were 4.8 and 5.4 times at risk of developing menstrual irregularity as compared to those who had normal level of stress, COR(95%CI), 4.8(2.3, 10) and 5.4(2.14, 13.5) respectively.

Students who have mother followed primary level of education had more chance to be protected from menstrual irregularity as compared to those who have mother who can't read and write, COR(95%CI), 0.25(0.1, 0.6). Participants who experienced scanty amount of menstrual period had more chance to be protected from risk of menstrual irregularity as compared to those who had normal amount of menstrual period, COR(95%CI), 0.5(0.3, 0.9) (Table 5).

Table 5. Bivariate analysis of factors associated with menstrual irregularity among preparatory school girls in Adama Town, Oromia, Ethiopia, 2021.

Variables	<u>Menstrual Irregularity (%)</u>		Crude OR(95%CI)
	Yes	No	
Age			
Teenager	70(24.7)	213(75.3)	1
Young adult	21(34.4)	40(65.6)	1.6 (0.9,2.9)
School type			
Public	32 (24.1)	101(75.9)	1
Private	59 (28)	152 (72)	1.2 (0.7, 2)
Marital status			
Single	82(25.9)	234(74.1)	1
Married	9(37.5)	15(62.5)	1.7 (0.7, 4.1)
Divorced	0(0)	4(100)	
Educational status			
Of mother			
Can't read and write	15(37.5)	25(62.5)	1
Read and write	22 (33.3)	44(66.7)	0.8 (0.4, 1.9)
Primary education	12 (12.9)	81(87.1)	0.25(0.1, 0.6)
Secondary education	26(29.2)	63(70.8)	0.7(0.3, 1.5)
Diploma and more	16(28.6)	40(71.4)	0.7(0.3, 1.6)
Family history of MI			
No	39(31.5)	85(68.5)	1
Yes	27(24.3)	84(75.7)	0.7(0.4, 1.2)
I don’t know	25(22.9)	84(77.1)	0.6 (0.4, 1.2)
Age at menarche			
Normal	38(20.5)	147(79.5)	1
Early	41(38.7)	65 (61.3)	2.4(1.4, 4.1)
Late	12(22.6)	41(77.4)	1.13(0.5, 2.4)

Duration of menstrual flow			
Normal	55(20.8)	210(79.2)	1
Short period	24(42.9)	32 (57.1)	2.9(1.6, 5.3)
Long period	12(52.2)	11(47.8)	4.2(1.7, 9.9)
Sleep per day			
7-9hour	33(19.3)	138(80.7)	1
< 7hour	49(38.6)	78(61.4)	2.6 (1.6, 4.4)
> 9hour	9(19.6)	37(80.4)	1.01(0.4, 2.3)
Stress			
Normal	47(19.8)	190(80.2)	1
Mild	13(25.5)	38(74.5)	1.4 (0.7, 2.8)
Moderate	19(54.3)	16(45.7)	4.8(2.3, 10)
Severe/Extremely severe	12(57.1)	9(42.9)	5.4(2.14, 13.5)
Amount of menstrual flow			
Normal period	46(33.3)	92(66.7)	1
Scanty period	39(20.6)	150(79.4)	0.5 (0.3, 0.9)
Heavy period	6(35.3)	11(64.7)	1.1(0.4, 3.1)
Dysmenorrhea			
Yes	51(23.6)	165(76.4)	1.5 (0.9, 2.4)
No	40(31.3)	88(68.8)	1
Alcohol drinking			
Non-drinkers	68(24.9)	205(75.1)	1
Slight-drinkers	20(29.4)	48 (70.6)	1.2 (0.7, 2.3)
Moderate-drinkers	3(100)	0(0)	
Coffee consumption			
Not at all	59(27.7)	154(72.3)	1
1-3 cup of coffee	28(24.3)	87(75.7)	1.15 (0.4, 3.7)
≥4 cup of coffee	4(25)	12(75)	0.9 (0.3, 3.2)
Physical activity			
Not at all	42(23.7)	135(76.3)	1
Regularly	22(27.8)	57(72.2)	1.24(0.7, 2.3)
Irregularly	27(30.7)	61(69.3)	1.4(0.8, 2.5)

After computing binary logistic regression for association of menstrual irregularity with each predictor variables, we have included predictor variables with P value <0.25 in the multivariable analysis so as to control the effects of confounding and expressed by adjusted odds ratio (AOR). On multivariable analysis, school type, AOR(95%CI)=2.01(1.03,3.94), educational status of mother (primary education, AOR(95%CI) = 0.14(0.05,0.39), secondary education, AOR(95%CI) = 0.37(0.14,0.99)), early age at menarche, AOR(95%CI) = 1.95(1.03,3.69), short period, AOR(95%CI) = 3.34(1.56,7.16), long period, AOR(95%CI) = 4.23(1.48,12.03), scanty period, AOR(95%CI) = 0.35(0.18,0.65), sleep <7hr, AOR((95%CI) = 2.18(1.14,4.18), and stress (moderate stress, AOR(95%) = 4.1(1.64,10.04), severe/extremely severe stress, AOR(95%CI) = 4.62(1.57,13.56), had statistically significant association with the occurrence of menstrual irregularity (Table 6).

Table 6. Bivariate and multivariable analysis of selected variables associated with menstrual irregularity among preparatory school girls in Adama Town, Oromia, Ethiopia, 2021.				
Variables	<u>Menstrual irregularity (%)</u>		Crude OR(95%CI)	Adjusted OR(95%CI)
	Yes	No		
School type				
Public	32(24.1)	101(75.9)	1	1
Private	59(28)	152(72)	1.2(0.7, 2)	2.01(1.03,3.94)*
Educational stutus of mother				
Cant read and write	15(37.5)	25(62.5)	1	1
Read and write	22(33.3)	44(66.7)	0.8 (0.4,1.9)	0.74(0.27,1.98)
Primary education	12(12.9)	81(87.1)	0.25(0.1,0.6)	0.14(0.05,0.39)**
Secondary education	26(29.2)	63(70.8)	0.7(0.3,1.5)	0.37(0.14,0.99) **
Deloma and more	16(28.6)	40(71.4)	0.7(0.3,1.6)	0.39(0.13,1.18)
Family history of MI				
Yes	27(24.3)	84(75.7)	0.7(0.4,1.2)	0.54(0.26,1.11)
No	39(31.5)	85(68.5)	1	1
I don’t know	25(22.9)	84(77.1)	0.6 (0.4,1.2)	0.86(0.43,1.75)
Physical activity				
Not at all	42(23.7)	135(76.3)	1	1
Regularly	22(27.8)	57(72.2)	1.2(0.7, 2.3)	0.99(0.47,2.06)
Irregularly	27(30.7)	61(69.3)	1.4(0.8, 2.5)	1.2(0.58,2.4)
Age at menarche				
≤12	41(38.7)	65(61.3)	2.4(1.4, 4.1)	1.95(1.03,3.69)*
13-14	38(20.5)	147(79.5)	1	1
≥15	12(22.6)	41(77.4)	1.13(0.5, 2.4)	0.91(0.39,2.12)
Duration of menstrual flow				
≤2 days	24(42.9)	32(57.1)	0.24(0.1,0.57)	3.34(1.56,7.16) *
3-7 days	55(20.8)	210(79.2)	1	1
>7 days	12(52.2)	11(47.8)	0.69(0.26,1.82)	4.23(1.48,12.03) *
Amount of menstrual flow				
1-2 sanitary pad/day	39(20.6)	150(79.4)	2.86(1.56,5.25)	0.35(0.18,0.65) *
3-5 sanitary pad/day	46(33.3)	92(66.7)	1	1
> 5 sanitary pad/day	6(35.3)	11(64.7)	4.16(1.74,9.95)	1.19(0.33,4.25)
Sleep per day				
<7 hr.	49(38.6)	78(61.4)	2.6(1.6, 4.4)	2.18(1.14,4.18) *
7-9hr.	33(19.3)	138(80.7)	1	1
> 9hr.	9(19.6)	37(80.4)	1.02(0.4,2.3)	0.84(0.32,2.17)
Strss				
0-14	47(19.8)	190(80.2)	1	1
15-18	13(25.5)	38(74.5)	1.4(0.7, 2.8)	1.35(0.58,3.09)
19-25	19(54.3)	16(45.7)	4.8(2.3,10.)	4.1(1.64,10.04) *
≥26	12(57.1)	9(42.9)	5.4(2.14,13.5)	4.62(1.57,13.56) *
* = P <0.05, ** = P < 0.001				

* = P <0.05, ** = P < 0.001

5.5. Discussion

Menstrual irregularity is one of the common menstrual problems which has considerable effect on life of female students and their health. In this institution based cross-sectional study we examined the prevalence of menstrual irregularity and its predictors among preparatory school girls, which includes 367 students. The result from this study revealed that the prevalence of menstrual irregularity was found to be 26.5% with 95% CI of (21.9%, 31.5%). The study also investigated different factors influencing the menstrual cycle. In our study factors significantly associated with menstrual irregularity were school type, age at the beginning of menstruation, duration of menstrual flow, sleep duration, stress and Body mass index. Severe stress was the most influencing factor of menstrual irregularity.

