

## Under Nutrition and Associated Factors among Adolescent Pregnant Women in Shashemenne District, West Arsi Zone, Ethiopia: A Community-based Study

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### Abstract

**Background:** Pregnancy places adolescent females who, in general, are at risk for nutritional problems at even greater risk. This study aimed to determine prevalence of under nutrition and identifying associated factors among adolescent pregnant women in Shashemenne district, West Arsi Zone, Ethiopia from March 10/2015-March 31/2015.

**Methods:** A cross-sectional, community based study was conducted on 424 adolescent pregnant women existing in ten randomly selected rural and urban kebeles (kebele is the smallest administrative unit in Ethiopia). Data were collected using a pre-tested, structured questionnaire and anthropometric measurement in their own respective homes. MUAC of <22 cm defined under nutrition. Data were analysed by SPSS version 21. A multivariable logistic regression was used to identify the predictors of under nutrition.

**Results:** In this study, the mean MUAC ( $\pm$  SD) of the study participants was 22.0cm ( $\pm$  2.8) and 34.0%, 95%CI: 29.5%, 38.4% of the women were undernourished. Women married before 15 years [AOR=7.3, 95%CI (9.5-23.7)] were sixteen times more likely undernourished than those married between 18-19 years. Whereas; Literate women [AOR=0.3, 95%CI (0.2-0.8)], No ANC visits [AOR=6.0, 95%CI (1.2-30.1)], Less than three pregnancies [AOR=0.1, 95%CI (0.03-0.3)], having support [AOR=0.4, 95%CI (0.2-0.8)] and Workload [AOR=13.6, 95%CI (6.3-28.8)]. Conclusion: The level of under nutrition was high. Thus, pregnant teenager's targeted efforts should be made by all concerned bodies to improve the health and nutritional conditions of teenage mothers and their offspring.

**Keywords:** Under nutrition; Antenatal care; Demographic survey; Health

nutritional status of adolescents. The additional energy and nutrient demands of pregnancy place adolescents at nutritional risk [3-10].

### Abbreviations

ANC: Antenatal care

BMI: Body Mass Index AOR: Adjusted odds ratio

CI: Confidence Interval

EDHS: Ethiopian Health and Demographic Survey

MUAC: Mid Upper Arm Circumference

WHO: World Health Organization Conflict of Interests

Due to the high rate of adolescent marriage in some developing countries, pregnancy during adolescence is still common. The magnitude of teenage pregnancy differs across countries of the developing world. According to EDHS 2005, despite a minimum legal marriage of 18 years in Ethiopia, early marriage remains common, with a median age at first marriage 16.1 years. Almost all pregnancies in Ethiopia occur within marriage, and the median age at first birth is about 17 years. Levels of contraceptive use are low, at 15% among married women of reproductive age.

Teenagers had lower contraceptive prevalence and used family planning methods sporadically compared with young adults age 20-24 and about 40% of women had begun childbearing by age 19, and many as early as age 15 or 16 [11]. In developing countries, many adolescents are undernourished and still growing when they enter pregnancy. Due to chronic malnutrition, age at menarche is delayed by about 3 years and growth continues until age 20. In cases in which a woman has not completed her physical, psychological, and social development, the pregnancy period affects the mother and infant negatively [12-14].

### Background

Adolescence refers to the developmental period between childhood and adulthood. The World health organization (WHO) defines adolescents as individuals between the ages of 10-19 years [1,2]. Adolescence is a time of rapid physical growth with nutritional requirements increasing significantly to support growth and development. A combination of the energy demands of the adolescent growth spurt and inadequate diet has contributed a lot to the poor

Adolescent pregnant women encounter challenges in addition to those encountered by all women who are pregnant. They are at greater risk for certain health conditions, such as pregnancy induced hypertension, pre-eclampsia, intra-uterine growth retardation, preterm delivery, low birth weight, and inadequate weight gain, related to their age and developmental stage, and have limited knowledge of their bodies, reproduction, pregnancy, and birth. Also adolescent pregnant women have been found to be at higher risk when compared to pregnant adults for certain social problems, such as discontinuation of education, unemployment, and social isolation [15-19]. Factors at individual, household and community level, or a combination of these factors, may contribute to poor nutrition and health status. Previous studies have shown that family income, education, MUAC and pregnancy body mass index (BMI) were associated with nutrient inadequacy [20,21]. Adolescents in populations with minimal access to contraception are likely to have many closely spaced pregnancies over their childbearing years. In such adolescents, changes in nutritional status during pregnancy may be predictive of long term reproductive nutritional depletion [22-24].

