Prevalence and Factors Associated with Undernutrition Among Pregnant Women in Lamwo District Northern Uganda

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Abstract

Background: Maternal undernutrition is one of the major causes of morbidity and mortality among pregnant women. While undernutrition is a common problem in Uganda, the magnitude of undernutrition especially among pregnant women in a post-conflict area where food may be scarce has not been documented. We determined the prevalence and factors associated with undernutrition among pregnant women in Lamwo District, Northern Uganda.

Method: This was a cross-sectional descriptive study carried out in four health facilities in Lamwo District in Northern Uganda from January, 3rd 2019 to February, 2nd 2019. A total of 522 pregnant women were consecutively enrolled into the study. A Mid Upper Arm Circumference (MUAC) of ≤23cm was used as a cutoff for undernutrition. Data was collected using an interviewer administered questionnaire. We used descriptive statistics to understand the socio-demographic characteristics of the pregnant mothers and their nutrition status. Multiple logistic regression was used to determine factors independently associated with undernutrition. Statistical significance was considered at a p-value of < 0.05.

Results: In this study, most 402 (77.01%) of the participants were 20-35 years of age, slightly more than half 270 (51.72%) had attained secondary or tertiary education, most 422 (80.84%) were married, and 367 (70.31%) had at least two meals a day. The prevalence of undernutrition was 8.6% [95% CI (6.4%, 11.4%)]. Single mothers were 4.2 times more likely to be undernourished compared to married women [OR= 4.24, 95%CI (1.73, 10.35)]. Women who had three or more meals were 86 percent less likely to be undernourished compared to those who had one meal [OR=0.14, 95% CI (0.02, 0.78)].

Conclusion: The prevalence of undernutrition among pregnant women in Lamwo, a rural post conflict district in Northern Uganda was 8.6 percent. Spousal support and having a diversified diet at least three times daily might reduce undernutrition among pregnant women.

Background

Globally, 462 million pregnant mothers are undernourished [1]. Undernutrition includes stunting, wasting, and micronutrient deficiencies [2]. It is also estimated that 32 million pregnant women are anaemic, 19 million suffer from vitamin A deficiency and many others suffer iron, folate, zinc and iodine deficiency [1]. Maternal undernutrition remains unacceptably high in Southeast Asia and sub-Saharan Africa [3]. It is estimated that 23.5 percent of pregnant women in Africa are undernourished [3]. In an Ethiopian study, 24 percent of pregnant women were wasted estimated using the Mid Upper Arm Circumference (MUAC) criteria [5] and the prevalence is as high as 43.1 percent in very burdened districts [5]. Normal fetal growth and development depends on pre-pregnancy and during pregnancy maternal nutritional status [6]. Maternal undernutrition directly contributes to the occurrence of major foetal complications such as intrauterine growth foetal retardation, low birth weight, preterm birth, intrauterine foetal death, birth asphyxia, and increased morbidity and mortality among children [7, 8]

The burden of undernutrition among pregnant women has been well reflected in the Ugandan Demographic Health Surveys (UDHS) of 2006, 2011, and 2016, [9]. In 2016, over 12 percent of women 15 to 49 years were under-weight [10]. This means that, a significant proportion of women in Uganda are already undernourished at the time of becoming pregnant [11]. According to the UNAIDS report, the prevalence of undernutrition among pregnant women was higher in Northern Uganda in 2014 (16.3%) compared to the western (7.8%) and central (7.3%) regions [12]. Previous studies have found similar trends [13]; For instance, a study involving 15 regions in Uganda found that regions in northern Uganda had increasing trends of wasting among pregnant women where Lango and Acholi regions were 1.6 and 1.2 times more at risk respectively [14]. Whereas most studies have reported on the prevalence of undernutrition among pregnant women in the Northern regions of Uganda, no specific studies have determined the associated factors. Lamwo District is one of the districts in Acholi sub-region in Northern Uganda that was heavily impacted by armed conflict over a period of two decades. People were displaced from their homes to internally displaced camps and have now returned to their homes in the villages. This changed their livelihood and economy. Acholi land currently depends on peasant farming where their main source of income includes agricultural labor, sale of grass, firewood and charcoal, brick making and fetching water for construction instead of their original mixed farming [15]. This drastic change in livelihood, put pregnant women at an increased risk for undernutrition. This study determined the prevalence and factors associated with maternal wasting among pregnant women in this post conflict district.