The prevalence of menstrual irregularity revealed by this study was in line with Debre Markos study on secondary and preparatory school students (25%), Debra Tabor University study (24.6%) (11 & 27). However it was higher than in Debra Birhan University study (14.6%), lower than Bahir Dar University study (46.2%) and Dabat and Kola Diba study among secondary school female students (42.8%) (14, 15 & 59). This difference may be explained by the age range difference between respondents, which was 15-22 in this study and 18-29 in Debra Birhan University study, 17-24 in Bahir Dar university study and 14-19 in Dabat and Kola Diba study, absence of universally accepted technique of defining menstrual irregularity and may also be related with difference in environment in which the student follow their academic activities, for example the stress of university students which has psychological impact that might induce menstrual irregularity.

The finding was also comparable with study done among Cairo University students (23.4%), India (26.9%), Thailand (25%), and Pakistan study (24%) (6, 16, 19, 20 & 39). But it was higher as compared to another study in Mansoura University, Egypt (12.5%), Ghana (17.7%), Bayero University study in Nigeria (8%) and in Palestine (22.1%) (17, 43, 44 & 45). And it was lower than Saudi Arabia study (36.4%), Egypt (41.7%) and India (40.8%) (8, 18, 23). This inconsistency may be mainly due to difference in use of selected age group between participants, sociocultural differences among participants and as well as the difference in life style. Moreover this difference may be resulted from the absence of universally accepted or standardized method of measurement or from its subjective measurements.

Being in private school was one of the factors associated with menstrual irregularity. Those students who were in private school were 2.01 times more likely to have menstrual irregularity as compared to students in public school (AOR = 2.01, 95% CI: 1.03, 3.94). This result may be explained by socio-economic status and life style differences between students in private school and public school, but further study is needed to conclude and recommend on this result.

Educational status of students mother is another factor significantly associated with menstrual irregularity. Student who have mother followed primary and secondary education had more chance to be protected from menstrual irregularity as compared to those who have mother followed other categories of educational status, AOR(95%CI), 0.14(0.05,0.39) and 0.37(0.14,0.99) respectively. The finding is supported by similar study on nursing students in Al khobar city, Saudi Arabia (18). This might be due to the fact that those students who had educated mother, may discuss about the problem more freely than those who had illiterate ones, which in turn might help the students to understand the problem better and cope up with the problem better than those who had not enjoy free discussion with their mothers.

The onset of menstruation typically occurs between the ages of 12 and 13 years, but with the improvements in the nutritional status and general health, it has declined in many populations during the last decades (3 & 4). In the present study, the minimum age at menarche was 10 years, while the maximum age at menarche was 16 years with an average mean of 13.16 ± 1.42 years which is comparable with other studies in Indonesia, India, and Debre Markos (1, 6, & 27). However, our result is inconsistent with studies in Pakistan, Egypt, Debre Tabor and Debre Berhan University students (19, 20, 11 and 14). This can be explained by the better socioeconomic status, academic activity related stress which may delay their menarche.

This study also identified a statistically significant association between age at the beginning of menstruation and menstrual irregularity. Those students who reached menarche at early age, at the age of ≤ 12 years were 1.95 times more likely to develop menstrual irregularity as compared to students who reached menarche by age of 13 and 14 (AOR= 1.95, 95%CI: 1.03, 3.69). This is supported by the studies conducted among school girls in USA (37), Taiwan study on nursing female students (35), Cross-sectional study among women aged 19-49 in Korea (36) and similar study conducted among female adolescent aged 15-19 in Korea (34), similar study on adolescent high school girls in Korea (48) and study on nursing students in Saudi Arabia (18).

But it is different from study among Italian secondary school girls (40), this might be due to the difference in the age of participants, which was from 15-22 in this study, but it was from 13 to 21 in Italian study. The inconsistency may also explained by the difference in age category for menarcheal age, in this study early age at the beginning of menarche is considered ≤ 12 years of age, but in Italian study it was ≤ 10 years of age.

Duration of menstrual flow was another factor found to have a statistically significant association with occurrence of menstrual irregularity. Those students who had short and long duration of menstrual flow were 3.34 and 4.23 times at risk of developing menstrual irregularity as compared to students who had normal menstrual flow (AOR = 3.34, 95%CI: 1.56, 7.16 and AOR = 4.23, 95%CI: 1.48, 12.03) respectively. These study also found a statistically significant association between scanty amount of menstrual flow and menstrual irregularity was observed, AOR (95% CI) = 0.35(0.18,0.65). This association was not assessed in many researches done before, therefore further investigation is needed to conclude and recommend on this result.

Currently, sleep has been gaining attention as an associated factor in menstrual irregularity, but the association between sleep duration and menstrual irregularity among female student has been scarcely studied. In our study a statistically significant association between sleep and menstrual irregularity was found. Students who slept less (< 7 hour) were 2.18 times at risk of developing menstrual irregularity as compared to those who slept 7-9 hour (AOR = 2.18, 95%CI: 1.14, 4.18). This finding was consistent with cross-sectional study in Korea among adolescent female students on 2017 (34), similar study among women aged 19-49 on 2018 in Korea (36) and Chinese female university students in China (52). This might be explained by short sleep duration may lead to stress and depressive mood, which further cause hormonal imbalance and increases the risk of menstrual irregularity. But this finding was not consistent with study conducted among female Chinese university students (52). The inconsistency might be explained by the difference duration of short sleep which was < 7 hr on our study while < 6 hr in Chinese study.

Our study also showed a statistically significant association between psychological stress and menstrual irregularity. Those students who had moderate and severe/extremely severe stress level were 4.1 and 4.62 times at risk developing menstrual irregularity as compared to students who had mild level of stress (AOR= 4.1, 95% CI: 1.64, 10.04 and AOR= 4.62, 95%CI: 1.57, 13.56) respectively. This is consistent with the finding of cross-sectional study conducted among female medical college students India (31), similar study among female international school in China (33), study conducted among female college students in Taiwan (35), cross-sectional study among female adolescent aged 15-19 in Korea (34) and similar study on Korean women in Korea (37), Japanese female students (56) and cohort study in North America (50). This might be explained by the fact that under stressful condition, corticotrophic releasing hormone (CRH) is released from hypothalamus and it stimulates the release of adeno-corticotrophic hormone (ACTH) from pituitary gland, then cortisone will be secreted and it inhibit release of LH by pituitary gland and estrogen by the ovaries which leads to interruption of menstrual cycle. Psychological stress also leads to menstrual irregularity through affecting hypothalamic-pituitary gonadal axis, leading to disruption in proper secretion of ovarian hormone and irregular menstruation.

In this study nutritional status of the girls was determined by their BMI. It was used as diagnostic tool in this study to identify the nutritional status within a population due to its ease of calculation. In our study the chi-square analysis showed that there were statistically significant association between Body Mass Index and Menstrual irregularity in both teenager and young adult students ($X^2_{df=3} = 19.73$, $p < 0.001$ and $X^2_{df=3} = 8.5$, $p < 0.05$) respectively. This is supported by studies conducted in Egypt among secondary school girls (23), similar study on high school female students in Benin City, Nigeria (58), in India study among adolescent girls (6, 24 & 26), in Duwakot among female medical college students (5), in Pakistan (19), in Iran among among female students (22) and study on Korean women which identifies statistically significant association between BMI and Menstrual irregularity (25).

This is probably due to nutritional factors like overweight and obesity leads to deregulation of several groups hormone through creating extra adipocytes which are source of extra estrogen, which causes menstrual irregularity. But the result differ from study in Nigeria and Indonesia (2 & 41). The inconsistency might be because of the difference in the age of study participants. The age in this study was from 15 to 22, but it was from 15 to 17 in Indonesia, this study include age ranges above the pick age, which might influences the interpretation of Body Mass Index. The difference might also be due to the use of different analysis method, which is independent T-test in Indonesia study.

5.6. Limitations and strengths of the study

As most of variables in this study were measured by the participants subjective report, readers should note that, recall bias of the condition may be introduced as the students were asked for some events within the last three months prior to the study. It was also difficult to compare results on associated factors with local studies due to lack of published research in the study area.