Nutritional deficiencies are far reaching consequences in adolescent pregnant women. Pregnancy among those who themselves are children can result in pregnancy complications. If their nutritional needs are not met, they are likely to give birth to undernourished children, thus transmitting under nutrition to future generations [3,4,12,13]. Addressing the nutritional needs of adolescent pregnant women could be an important step towards breaking the vicious cycle of intergenerational malnutrition. The vicious cycle of under nutrition, if not broken, will go on resulting in more and more severe consequences. One way to break the intergenerational cycle of under nutrition is to improve the nutrition of adolescent girls prior to conception in general and during pregnancy in particular [25].

Despite the fact that adolescence in general and adolescent pregnancy in particular is one of windows of opportunity in the life cycle nutritional interventions, a few studies have reported the nutritional status of pregnant adolescents. Nutritional requirements during adolescent pregnancy are greater than during adult pregnancy. If an adolescent is well nourished during pregnancy, she will have adequate fat and other nutrient reserves that can be used to compensate partially for her additional requirements and her foetus. Because of this, and the importance of nutrition in the course and outcome of pregnancy, all adolescent pregnant women should have a formal assessment of their nutritional status at the beginning of their prenatal care, with ongoing surveillance throughout the pregnancy. So, information on nutritional status and associated factors of the adolescent pregnant women is urgently needed for prioritizing, designing and initiating intervention programs aimed at improving maternal nutrition. The process of priority setting should start with the assessment and analysis of the situation that adolescent pregnant women face in their environment. In Ethiopia where marriage is universal and occurs at younger ages; the nutritional status and associated factors of pregnant adolescents is of prime public health importance. To the best of principal investigator's knowledge, there is no research based information regarding pregnant adolescent's nutritional status and associated factors from the study communities. Thus, the objective of this study was to assess the level of undernutrition and associated factors among adolescent pregnant women in Shashemene district.

## Methods

### Study setting, design and period

A community-based cross-sectional study was conducted in Shashamane district, West Arsi Zone, Oromia National Regional State, Ethiopia from March 10/2015-March 31/2015 among adolescent pregnant women. The district is one of 13 districts in West Arsi zone and its population is divided into rural and urban dwellers. Shashemenne is its capital city (the capital city of West Arsi zone); it is located 206 Kms from Adama (the capital city of Oromia Regional State) and 251 Kms from Addis-Ababa (the capital city of Ethiopia). According to Shashemenne district health office report, the total population of the district, in the year 2014, was estimated to be 328,035 (156, 237 males and 171,798 females) and 24% [78,729] of the population are women of reproductive age group and about a quarter (19,682) of those women are teenagers. The total numbers of adolescent pregnant women, which were the source population, in the district were 2,007. The district is constituted by 47 kebeles (10 urban and 37 rural kebeles). The district has two hospitals, 14 health centers, 47 health posts, 3 small, 5 medium and 6 higher private clinics, one private hospital and 12 private drug vendors. The potential health service coverage in the district is 98% [26].

### Study population, sample size and sampling

Adolescent pregnant women between the ages of 10-19 years in the randomly selected kebeles of the district were the study population. Pregnant women were identified by self-report, from the report of health extension workers in the kebeles. A sample size of 434 adolescent pregnant women was calculated using a single population proportion formula with a 95% confidence level, 5% margin of error, and 15.1% estimated prevalence of chronic wasting (MUAC<22 cm) in the study area [27] and by considering a non-response rate of 10%. This study was based on the random sample of ten kebeles of the forty seven kebeles existing in the district. The total kebeles in the district were initially stratified into rural and urban (10 urban and 37 rural) areas. Then, ten (three from urban and seven from rural) were selected randomly based on Probability Proportional to Size (PPS) sampling technique and then the determined sample size was distributed proportional to total adolescent pregnant women of each stratum. After that, simple random sampling was used to select the required number of adolescent pregnant women.

### Data collection methods and procedures

Data was collected by four grade twelve complete female data collectors and supervised by one BSc nurse and principal investigator who were able to speak and write local languages. Data was collected using a pre-tested, structured questionnaire adapted from related studies and anthropometric measurement. The adapted questionnaire was modified, contextualized to the local situation and the research objectives. Information on socio-demographic, psychosocial, eating habits and maternal health variables of the identified eligible respondents' were assessed using a structured face-to-face interview administered questionnaire in their own respective homes.

### Anthropometric measurement

The nutritional status of pregnant women is often measured using mid upper arm circumference (MUAC). MUAC is independent of pregnancy or lactation status and therefore can be used as an effective

indicator of women's nutritional status throughout the reproductive years. MUAC is more useful than weight during pregnancy, as it varies little during pregnancy and has been associated with maternal BMI and weight, maternal and infant mortality, prematurity and other poor foetal outcomes [28]. Because of MUAC instrument is simple and the training is straightforward, MUAC measurement was taken by the grade twelve complete data collectors. MUAC is the circumference of the left upper arm measured in centimeters using a non-stretchable MUAC tape. The point is between the tip of the shoulder and the elbow. Wasting in pregnant women can be defined as a mid- upper arm circumference (MUAC) <22 cm [29].

**Statistical analysis**

Data was double entered and cleaned in EPI data software version 3.1. The entered data were exported and analyses with SPSS version 21. Descriptive tests like proportions mean and standard deviation was used to describe the data. Bivariate and multivariate logistic regression analyses with an odds ratio along with the 95% confidence interval were used to ascertain the association between covariates and under nutrition among adolescent pregnant women. Hosmer- Lomeshow goodness-of-fit is used to test model fitness. Only covariates that have (P<0.2) at the bivariate level were included in the multivariate logistic regression to control for all possible confounders. For all statistical tests P-value ≤ 0.05 was considered for level of statistical significance.

**Ethical consideration**

Officially written approval letter from Haramaya University institutional research ethics and review committee (IRERC) was obtained prior to the study. Then, informed consent was obtained, privacy and confidentiality was maintained for the participants. For adolescent pregnant women below 18 years, the interview was conducted after informed consent from their husband/male partner or parents/legal guardians. Verbal assent was also obtained from the adolescent pregnant women under 18 years. The purposes, the data collection procedures, the risks, and the benefits of the research were explained to the eligible respondents before obtaining their informed consent.

**Results**

**Socio-demographic characteristics of the respondents**

A total of 424 adolescent pregnant women were interviewed making a response rate of 97.5%. The median (±SD) age of mothers was 18.0 (±1.2) years. The majority of participants were Oromo (67.2%) and Muslim (66.5%), (Table 1).

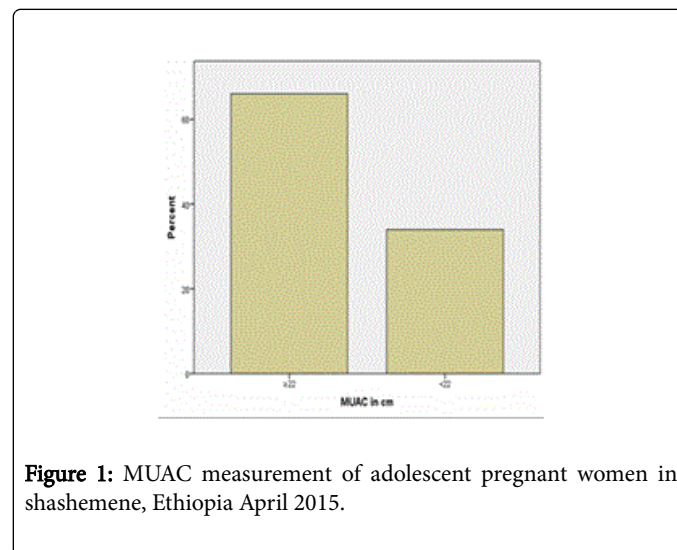
Variable	Category	Number	Percentage (%)
Age	15-17	146	34.4
	18-19	278	65.6
Age at first marriage	Never married	48	11.3
	<15	35	8.3
	15-17	306	72.1
	18-19	35	8.3
Occupation	House wife	191	45.1