Despite limitation, to the best of our knowledge, this is the first study in our country to contribute additional information on factors associated with menstrual irregularity. Most of studies in our country regarding menstrual disorders done on university students, while the problem is more common on late adolescent girls, and our study identified the problem in the right setting where most of late adolescent female students found.

5.7. Conclusions

In summary the result of our study indicated that the prevalence of menstrual irregularity among preparatory school girls in Adama Town was higher as compared to studies conducted in some parts of our country and Asian countries. Menstrual irregularity was more common with private school students, early age at menarche, short and long duration of menstrual flow, sleeping less than seven hour per day, having moderate, severe or extremely severe level of stress and being overweight or obese. Whereas having mother followed primary and secondary level of education and having scanty amount of menstrual flow were found to be protective factors for the occurrence of menstrual irregularity.

The result implies that considering these factors will reduce the magnitude of the problem and its overall impact on female students quality of life as most of them are modifiable risk factors. Our result also suggested that further country wide longitudinal studies should be conducted in the future to avoid recall bias that might affect quality of such cross-sectional studies and also to identify other risk factors for menstrual cycle irregularity and its impact on students' academic performance. This will also allow the development of strategies, which can help improve the physical and emotional health of girls suffering from menstrual disturbances.

5.8. Recommendations

It is very important to create awareness regarding what regular and irregular menstrual cycle means and factors that lead to menstrual irregularity via the education system and media.

Students' family, especially mothers who are the main source of knowledge for their girls should actively participate and openly discuss about menstrual issue and reproductive health.

Parents, schools, as well as public health professionals should work hand in hand to provide health education on the factors that lead to menstrual irregularity for girls so that they could understand the problem earlier and seek appropriate management.

In the present study result showed that females with regular cycle had a greater sleep duration than females with irregular cycle. So students should be educated on the importance of adequate sleep duration with better mental health on menstrual cycle regularity.

As being overweight and obese is one of the factors that leads to menstrual irregularity, health education should be given on role of life style modification, like exercise and diet in maintaining the normal body weight and ideal BMI in order to prevent menstrual irregularity.

Recreational facilities should also be accessible and persistently provided by the school so as to reduce the effect of stress on menstrual cycle regularity.

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7. Annexes

7.1. Annex 1. Information sheet English version

Information sheet

Greeting: Good morning/afternoon!

Title of the Research Project: Magnitude and factors associated with menstrual irregularity among preparatory school female students in Adama, West-Ethiopia: Institution based cross-sectional study, 2020.

Principal investigator: Kemer Negesso Senti

Name of the organization: Addis Ababa University College of health science School of public health.

Introduction: This information sheet is prepared to explain the study you are being asked to join. Please listen carefully and ask any questions about the study before you agree to join.

Purpose of Research Project: The main purpose of this study is to determine the magnitude of menstrual irregularity and associated factors among preparatory female students in Adama, Western Ethiopia, 2020.

Procedure: To assess the magnitude of menstrual irregularity and associated factors, we invite you to take part in this project. If you are willing to participate in this project, you need to understand and give your oral consent. It may take around 15-20 minutes to accomplish the project questions. First written questions will be provided to you and you should need to understand and select the possible answer, then at the end you will be measured your weight and height. You do not need to tell your name and all your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your response.

Risk/Discomfort: By participating in this research project, you may feel that it has some discomfort especially on wasting time about 15-20 minutes. We hope you will participate in the study for the sake of the benefit of the research result. There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you but your participation is likely to help us in assessing magnitude of menstrual irregularity and associated factors among female students and this will help us for developing appropriate interventions.

Incentives: You will not be provided any incentives or payment to take part in this project.

Confidentiality: The information collected from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it and it will not be revealed to anyone except the principal investigator.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish, without losing any of your right.

Person to Contact: If you want more information and check about this project you can contact the following people.

Principal Investigator Name and Address:

Name: Kemer Negesso, kimemnegesso@gmail.com 09-10-35-41-23

Advisor's Name and Address

Name of primary Advisor: Professor Wakgari Deressa, Deressaw@gmail.com, 09-11-48-37-14

Name of Co advisor: Wondimu Ayele, wondaay@gmail.com, 09-11-70-67-79

7.2. Annex 2.Questionnaire English version

Addis Ababa University, School of Public Health

Date of data collection __/__/ 2020 Questionnaire code.....

SECTION 1: SOCIO – DEMOGRAPHIC INFORMATION (circle the correct answer/fill in space provided)

S. no	Demographic Questions	Responses	Skip	Code
1.	How old are you? (Age in years)	-----		
2.	School grade	1. 11 2. 12		
3.	School type	1. Public 2. Private		
4.	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Others (Specify).....		
5.	Marital status	1. Single 2. Married 3. Divorced		
6.	Educational status of your mother	1. Can't read and write 2. Read and Write 3. Primary education 4. Secondary education 5. Diploma and more		
7.	Family history of menstrual irregularity(mother or sister)	1. Yes 2. No 3. I don't know		
8.	Fathers occupation	1. Government employee 2. Private employee 3. Merchant 4. Farmer 5. Others (Specify) -----		
9.	Mothers occupation	1. Housewife 2. Merchant 3. Government employee 4. Private employee		

SECTION 2: MENSTRUAL CHARACTERISTICS (Menstrual information)(circle the correct answer/fill in space provided)

S. no	Demographic Questions	Responses	Skip	Code
1.	At what age did you have your first menstrual period? (age in years)	-----		
2.	Do you use contraceptive methodscurrently ?	a. Yes b. No		

3.	How long does your period last in the last 3 months?	a. 1 to 2 days b. 3 to 7 days c. Greater than 7 days		
4.	On average, how long is your monthly cycle in the past 3 months?	a. Less than 21 days b. 21 to 35 days c. Greater than 35 days		
5.	How many sanitary pad or towel did you use during menstruation period?	a. 1 to 2 sanitary pad or towel per day b. 3 to 5 sanitary pad or towel per day c. Greater than 5 sanitary pad or towel per day		
6.	Do you have abdominal pain, back pain or thigh pain before or during menstruation in the last 3 months?	a. Yes b. No		

SECTION 3: LIFE STYLE (BEHAVIORAL) CHARACTERISTICS (circle the correct answer/fill in space provided)

S. no	Demographic Questions	Responses	Skip	Code
1.	How often do you have a drinkcontaining alcohol?	a. Never b. Less than or equal to 1 times a month c. 2 to 4 times a month d. 2 to 3 times a week e. 4 or more times a week		
2.	Did you drink coffee during menstruation?	a. Yes b. No		
3.	If yes for question number 2 above: cup of coffee consumed per day?	a. 1 to 3 b. Greater than or equal to 4		
4.	Did you perform physical activities like running, swimming, cycling and jumping rope?	a. Yes b. No		
5.	If yes for question number 4 above: times per week of physical activity?	a. 1 to 2 b. 3 to 4 c. 5 to 7		
6.	Did you smoke cigarette during menstruration?	a. Yes b. No		
7.	If yes for question number 4 above: Number of cigarette per day?	a. 1-5 b. Greater than 5		
8.	How many hour do you sleep on average	a. < 7hr b. 7-9hr		

	per day?	c. > 9hr		
9.	Stress questions (DASS-21) Please read each of the statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week before menstruation. There are no right and wrong answer. Do not spend much time on any statement. The rating scale is as follows: 0 = Did not apply to me at all 1 = Applied to me to some degree, or some of the time 2 = Applied to me to a considerable degree, or a good part of time 3 = Applied to me very much, or most of the time Questions 1. I found it hard to wind down0 1 2 3 2. I tended to over react to situation0 1 2 3 3. I felt that I was using a lot of nervous energy0 1 2 3 4. I found myself getting agitated0 1 2 3 5. I found it difficult to relax0 1 2 3 6. I was intolerant of anything that kept me- from getting on with what I was doing0 1 2 3 7. I felt that I was rather touchy0 1 2 3			

Section 4: Anthropometric measurements

Weight and height of participants will be measured using mobile weighing scale and a stadiometer respectively, and then BMI of the students will be calculated by dividing their weight to their height square.