	Merchant	98	23.2
	Gov't employee	56	13.2
	Others	79	18.7
Educational status	Illiterate	151	35.5
	Literate	273	64.5
Current marital relationship	Never married	48	11.3
	Married	303	71.5
	Other	73	17.2
Marriage type	Never married	48	11.3
	Arranged marriage	207	48.8
	Love marriage	169	39.9
Residence	Urban	65	15.3
	Rural	359	84.7

**Table 1:** Characteristics of pregnant women in Shashemene, southern Ethiopia April, 2015.

**Under nutrition and associated factors**

The mean MUAC (± SD) of the study participants was 22.0cm (± 2.8). Among 424 women interviewed, 144 (34.0%, 95%CI: 29.5%, 38.4%) were undernourished (MUAC<22 cm) (Figure 1).



**Figure 1:** MUAC measurement of adolescent pregnant women in shashemene, Ethiopia April 2015.

In the bivariate analysis; literate women were nine times less likely to be undernourished than those illiterate women. Women married before 15 years were sixteen times more likely to be undernourished than those married between 18-19 years and women who had exposure to mass media and live in urban were eight and five times less likely to be undernourished than their counterparts respectively. Women who get pregnant less than three times were nine times less likely to be undernourished than their counterparts. Women who desired their current pregnancy were eight times protected from under nutrition than women who did not desire their current pregnancy. Respondents those who avoid any foods during their pregnancy time

were three times more likely to be undernourished than their counterparts. Women having literate partner and desired pregnancy by partner were less likely to be under nourished and respectively. In multivariate analysis, Compared to respondents married between 18-19 years, those married before 15 years were about seven times more likely to be undernourished. On the other hand, literate women were protected from under nutrition. The odds of under nutrition were 70% lower for the literate adolescent pregnant women than the illiterate women. Adolescent pregnant women who didn't visit ANC

were six times more likely to be undernourished when compared to respondents who attended ANC greater or equal to four times. Adolescent pregnant women who get pregnant less than three times were less likely to be under nourished than those who had more pregnancy. Moreover, adolescent pregnant women having partner, peer or family support were protected from being under nourished. Adolescent pregnant women having daily heavy workload were thirteen times more likely to be undernourished as compared to their counterparts (Table 2).

Variable	Under nutrition		COR	AOR	P-value
	Yes	No	(95% CIs)	(95%CI)	
Age(years)					
15-17	74(50.7%)	72(49.3%)	3.1(2.0-4.7)*	1.4(0.6-3.7)	0.448
18-19	70(25.2%)	208(74.8%)	1		
Marital status					
Never married	9(23.7%)	39(76.3%)	1.3(0.5-3.4)	5.2(0.03-9.9)	0.539
Married	124(40.9%)	179(59.1%)	3.9(2.0-7.7)*	1.5(0.4-5.8)	0.55
Other	11(15.1%)	62(84.9%)	1		
Age at 1 <sup>st</sup> Marriage					
Never married	9(23.7%)	39(76.3%)	2.6(0.9-7.4)	1	
<15	14(39.5%)	21(60.5%)	16.0(6.5-39.4)*	7.3(9.5-23.7)*	0.022
15-17	118(38.6%)	188(61.4%)	7.0(3.1-16.2)*	0.5(0.1-2.3)	0.353
18-19	3(8.2%)	32(91.8%)	1	1	
Marriage type					
Never married	9(23.7%)	39(76.3%)	2.9(1.2-6.9)*	1	
Arranged	120(58.3%)	86(41.7%)	15.4(8.4-28.5)*	0.8(0.2-2.4)	0.641
Love	14(8.3%)	155(91.7%)	1	1	
Educational status					
Literate	49(17.9%)	224(82.1%)	0.1(0.1-0.2)*	0.4(0.2-0.8)*	0.043
Illiterate	95(62.9%)	56(37.1%)	1	1	
Occupation					
House wife	103(53.9%)	88(46.1%)	1.2(0.7-2.0)	1.1(0.3-3.7)	0.854
Merchant	16(16.3%)	82(83.7%)	0.3(0.1-0.5)*	1.2(0.3-4.4)	0.762
Gov't employee	11(19.6%)	45(80.4%)	0.2(0.1-0.4)*	0.5(0.1-4.3)	0.54
Other	55(69.6%)	24(30.4%)	1	1	
Numbers of pregnancy					
<3	91(23.3%)	268(74.7%)	0.1(0.04-0.2)*	0.1(0.03-0.3)*	0.0001
≥3	53(81.5%)	12(18.5%)	1	1	
ANC visits					
No ANC	114(55.3%)	92(44.7%)	11.4(6.3-20.5)*	6.0(1.2-30.1)*	0.031

<4 visits	27(27.8%)	70(72.2%)	4.6(2.4-8.8)*	1.2(0.2-6.5)	0.834
≥4 visits	3(2.5%)	118(97.5%)	1	1	
Number of meals/day					
<3meal	28(71.8%)	11(28.2%)	3.4(1.7-7.1)*	1.1(0.3-3.4)	0.897
≥3meal	116(30.1%)	269(69.9%)	1	1	
Meal pattern					
Regular	51(19.7%)	208(80.3%)	0.2(0.2-0.4)*	1.2(0.6-2.5)	0.63
Irregular	93(56.4%)	72(43.6)	1	1	
Change in food intake					
No change	112(50.2%)	111(49.2%)	6.0(3.5-11.7)*	0.5(0.2-1.5)	0.199
Frequency	15(26.3%)	42(73.7%)	2.0(1.0-4.0)*	0.7(0.2-2.4)	0.624
Amount	7(16.3%)	36(83.7%)	2.0(1.0-4.5)*	0.6(0.2-2.6)	0.543
Freq. & amt.	10(9.9%)	91(90.1%)	1	1	
Workload					
Yes	119(72.6%)	45(27.4%)	7.3(4.7-11.3)*	13.6(6.3-28.8)*	0.0001
No	25(9.6%)	235(90.4%)	1	1	
Support					
Yes	53(18.1%)	240(81.9%)	0.2(0.1-0.3)*	0.4(0.2-0.8) *	0.007
No	91(69.5%)	40(30.5%)	1	1	

**Table 2:** Key: COR=crude odds ratio, AOR=Adjusted odds ratio, CI=confidence interval, \*=P-value ≤ 0.05 for statistical significance.

## Discussion

The study showed a high prevalence of under nutrition. Age at first marriage, educational status, ANC visits, and numbers of pregnancy, work load and support during pregnancy remained the main significant factors associated with under nutrition. The result of the study was almost consistent with findings on the level of under nutrition in some parts of the country; the prevalence of wasting among adolescent pregnant women of the Tigray region and Southern region was (37.5%) and (37%) respectively [30]. This result is also consistent with study from Philippines where the prevalence of wasting was 33.1% [31]. But more than two times finding from Aletawondo, Southern region of Ethiopia which is 15.1% [27] and finding from South Africa (13%), [32]. The level of under nutrition in this study also much higher than findings from other different countries, i.e., 6.4% in Uganda [33], 18.1% in Thailand [34], 25% in Bangladesh [35] and 20% in Nigeria [36]. The probable reason for the above variation in rates could be little interventions on adolescents' health, nutrition, early marriage, family planning and other adolescent women empowering programs by the government as well as other non-governmental organizations in the study area which in turn resulted in chronic energy deficiency, inadequate weight gain during pregnancy and poor nutritional status of adolescent pregnant women. This finding evidenced that, those married before 15 years were more likely undernourished. This was in line with other studies [37]. The practices of early marriage, which was a case in the study area (The median age

at first marriage was 16.0(±1.3) years which was almost similar with the national figure which is 16.1 [11], limit the education and development of girls which in turn trigger the occurrence of under nutrition. Compared to illiterate women, literate women were protected from under nutrition. This is consistent with other studies [38]. This may be due to educated adolescent pregnant women have adequate knowledge about their own health, development and nutritional needs and also education affects fertility through delay in age at marriage, improving knowledge and access to effective family planning methods and ability on decision making on number of children needed.