S. no	Measurement	Response	Code
1.	Weight	-----kg.	
2.	Height	-----m	

7.3. Annex 3. Information sheet Amharic version

መረጃመግለጫቅጽ

እንደምን አደሩ/ዋሉ

የጥናቱ ርዕስ:-የወር አበባ ስርጭትና መንስኤዎች በአዳማ መሰናዶ ት/ቤቶች ሴት ተማሪዎች፣ምእራብ ኢትዮጵያ፣2020

የጥናቱ ባለቤት:- ቀመር ነጌሶ ሴንቲ

የድርጅት ስም:- የአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ት/ቤት

የጥናቱ ዓላማ:- የዚህ ጥናት ዋና ዓላማ በአዳማ መሰናዶ ት/ቤት ሴት ተማሪዎች የወር አበባ መዛባት ስርጭቱ ምን ያክል እንደሆነና መንስኤዎች ምን እንደሆኑ ለይቶ ማወቅ ነው።

የጥናቱ ቅደም ተከተል:- የወር አበባ መዛባት ስርጭትና መንስኤዎች ምን እንደሆኑ ለማወቅ በዚህ ፕሮጀክት ወይም ጥናት እንዲሳተፉ በአክብሮት ጥያቄ እናቀርብልዎታለን። በዚህ ጥናት ላይ ለመሳተፍ ፍቃደኛ ከሆኑ የጥናቱን አላማ በመረዳት ፍቃድዎትን በቃል መስጠት ይኖርብዎታል። የጥናቱን ጥያቄዎች ለመመለስ ከ15- 20 ደቂቃ ያላለፈ ጊዜ የሚወስድ ሲሆን፣ መጀመሪያ በወረቀት ላይ የተጻፉትን ጥያቄዎች አንብቦ ተገቢውን መልስ መስጠትና በመጨረሻም ክብደትና ቁመትን መለካትን ያካትታል። ስምዎትን መግለጽ አይጠበቅብዎትም፣ እንዲሁም ለጥያቄዎች የምትመልሱት መልሶች ምስጢርነታቸው ሙሉ በሙሉ የተጠበቀ ማንም ሊያውቅ የማይችል የምስጢር ቁጥር እንጠቀማለን።

የጥናቱ ጉዳዮች:- በዚህ ጥናት ላይ በመሳተፍዎ ከ15-20 ደቂቃ በመቆየትዎ የተወሰነ አለመመቸት ሊሰማዎት ይችላል፣ ነገር ግን ይህ ጥናት የወር አበባ መዛባትን እና መንስኤዎችን ለይቶ ለማወቅና ለችግሩ መፍትሔ ለመስጠት የላቀ ቦታ ስላለው ይህን በመገንዘብ እንደምትሳተፉ ባለሙሉ ተስፋ ነን። በዚህ ጥናት በመሳተፍ የሚደርስብዎት ምንም አይነት ጉዳት የለውም።

የጥናቱ ጠቀሜታ:- በዚህ ጥናት ላይ በተሳተፍዎ ምንም አይነት ገንዘብ የለውም፣ ነገር ግን የአጭርና ረጅም ጊዜ ጥቅም ያገኛሉ። ከአጭር ጊዜ ጠቀሜታዎች መካከል የወር አበባ መዛባት ማለት ምን ማለት እንደሆነ እና እንዲሁም ክብደትዎን በማወቅ ለጤና የሚመከር የክብደት መጠን እንዴት እንደሚሰራ ለማወቅ ይረዳዎታል። ለወደፊት ደግሞ የወር አበባን መዛባት የሚያስከትሉ መንስኤዎችን በመለየት ለችግሩ መፍትሔ መስጠትና ጤንነትዎን እንዲጠብቁ ይረዳዎታል።

የጥናቱ ምስጢር ጠባቂነት:- በዚህ ጥናት ፕሮጀክት ወቅት የሚሰበሰብ ማንኛውም መረጃ ምስጢርነቱ ሙሉ በሙሉ የሚጠበቅ ሲሆን፣ በጥናቱ ወቅት የተሰበሰቡ መረጃዎች የተሳታፊዎችን ዝም ስለማይዝ እና የምስጢር ቁጥር ስለሚሰጠው መረጃውን ከጥናቱ ባለቤት ውጪ ማንኛውም አካል ሊያገኘው አይችልም።

የተሳታፊዎች መብት:-በጥናቱ ላይ የመሳተፍዎ ሆነ ያለመሳተፍ ሙሉ መብት አልዎት፣ ጥናቱ ውስጥ ተሳታፊ ሆነው ቢሆን እንኳን አቋርጦ መውጣት ይችላሉ ፣ ሁሉንም ጥያቄዎች መመለስ አሊያም አለመመለስ ይችላሉ ። ያልገባዎትን ማንኛውንም ጥያቄ መጠየቅ ይችላሉ።

ለማግኘት የሚችሉ ግለሰቦች:- ጥናቱን በተመለከተ ተጨማሪ መረጃ የሚፈልጉ ከሆነ ከዚህ በታች የተጠቀሱትን ግለሰቦች ማግኘት ይችላሉ።

የጥናቱ ባለቤት ስምና አድራሻ:-

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Annex 4.የአማርኛቃለመጠይቅቅጽ

አዲስ አበባ ዩኒቨርሲቲ፣ የህብረተሰብ ጤና ትምህርት ክፍል

ቃለ-መጠይቅ የተደረገበት ቀን.../.../2020 ቃለ-መጠይቅ ኮድ.....

ክፍል አንድ:-ማህበራዊ እና ስነ-ህዝባዊ መረዳ (ትክክለኛውን መልስ አክብቡት)

ተ/ቁ.	ጥያቄ	መልስ	ዝለል	የምስጢር ቁጥር
1.	ዕድሜሽ ስንት ነው? (ዕድሜ በዓመት)			
2.	ስንተኛ ክፍል ነሽ?	1. 11 2. 12		
3.	የት/ቤት አይነት	1. የግል 2. የመንግሥት		
4.	ሃይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ (ይግለጹ)... 6.		
5.	የጋብቻ ሁኔታ	1. ያላገባች 2. ያገባች 3. አግብታ የፈታች		
6.	የእናትየው የት/ት ደረጃ	1. መጻፍና ማንበብ የማትችል 2. መጻፍና ማንበብ የምትችል 3. የመጀመሪያ ደረጃ ያጠናቀቀች 4. ሁለተኛ ደረጃ ያጠናቀቀች 5. ዲፕሎማ እና ከዚያ በላይ 6.		
7.	በቤተሰብ ውስጥ (እናት ወይም እህት) የወር አበባ የመዛባት ሁኔታ አለ?	1. አዎ 2. አይደለም 3. አላውቅም		
8.	የአባት የሥራ ሁኔታ	1. የመንግሥት ሰራተኛ 2. የግል ሥራ የሚሰራ 3. ነጋዴ 4. አርሶ አደር 5. ሌላ (ይግለጹ).....		
9.	የእናትየው የሥራ ሁኔታ	1. የቤት እመቤት 2. ነጋዴ 3. የመንግሥት ሰራተኛ 4. የግል ሥራ የምትሰራ		

ክፍል ሁለት፦ የወር አበባ ሁኔታ ጥያቄዎች (ትክክለኛውን መልስ ክበቡት)

ተ/ቁ.	ጥያቄ	መልስ	ዝለል	የምስጢር ቁጥር
1.	ለመጀመሪያ ጊዜ የወር አበባ ያየሽው በየትኛው የእድሜሽ ክልልነው?(ዕድሜ በዓመት)			

2.	በአሁን ወቅት የእርግዝና መከላከያ ዘዴዎችን ትጠቀሟልሽ ?	ሀ. አዎ ለ. አይደለም		
3.	የወር አበባሽ ለምን ያህል ጊዜ ይቆይብሻል?	ሀ. ከ 1 - 2 ቀናት ለ. ከ 3 - 7 ቀናት ሐ. ከ 7 ቀን በላይ		
4.	በአማካይ የወር አበባሽ በየስንት ቀኑ ነው የሚመጣው?	ሀ. < 21 ቀናት ለ. ከ 21 - 35 ቀናት ሐ. > 35 ቀናት		
5.	በወር አበባ ጊዜ ስንት የንጽህና መጠበቂያ (ጥዕዴሊስ) ትጠቀሟልሽ?	ሀ. በየቀኑ ከ 1 - 2 ለ. በየቀኑ ከ 3 - 5 ሐ. በየቀኑ ከ 5 በላይ		
6.	Belefut 3worat wust, wor abeba kemayetish befit woynm wor abeba bemitayibet gize ye hodi, jerba woynm taafaa himem tesemtosh yawkal?	a. Awo b. Aydelem		

ክፍል ሦስት፡- የአኗኗር ዘይቤ (ሁኔታ) ጥያቄዎች (ትክክለኛውን መልስ ክበቡ)

ተ/ቁ.	ጥያቄ	መልስ	ዝላል	የምስጢር ቁጥር
1.	አልኮል ያለውን መጠጥ በየስንት ጊዜ ትጠቀሟልሽ	ሀ. በጭራሽ አልጠቀምም ለ. Be wor ande woyim ke and yanase gize ሐ. በወር ከ2-4 ጊዜ እጠቀማለሁ፡፡ መ. በሳምንት ከ2-3 ጊዜ እጠቀማለሁ፡፡ ሠ. በሳምንት ከ4 woymke 4 ጊዜ በላይ እጠቀማለሁ፡፡		
2.	በወር አበባ ጊዜ ቡና ትጠቀሟልሽ?	ሀ. አዎ ለ. አይደለም		
3.	የምትጠቀሟ ከሆነ በቀን ምን ያህል ሲኒ ቡና ትጠቀሟልሽ?	ሀ. ከ 1 - 3 ለ. ከ 4 በላይ		
4.	እደመሮጥ፣ ዋና መዋኘት ፣ ሳይክል መንዳት እና ገመድ መዝለል ያሉ የአካል ብቃት እንቅስቃሴዎችን ታደርጊያለሽ?	ሀ. አዎ ለ. አይደለም		
5.	መልስሽ አዎ ከሆነ በሳምንት ስንቴ ትሰራያለሽ?	ሀ. ከ 1 — 2 ቀን ለ. ከ 3 — 4 ቀን ሐ. ከ 5-7ቀን		

6.	በወር አበባ ጊዜ ሲጋራ ታጨሻለሽ?	ሀ. አዎ ለ. አይደለም		
7.	መልስሽ አዎ ከሆነ በቀን ውስጥ ምን ያህል ሲጋራ ታጨሻለሽ?	ሀ. ከ 1 — 5 ለ. ከ 5 በላይ		
8.	በቀን ውስት ምን ያክል ሰዓት ትተኛለሽ?	ሀ. < 7 ሰዓት ለ. 7-9 ሰዓት ሐ. > 9 ሰዓት		
9.	የጭንቀት (ሰትረስ) ጥያቄዎች (DASS-21) ከታች ያሉትን ዓረፍተ ነገሮች በማንበብ ከፈት ለፊት ያሉትን ቁጠሮች ያክብቡ(0,1, 2, 3,) ቁጥሮቹ የሚያመለክቱት ዓረፍተ ነገሮቹ ባለፈው ሳምንት ውስጥየወር አበባ ከማየታችሁ በፊት በእናንተ ላይ የሚታየውን ባህሪ የሚያመለክቱ መሆናቸውን ነው። 0 የሚያመለክተው፡- ዓረፍተ ነገሮቹ በእኔ ላይ የሚታየውን ባህሪ አያሳዩም 1 የመያመለክተው፡- አንዳንዴ በተወሰነ ሁኔታ እኔ ላይ የሚታየውን ባህሪ ይገልጻሉ። 2 የሚያመለክተው፡- ብዙው ጊዜ በእኔ ላይ የሚታየውን ባህሪ ይገልጻሉ። 3 የሚያመለክተው፡- አብዛኛውን ጊዜ በእኔ ላይ አዘውትረው የሚታዩ ባህሪዎችን ይገልጻሉ። <u>ጥያቄዎች፡-</u> 1. ስናደድ ወይም ስበሳጭ ቶሎ ለመቀዝቀዝ ወይንም ከንዴቱ ስሜት መውጣት ይከብደኛል።..... 0 1 2 3 2. ነገራቶች ላይ በቀላሉ እበሳጫለሁ ወይም ስሜታዊ እሆናለሁ። 0 1 2 3 3. ተናድጄ ብዙ ሃይል የምጠቀም ይመስለኛል። 0 1 2 3 4. እራሴን ብስጩ (ነጭናጫ) ሆኜ አገኘዋለሁ። 0 1 2 3 5. መዝናናት ከባድ ነገር ይመስለኛል። 0 1 2 3 6. የምሰራውን ስራ እንዳልሰራ የሚያደርገኝን ነገር መታገስ ይከብደኛል። 0 1 2 3 7. እራሴን ቁጡ ሆኜ አገኘዋለሁ። 0 1 2 3			

ክፍል አራት፡- የልኬት ሰው (Anthropometric measurement) መለኪያ

የተጠያቂዎቹ ክብደትና ቁመት ስታንዳርድ የሆኑ ማቴሪያሎችን በመጠቀም ይለካሉ። ከዚያ የተማሪዎቹ ቦዲማስ ኢንዴክስ (BMI) ክብደታቸውን ለቁመታቸው እስኩዌር በማካፈል ይታሰባል።

ተ/ቁ.	መለኪያ	መልስ	የምስጢር ቁጥር
1	ክብደት	ኪ.ግ	
2	ቁመት	ሜትር	

7.4. Annex 5. Information sheet Afan Oromo version.

Akkam bultan/ Akkam ooltan

Mataduree qorannichaa: Baayinna yeroo malee dhufuu xurii marsaa laguufi wantoota sababa isaa tahuu dandehan, barattoota shamaraa manneen barnoota qoophaina Adama irratti qorannoo taasifamu, Lixa Itoophiyaa, 2020.

Hoogganaa qorannichaa: Qamar Nageessoo Seenxii

Maqaa dhaabbataa: yuniverisitii kooleejii saayinsii fayyaa, dame mana barnoota fayyaa ummataa Addis Ababaa.

Kaayyoo qorannichaa: kaayyoon ijoon korannoo kanaa baayinni ykn babbalinni yeroo malee dhufuu marsaa lagu beekuufi wontoota sababa isaa tahuu dandehan beekuudhaaf shamarran manneen barnoota qophaaina Adaama iratti qorannoo adeemsisuudha.

Adeemsa qorannichaa: baayinna yeroo malee dhufuu xurii marsaa lagu beekuufi wontoota sabab tahu dandehan addaan baafachuuf, qorannoo kana irratti akka hirmaatan waamicha isiniif taasifna.Qorannoo kana irratti hirmaachuuf hayyamamaa yoo taatan, kayyoo korannichaa hubachuun hayyama keeysan jechaan kennuun isinirraa eegama. Gaafillee qorannichaa deebisuuf daqiiqaa 15-20 kan fudhatu yoo tahu, jalqaba irratti gaafillee barreefamaan isiniif dhihaatan hubachuun deebii madaalawaa tahe deebisuun isinirraa eegama, itti aansuun ulfaatina fi hojjaa keeysan safaramuun qorannichi ni xumurama. Qorannicha irratti maqaan hirmaataa hin ibsamu, akkasumas deebiin isin gaaffilee hundaaf laattan hunduu icciittiin isaa guutumaan guututti kan eegamu tahuufi gaaffilee hundaaaf lakkoofsa iciitii laatuun oddeeffannoon isin nuuf laattan eenyuu beeku akka hin dandeenyee isiniif ibsuu barbaanna.

Balaawwan qoannichaa: qorannoo kana irratti hirmaachuun daqiiqaa 15-20 waan tursiisuu dandehuuf mijaawinni isinitti dhagahemuu dhabuu dandeha, haa tau malee faaydaan qorannoo kana irraa argamu olaanaa waan taheef, faayda inni kabu hubachuun akka hirmaattan abdii kebana. Korannoo kana irratti hirmachuun miidhaa tokkollee akka hin kebne isin hubachiisuu barbaanna.

Iccitii eeguu oddeeffanoo sassaabuufi tamsaasuu irratti:-walitii qabaan oddeeffannoo abba qo’aniichaatiin leenjii kennama. Akksumaas hordooffiin nigodhamaa odefannoon nama dhuunfaa yammuu kenamuu ragaa irratti kan hundefamee fi fedhii irrattii iciittichii kan eegame ta’a. Ibsi nama dhuunfaa maqaan hin galmahuu sadarkaan qo’anichaa inni duraa qo’aataa qo’anichattiin kan qabamuu yemmuu ta’uu addeefanichiis lakk iccittiin kan cufamu ta’a. Ragaa wal-fakkaatuu yammuu ibsamuu eenyumaa maqaa namootaa dhuunfaa ragaan kan hin ibsaminee fi ragaan tamsasamuufi lakka iccitittiin kan cufam ta’a. yeroo qo’ anichaa ragaa walitti qabamuu abba qo’anichaa qofaatu Qabaata. Gara gaafillee qoanichaatti osoo hin seenin dura wonti ifa isinii hin tahir kamiyyuu yoo jiraate gaafadhaa.

Mirga hirmaattotaa: qo’anichaa irrattii hirmachuus ta’ee hiramachuu dhisuuf mirgaa guutuu qabdu. Qo’anichaa keessattii hirmaataa yoo taatanii illee dhiftanii bahuu dandeesuu. Gaffiiwwaan hundaa deebisuu ykn deebisuu kan hin barbanne dhisuu dandeesuu. Gaafii isinii hin galiin kamiyyuu gaafachuu dandeesuu.