Compared to respondents who visits ANC greater or equal to four times (which is recommended), those who did not visit ANC were more likely under nourished. The risk is higher than the study finding from Aletawondo where the odds of under nutrition (MUAC<22 cm) during pregnancy among women who did not visit ANC were 2.9 compared with other women [27]. This might be because those who frequently visit the health institutions were getting health and nutrition educations as well as advice from the respective health professionals. Similarly, compared to respondents who get pregnant greater or equal to three times, those who get pregnant less than three times were less likely under nourished. This is in line with other study [27]. This may be due to the average age of marriage for women have a significant effect on the teenage birth rate. So, adolescents in populations where early marriage is common together with minimal access to contraception are likely to have many closely spaced pregnancies.

In this study, adolescent pregnant women having daily heavy workload were more likely undernourished as compared to their counterparts. This was in line with study from Aletawondo [27]. The practices of arranged marriage, which is a case in the study area, may limit the love, attention and care given by the partner which in turn make pregnant adolescents work largely on the families' jobs. Adolescent pregnant women having adequate partner, peer or family support were protected from being undernourished. This is in line with study from South Africa [32,39]. It should be noted that; woman who has not completed her physical, psychological, and social development needs support to protect the health and nutritional conditions of the growing mother and her foetus.

Contrary to the general perception, age of respondents, occupation, exposure to mass media, avoid eating any food during pregnancy, meal pattern and desiredness of pregnancy was found to have no significant association with under nutrition in our study. The finding of a lack of association could reflect effect modification on the basis of settings or cultural contexts. Major strengths of this study were the community based approach and random selection of the study households or kebeles. This may have made generalization possible to the study communities as an attempt was made to identify randomized households and adolescent pregnant women from the study communities. The study couldn't establish firm causal links though association was observed due to its cross-sectional design. This study also used only MUAC measurement for nutritional assessment which is indirect measure of nutrition and status. As study was based on the women's self-reported pregnancy, there was the cultural unacceptability and fear of disclosing the issue and this may have resulted in under reporting.

## Conclusion

There was high level of under nutrition among the Adolescent pregnant women in the study area. Age at first marriage, respondent's educational status, and number of pregnancy, ANC visits, workload and support during pregnancy were found to be the main significant factors associated with under nutrition. Thus, adolescent pregnant women in the study area are at higher risk of under nutrition which may affect the health of the growing mother and their foetus negatively. Therefore, there should be the community awareness in the setting to respect a Federal family guidance (delay marriage until after 19 years of age) and incentives for girls to stay in school. There is need to identify and target post-menarcheal married nulligravid and unmarried adolescents who are undernourished for food supplementation programs and family planning programs which should preferentially target adolescent married girls through incentives to delay their first pregnancy and to increase birth intervals. The intervention should also focus on nutritional screening for adolescent pregnant women and close monitoring of pregnancy weight gain especially during ANC visits and to deal with the special needs of adolescents in a friendly manner and health education to pregnant teenagers and their families like avoiding work load and adequate support during pregnancy.

## Conflicts of Interest

The authors did not receive payments, funding, or salary from any organization in relation to the work and publication of this paper in the past five years and there will also be no financial support to be received in the future. There is not any organization affected positively or negatively by the publication of this paper. There are not any

competing interests related with patents of the content of the paper. The authors also declare that there are not any other financial or nonfinancial competing interests.

## Authors' Contribution

All authors, Belete Yimer, Negga Baraki, and Firehiwot Mesfin, conceptualized the research question, monitored and managed fieldwork, analyzed and interpreted the findings, and written the paper.

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