Namoota qunnamuu dandeeysan: projectii ykn qorannoo kana irratti odeeffannoo dabalataa yoo barbaaddan namoota armaan gadii qunnamuu ni dandeeysu.

Maqaa hoogganaa qorannichaafi teessoo isaanii:

Maqaa: Qamar Nageessoo, kimemnegesso@gmail.com09-10-35-41-23

Maqaa gorsitootaafi teessoo isaanii:

Maqaa gorsaa duraa: Profeesar waakgaarii dheerressaa, Deressaw@gmail.com, 09-11-48-37-14

Maqaa gorsaa lammaffaa: Wondimmuu ayyalaa, wondaay@gmail.com, 09-11-70-67-79

7.4. Annex 6. Questionnaire Afan Oromo version.

Yuniveristii Addis Ababa, Mana Barnoota Fayyaa Ummataa

Guyyaa daataan sassaabamu ____/____/ 2020 Lakk. Iccitii gaaffiiwanii

KUTAA TOKKO: ODEEFANNOO HAWAASUMMAAFI TEESSUMA LAFAA(Deebii sirrii tahe irra mari/ iddoo kennametti guuti).

Tartiiba Lakk.	Gaaffilee teesuma lafaa	Deebii	Dhiis i/irra utaali	Lakk. icciitii
1.	Umriin kee meeqa? (umrii woggaadhaan)			
2.	Kutaa mana barumsaa	1. 11 2. 12		
3.	Gosa mana barnootaa	1. Kan mootummaa 2. Kan dhuunfaa		
3.	Amantaa	1. Ortodoksii 2. Musliimaa 3. Protestaantii 4. Kaatoolikii 5. Kan biraa (adda baasii ibsi)		
6.	Haala fuudhaafi	1. Kan heerumte		

	heerumaa	2. Kan hin heerumne 3. Kan heerumtee hiikte		
7.	Haala barnoota harmee keetii	1. Dubbisuufi barreessuu kan hin dandeenye 2. Dubbisuufi barreessuu kan dandeessu 3. Gosa barnoota sadarkaa 1 ^{ffaa} kan xumurte 4. Gosa barnoota sadarkaa 2 ^{ffaa} kan xumurte 5. Dipiloomaa fi achii oli		
6.	Maatii keesatti (obeleettii ykn haadha) yeroo isa malee dhufuun marsaa xurii lagu jiraa?	1. Eeyyan 2. Lakki 3. Hin beeku		
7.	Gosa hojii abbaa?	1. Hojjetaa mootummaa 2. Hojjetaa dhuunfaa 3. Daldalaa 4. Qonnaan bulaa 5. Kan biraa (adda baasi ibsi).....		
8.	Gosa hojii haadhaa?	1. Haadha manaa 2. Daldaltuu 3. Hojjettuu mootummaa 4. Hojjettuu dhuunfaa		

KUTAA LAMA. GAAFFILEE XURII MARSAA LAGUUTIIN (MENSTRUAL INFORMATION) WOL KEBATAN(Deebii sirrii tahe irra mari/ iddoo kennametti guuti).

Tartiiba Lakk.	Gaaffilee teesuma lafaa	Deebii	Dhiisi/irra utaali	Lakk. icciitii
1.	Marsaa lagu kee isa jalqabaa umrii meeqatti argite? (umrii woggaadhaan)			
2.	Yeroo ammaa qusannaa maatii fayyadamtaa?	a. Eeyyan b. Lakki		
3.	Ji'oota sadan (3) darban keesatti marsaan lagu kee guyyoota meeqaaf sirra ture?	a. Guyyaa 1hamma 2 b. Guyyaa 3 hamma 7 c. Goyyaa 7 oli		
4.	Avereejidhaan ji'a sadan darban keesatti marsaa lagu kee guyyaa meeqa meeqaan agarta?	a. Guyyoota 21 gaditti b. Guyyoota 21 hamma 35 c. Guyyoota 35 olitti		
5.	Yeroo marsaa lagu agartu waccuu ykn moodeelsii hagam fayyadamta?	a. Guyyatti waccuu 1 hamma 2 b. Guyatti waccuu 3 hamma 5 c. Guyatti waccuu 5 oli		
6.	Ji'oota sadan (3) darban keesatti marsaa lagu arguun duratti ykn yogguu marsaa lagu agartu dhukkubbiin garaa, dugdaa, kofa ykn sarbaa sitti dhagahamee beekaa?	a. Eeyyan b. Lakki		

KUTAA 3. GAAFFIIWWAN HAALA JIRUUFU JIREENYA(LIFE STYLE) YKN AMALEEFANNAA(Deebii sirrii tahe irra mari/ iddoo kennametti guuti).

Tartiiba Lakk.	Gaaffilee teessuma lafaa	Deebii	Dhiisi/irra utaali	Lakk. icciitii
1. Dhugaatii alkoolii qabu yeroo kam fa'a fayyadamta?	a. Gonkumaa hin fayyadamu b. Jiatti yeroo 1 ykn yeroo 1 gadi c. Jiatti sia 2 hamma 4 d. Torbaanitti sia 2 hamma 3 e. Torbaanitti yeroo 4 fi achii oli			
2. Yeroo xurii lagu agartu buna ni fayyadamtaa?	a. Eeyyan b. Lakki			
3. Gaafii armaan olii Lakk. 3 irratti gaafatameef deebiin kee	a. 1 hamma 3 b. 4 fi achii oli			

eeyyan yoo tahe, sinii bunaa hagam fayyadamta?				
4. Sochii qaamaa kan akka fiigichaa, bishaan daakuu, saaykilee oofuu fi haada utaaluu raawwattaa?	a. Eeyyan b. Lakki			
5. Gaaffii armaan olii 4 fi deebiin eeyyan yoo tahe, torbaanitti hamma meeqa raawwatta?	a. 1 hamma 2 b. 3 hamma 4 c. 5 hamma 7			
6. Sijaaraa afuuftaa/fayyadam taa?	a. Eeyyan b. Lakki			
7. Gaaffii armaan olii 6 fi deebiin eyyan yoo tahe, guyyaa keesatti sijaaraa hangamii fayyadamta?	a. 1 hamma 5 b. 5 fi achii oli			
8. Hirriba guyyatti sa'aatii meeqaaf rafta?	a. Sa'a 7 gadi b. Sa'a 7 hamma 9 c. Sa'a 9 oli			
9.	Gaaffiiwwan dhiphachuu ykn cinqamuun (stress) wol-qabatan (DASS 21) Jechoota armaan gadii dubbisuudhaan lakkoofsa 0, 1, 2, ykn 3 irra mari, lakkoofsi kunniin kan agarsiisan jechoonni armaan gaditti barraahan turban darbee keessatti xurii laguun arguun duratti hammam akka isiniratti muldhatan kan ibsaniidha. Madaalli ittiin tarreefaman akka armaan gadiitti taahee jira: 0 = Guutumaa guututti naratti hin mullatu 1= Sadarkaa hamma taheetti darbee darbee narratti ni mullatta 2 = Sadarkaa tilmaama keessa galuu dandahuun ykn haala gaariin narratti ni mullata 3 = Hamma baayyee tokko ykn yeroo hedduuf naratti ni mullata Gaaffiiwwan - Yeroo dallanu ykn aaru, dallansuu san dafee irranfachuun natti ulfaata.....0 1 2 3 - Wontoota irratti haala salphaanni dallana ykn ni aara..... 0 1 2 3 - Yogguun dallanu human dallansuu ykn aarii waan fayyadamu natti fakkaata0 1 2 3 - Yeroo baayyee ofii koo akka nama ololuutti (nechanechemuutti) tahee ofi arga.....0 1 2 3 - Bashannanuunykn ofi bashennensiisuun waan ulfaataa tahee natti mullata0 1 2 3 - Waan hojjetaa ykn dalagaa jirru irraa yoo na kaasan obsa hinqabu.....0 1 2 3 - Ofii koo nama lolu ykn oodu tahee ofi arga.....0 1 2 3			

KUTAA 4. SAFARA ULFAATINNAA FI HOJJAA (Anthropometric Measurement)

Ulfaatinnii fi hojjaan hirmaattotaa meshaa haala salphaan sochoossun dandahemuun ni safarma. Ergasiin booda BMI barattootaa ykn hirmaattotaa ulfaatina isaanii dachaa hojjaa isaaniitii hiruun ni shallagama.

Tartiiba Lakk.	Safara ykn bikkooma	Deebii	Lakk. Iccitii
	Ulfaatinna (weight)	kg	
	Hojjaa (Height)	m	

7.6. Annex 7. Curriculum vitae

Kemer Negesso Senti

Contact detail: (+251)910354123 Email: kimemnegesso@gmail.com

1. Personal information

Sex: **Male**
Date of birth: **April 03, 1995 G.C.**
Place of birth: **Dodola, West arsi zone of oromia region, Southeastern Ethiopia**
Marital status: **Single**
Nationality: **Ethiopian**

2. Education

Since sep. 2010 G.C. – still student of masters of public health
Sep. 2014- June. 2017 G.C: **B.S.C. in public health** from Wachemo Univeristy
Sep. 2010- June. 2013 G.C. **Preparatory school (High School Diploma)** at Radical Academy, Addis Ababa, Ethiopia.
Primary and High Schoolat Dodola junior school (Dodola), Dilber Secondary School, Dejazmach Belay Zelake primary and secondary school, Addis Ababa, Ethiopia.

3. Studies Applied For: Master of public health in Epidemiology and Biostatistics.

4. Personal Statement:

A graduate of Public Health with strong communication and organizational skills gained from work experience, now seeking to study masters program.

5. Work Experience

July 2017 to present	Graduate Assistant II			
Wachemo	University,	SNNPR,	Hosana,	ETHIOPIA
Tel.: +251- 046-555-19-10Fax +251-046-555-19-30				
Mail: www.wcu.edu.et				

6. Skill

Languaages:
Mother tongue: Afan Oromo

- ✓ **Afan Oromo** (fluent in speaking, reading, writing and listening)
- ✓ **Amharic** (fluent in speaking, reading, writing and listening)
- ✓ **English** (fluent in speaking, reading, writing and listening)

Communication Skills:

- Excellent interpersonal and communication skills gained through my experience from lecturing in the classroom, supervision of public health students during their ward attachments, CBTP, CHA and TTP site coordinator .

Computer skill:

- ✓ **Microsoft office packages** (word, excel, Access, power point)
- ✓ **SPSS**
- ✓ **Internet**

Job-Related Skills

- Supervisory, Advisory, guidance and support for students gained through Work experience in Wachemo University.

Other Personal Skill:

- ✓ Punctuality

- ✓ Confident
- ✓ Flexible and Adaptable
- ✓ Integrity
- ✓ Planned and Organized
- ✓ Positive Attitude

7. Research paper

Under graduate: Magnitude of late booking ANC service and associated factors among pregnant women at NEMMH (Nigist Eleni Mohammed Memorial Hospital) following ANC service, Hossaena, Ethiopia, 2017.

8. Activities & interests

Reciting Holly Quran, Enjoy attending eventful places, spending time with family, discussing current issues, reading and learning new things, watching movies and the like.

References

Amir Negesso (DDM/Doctor of dental medicine), amirodent@gmail.com, 0912031486

Aregash Mecha (Head, Department of Public health), areg.mecha@gmail.com, 0932545148

CURRICULUM VITAE (CV)

Wakgari Deressa Amente, BSc, MPH, PhD.

Professor of Public Health, Addis Ababa University, Ethiopia

D.O.B 10.11.1969 Tel: +251911483714 Email: deressaw@gmail.com

Academic Qualifications

2017 Diploma for Teaching in Higher Education Institutions, Addis Ababa University, Ethiopia.

2015 Post-doctoral research (Epidemiology), *Non-degree*, University of Bergen, Norway.

2007 PhD in Public Health, Addis Ababa University, Ethiopia.

2000 Master of Public Health (MPH), Addis Ababa University, Ethiopia.

1989 BSc in Biology, Addis Ababa University, Ethiopia.

Honours/Awards

2018: *Certificate of Award*: Federal Democratic Republic of Ethiopia Ministry of Science and Technology, for providing outstanding and continuous contribution in reviewing research protocols through the National Research Ethics Review Committee of the Ministry.

2014: *Certificate of Merit accompanied by a Silver Memorabilia Pin*: Ethiopian Public Health Association (EPHA), for recognition of outstanding contribution to EPHA as a Board member from 2009 to 2013.

2013: *Certificate of Recognition*: African Field Epidemiology Network (AFENET) and Ethiopian Health and Nutrition Research Institute (EHNRI), for invaluable contribution towards organizing the 5th AFENET Scientific Conference, held in Addis Ababa (Ethiopia) from November 17-21, 2013.

2013: *Certificate of Recognition accompanied by a Trophy*: Ethiopian Public Health Association, for commitment and dedicated service as executive board member and vice president of the Association from 2008-2013.

2012: *Certificate of Recognition*: Federal Democratic Republic of Ethiopia Ministry of Health and Ethiopian Public Health Association, for outstanding contribution and commitment in organizing the 13th World Congress on Public Health, held in Addis Ababa (Ethiopia) from April 23-27, 2012.

2007: *Gold Medal and Certificate of Merit*: Junior Public Health Research Award of the Ethiopian Public Health Association for outstanding achievements in conducting and promoting public health research in Ethiopia.

Present appointments

2019-current Professor of Public Health, School of Public Health, Addis Ababa University (AAU), Ethiopia

2017-current Senior Advisor for Research and Policy Translation, Ministry of Health, Ethiopia

Previous appointments

2013-2017 Dean, School of Public Health, College of Health Sciences, AAU, Ethiopia

2013-2017 Member of the Academic Commission and Managing Council of the College of Health Sciences at AAU, and member of the AAU Senate, Ethiopia

2010–2012 Chair, Department of Epidemiology and Biostatistics, School of Public Health, AAU, Ethiopia

2010-2013 Vice President of the Ethiopian Public Health Association, Ethiopia

2009-2011 Member of Research and Ethics Committee, School of Public Health, Ethiopia

2005-2011 Assistant Professor, School of Public Health, AAU

2008-2010 Executive Board Member of the Ethiopian Public Health Association, Ethiopia

2007-2010 Postgraduate Programme Coordinator, School of Public Health, AAU

2008–2009 Assistant Dean for Undergraduate Program, Faculty of Medicine, AAU

2001-2005 Lecturer, School of Public Health, AAU

2000-2001 Malaria epidemiology team leader, Oromia Health Bureau, Ministry of Health, Ethiopia.

1993-1997 Malaria control team leader, West Hararge Zone Health Department, Chiro, Oromia Regional State, Ethiopia.

1990-1993 Zone chief of malaria control program, Gojjam, Debre Markos, Ethiopia.

1989-1990 Junior malaria control expert, Ministry of Health, Ethiopia.

Recent Research Grants

Bauld, L, Britton, J, Collin, J, Fogarty, A, Gilmore, A, McNeill, A, Parrott, S, Siddiqi, K, Arora, M, Dalessandro, U, Deressa, W, Hugue, R, Kulkarni, M, Owusudabo, E. Nyamurungi, K, van Walbeek, C. *Building capacity for applied research to reduce tobacco-related harm in low and middle income countries*. Research Councils UK, Global Challenges Research Fund. October 2017-December 2021, £3,359,693.

Mamuya, S, Deressa, W, Bente, E. Moen. *Reduction of the burden of injuries and diseases due to occupational exposures through capacity building in low income countries*. Norway Agency for Development Cooperation (NORHED/NORAD). January 2014-December 2020, NOK 20,198,675 (≈\$2.5 million).

Alonge, O, Deressa, W, Saljuqi, T, Sarker, M, Kayembe, P, Gupta, SD, Mahendradhata, Y, Owoaje, E. *Synthesis and translation of research and innovations from polio eradication*. Bill and Melinda Gates Foundation. April 2018-December 2022, \$3,700,000.

Samet, J, Berhane, K, Wipfli, H, Gilliland, F, Fruin, S, McConnell, R, Avol, E, Zacharias, K, Patz, J, Schauer, J, **Takele, AK**, Tefera, WM, Birhanu, BS, Deressa, W, Asfaw, A, Worku, A, et al. *GeoHealth HUB for research and training in eastern Africa*. NCI, NIEHS, NIOSH (CDC) and Canada’s International Development Research Centre (IDRC). September 2015-August 2020, \$3,000,000.

Ali, J, Hyder, A, Addissie, A, Deressa W, Woldeamanuel Y, Feleke Y. Johns Hopkins University- Addis Ababa University research ethics training program (Ethiopia). NIH/Fogarty International Center. April 2019-March 2024, \$1,200,000.

Hyder, A, Deressa, W. *Monitoring and Evaluation of Bloomberg Global Road Safety Initiative in Addis Ababa, Ethiopia*. Bloomberg Philanthropies. August 2015-December 2019, \$417,097.

Hyder, A, Deressa, W, Kass, NE. *Supporting performance of the ethics committee for research (SUPER) in Ethiopia*. NIH/Fogarty International Center. April 2018-March 2021, \$120,189.

SELECTED PUBLICATIONS (Total=113)

1. Shentema MG, Kumie A, Bråtveit M, **Deressa W**, Ngowi AV, Moen BE. Pesticide Use and Serum Acetylcholinesterase Levels among Flower Farm Workers in Ethiopia—A Cross- Sectional Study. *International Journal Environmental Research and Public Health* 2020, **17**, 964; doi:10.3390/ijerph17030964.

2. Teklesilasie W, **Deressa W**. Barriers to husbands’ involvement in maternal health care in Sidama zone, Southern Ethiopia: a qualitative study. *BMC Pregnancy and Childbirth* 2020; **20**:21. <https://doi.org/10.1186/s12884-019-2697-5>.

3. Mekonen E, Azeez B, Fikre A, Taye H, Abiye H, Shiferaw D, Yohannes D, Paul EG. Miliard D, Peter M, Tamara B, **Deressa W**. The role of environmental factors in the etiology of Non-syndromic Orofacial Clefts. *Journal of Craniofacial Surgery* 2020; **31**(1): 113-116. doi: 10.1097/SCS.00000000000005924.

4. Roro M, **Deressa W**, Lindtjørn B. Intrauterine growth patterns in rural Ethiopia compared with WHO and INTERGROWTH-21st growth standards: A community-based longitudinal study. *PLoS ONE* 2019;**14**(12): e0226881. <https://doi.org/10.1371/journal.pone.0226881>.

5. Getachew S, Lewis S, Britton J, Deressa W, Fogarty AW. Prevalence and risk factors for initiating tobacco and alcohol consumption in adolescents living in urban and rural Ethiopia. *Public Health* 2019; 174:118-126.
6. Loha E, Deressa W, Gari T, et al. Long-lasting insecticidal nets and indoor residual spraying may not be sufficient to eliminate malaria in a low malaria incidence area: results from a cluster randomized controlled trial in Ethiopia. *Malaria Journal* 2019; 18:141.
7. Abay SW, Bråtveit M, Deressa W, et al. Microbial contamination of coffee during postharvest on farm processing: A concern for the respiratory health of production workers. *Archives of Environmental & Occupational Health* 2019; 1592094.
8. Assefa A, Ahmed AA, Deressa W, et al. Multiplex serology demonstrate cumulative prevalence and spatial distribution of malaria in Ethiopia. *Malaria Journal* 2019; 18:246.
9. Abaya SW, Bråtveit M, Deressa W, et al. Respiratory health among hand pickers in primary coffee-processing factories of Ethiopia. *Journal of Occupational and Environmental Medicine* 2019; 61(7):565-571.
10. Asres A, Jerene D, Deressa W. Delays to anti-tuberculosis treatment initiation among cases on directly observed treatment short course in districts of southwestern Ethiopia: a cross sectional study. *BMC Infectious Diseases* 2019; 19:481.
11. Solomon T, Loha E, Deressa W, et al. Low use of long-lasting insecticidal nets for malaria prevention in south-central Ethiopia: A community-based cohort study. *PLoS ONE* 2019; 14(1): e0210578.
12. Wolka E, Deressa W, Reja A. Prevalence of gestational diabetes mellitus and associated factors in Southern Ethiopia. *Asian Journal of Medical Sciences* 2019; 10 (1):86-91.
13. Kenea O, Balkew M, Tekie H, **Deressa W**, et al. Impact of combining indoor residual spraying and long-lasting insecticidal nets on *Anopheles arabiensis* in Ethiopia: results from a cluster randomized controlled trial. *Malaria Journal* 2019; **18**:182. <https://doi.org/10.1186/s12936-019-2811-1>.
14. Hailu A, Lindtjørn B, Deressa W et al. Cost-effectiveness of a combined intervention of long lasting insecticidal nets and indoor residual spraying compared with each intervention alone for malaria prevention in Ethiopia. *Cost Effectiveness and Resource Allocation* 2018; 16:61.
15. Abaya SW, Bråtveit M, Deressa W, et al. Reduced lung function among workers in primary coffee processing factories in Ethiopia: a cross sectional study. *Int. J. Environ. Res. Public Health* 2018; 15 (11), 2415.
16. Gari T, Loha E, Deressa W, Solomon T, Lindtjørn B. Malaria increased the risk of stunting and wasting among young children in Ethiopia: Results of a cohort study. *PLoS ONE* 2018; **13** (1): e0190983.
17. Beyene H, Deressa W, Kumie A, Grace D. Spatial, temporal, and spatiotemporal analysis of under-five diarrhea in Southern Ethiopia. *Tropical Medicine and Health* 2018; 46:18.
18. Egata AD, Deressa W. Maternal disempowerment and severe food insecurity as determinants of undernutrition among 6-36 month old children in Gurage Zone, Southern Ethiopia: a case-control study. *Journal of Food and Nutrition Sciences* 2018; 6(2): 46-57.
19. Abaya SW, Bråtveit M, **Deressa W**, Kumie A, Moen BE. Personal Dust Exposure and Its Determinants among Workers in Primary Coffee Processing in Ethiopia. *Annals of Work Exposures and Health* 2018; **62** (9):1087–1095.
20. Asres A, Jerene D, **Deressa W**. Pre- and post-diagnosis costs of tuberculosis to patients on Directly Observed Treatment Short course in districts of southwestern Ethiopia: a longitudinal study. *Journal of Health, Population and Nutrition* 2018; **37**:15.
21. Solomon T, Loha E, **Deressa W**, Balkew M, Gari T, Overgaard HJ, Lindtjørn B. Bed nets used to protect against malaria do not last long in a semi-arid area of Ethiopia: a cohort study. *Malaria Journal* 2018, **17**:239.
22. Asres A, Jerene D, **Deressa W**. Delays to treatment initiation is associated with tuberculosis treatment outcomes among patients on directly observed treatment short course in Southwest Ethiopia: a follow-up study. *BMC Pulmonary Medicine* 2018; **18**:64.
23. Assefa A, Ali A, **Deressa W**, et al. Glucose-6-phosphate dehydrogenase (G6PD) deficiency in Ethiopia: absence of common African and Mediterranean allelic variants in a nationwide study. *Malaria Journal* 2018, **17**:388.
24. Teklesilasie W, **Deressa W**. Husbands' involvement in antenatal care and its association with women's utilization of skilled birth attendants in Sidama zone, Ethiopia: a prospective cohort study. *BMC Pregnancy and Childbirth* 2018; **18**:315.
25. Hailu A, Lindtjørn B, Deressa W, et al. Economic burden of malaria and predictors of cost variability to rural households in south-central Ethiopia. *PLoS ONE* 2017; 12(10): e0185315.
26. Deressa W. Individual and household factors associated with ownership of long-lasting insecticidal nets and malaria infection in south-central Ethiopia: a case-control study. *Malaria Journal* 2017; 16:402.
27. Abdelrazig S, Ortori C, Davey G, Deressa W, Mulleta D, Barrett D, Amberbir A, Fogarty A. A metabolomic analytical approach permits identification of urinary biomarkers for *Plasmodium falciparum* infection: a case-control study. *Malaria Journal* 2017; 16:229.
28. Tadesse F, Fogarty A, Deressa W. Prevalence and associated risk factors of malaria among adults in East Shewa Zone of Oromia Regional State, Ethiopia. *BMC Public Health* 2017:18:25.

29. Tadesse F, Deressa W, Fogarty A. Concerns about covert HIV testing are associated with delayed presentation in Ethiopian adults with suspected malaria: a cross-sectional study. *BMC Public Health* 2016; 16:102.
30. Haji Y, Fogarty AW, Deressa W. Prevalence and associated factors of malaria among febrile children in Ethiopia: A cross-sectional health facility-based study. *Acta Tropica* 2016; 155:63- 70.

7.7. Annex 8. Declaration

Declaration

This is to certify that the thesis prepared by Kemer Negesso, entitled: Prevalence of menstrual irregularity and associated factors among preparatory school girls in Adama Town, Oromia region, Ethiopia. It is submitted to Addis Ababa University on the year 2021 in partial fulfilment of the requirements for the Degree of Masters of Public Health (MPH) in Epidemiology and Biostatistics complies with the regulations of the university and meets the accepted standards with respect to originality and quality. This thesis has not been presented for a degree in any other university, and that all sources of materials used for the thesis have been duly acknowledged.

Principal investigator

Signature

Date

Kemer Negesso (MPH Student)

Principal advisor

Wakgari Deressa (PhD), Professor of Public Health

Co-advisor

Wondimu Ayele(MSc, PhD Fellow), Assistant Professor of Biostatistics and Health informatics. _____

Examiners

Assefa Seme Deresse, MD, MPH, Associate Professor

Samson Wakuma (PhD)