Methods

Study Design

This was a cross-sectional descriptive study that collected quantitative data.

Study area and population.

This study was carried out in four health centres in Lamwo district in the Acholi sub-region, Northern Uganda. These health centres were purposively selected due to availability of antenatal care services and an adequate number of pregnant women. The study included pregnant women who came for antenatal care services in selected health facilities in Lamwo District and consented to participate in the study. Pregnant women who were critically ill and required urgent referral were excluded from the study. The study was conducted from January, 3rd 2019 to February, 2nd 2019.

Sample Size And Participant Selection

The sample size was determined using the Leslie Kish survey sampling formula [16]; Z (the value from standard normal distribution) with a 95% Confidence Interval (CI) of 1.96. P, the proportion of undernutrition among pregnant women was 19.06% [17]; e (the margin of error) was 5% (0.05) to arrive at N (the actual sample size) of 522 pregnant women. Each health centre under the study was allocated a

sample proportionate to the available study population. The sample size was distributed across study health centres as follows; Madi-Opei (190), Padibe (143), Lokung (95) and Palabek (94). At each health centre, mothers were consecutively recruited into the study as they came to the antenatal clinic for antenatal care.

Data Collection

Data was collected using an interviewer-administered structured questionnaire formulated purposely for this study. Questions on nutritional status, socio-economic status, house hold food security, maternal health status, and socio-demographic characteristics were asked. Maternal nutrition status was assessed by taking the woman's Mid Upper Arm Circumference (MUAC) using the MUAC tape. Mid Upper Circumference was measured at the non-dominant arm at the mid-point between the tip of shoulder and elbow. Pregnant women with MUAC reading less or equal to 23cm were considered to be undernourished or wasted. Socio-economic status or wealth index was ascertained using presence or absence of homestead assets and categorized into low, middle or high; Education level was organized in three levels that is to say no formal education, primary, and secondary/tertiary; A mother was considered married if she stayed with the husband and single if she separated from the husband and was staying a lone; A household was categorized as food secure if the woman reported that she possessed food in a store or granary and food insecure if she possessed no food in the food store at the time of interview; and a mother was considered as having adequate nutrition knowledge if she was able to mention nutritional components of a balanced diet.

Data Analysis

Data were analysed using STATA version 14.2 (Stata Corp; College Station, TX, USA). Categorical variables were summarized as proportions and continuous variables as means (SD) or medians (IQR) as appropriate. We used Logistic regression to determine the factors associated with undernutrition in our study. Based on scientific literature and biological plausibility, we included the following factors in our final multivariable model: mothers' education, maternal age, inter-pregnancy interval, physical activity, malaria in pregnancy, nutritional knowledge, meal frequency, gestation, husband's education, house hold food security, and wealth index. All the variables in the model were assessed for collinearity, which was considered present if the variables had a variance inflation factor (VIF) of > 10. There was no substantial collinearity among the variables included in our model. Statistical significance was determined at $p \leq 0.05$. Wealth index was calculated to represent wealth status of the participants' households. Wealth quintiles were calculated from an asset-based index, using principal component analysis. The following assets were considered: Bicycle, Car, Land, Animals, and Business Granary. The wealth index was later collapsed into tertiles three groups; lowest third, middle third and top third.

Results

Socio- demographic characteristics of the study participants.

In this study, most 402 (77.01%) of the participants were 20–35 years of age, slightly more than half 270 (51.72%) had attained secondary or tertiary education, most 422 (80.84%) were married, almost half, 227 (43.49%) had the least wealth index, 367 (70.31%) ate at least two meals a day, 331 (63.41%) were in their third trimester of pregnancy and 448 (85.82%) were food secure. [Table 1]

Table 1
Socio-demographic characteristics of pregnant women in Lamwo district, Northern Uganda

Variables	Nourished (n = 477)	Undernourished (n = 45)	Total (n = 522)	P-value
Marital Status				
Married	397 (83.23%)	25 (55.56%)	422 (80.84%)	0.05
Single	80 (16.77%)	20 (44.44%)	100 (19.16%)	0.57
Mothers' Education				
No formal education	141 (29.56%)	6 (13.33%)	147 (28.16%)	0.45
Primary	245 (51.36%)	26 (57.78%)	271 (51.92%)	0.59
Secondary and Tertiary	91 (19.08%)	13 (28.89%)	104 (19.92%)	0.08
Maternal Age				
≤ 19	70 (14.68%)	9 (20.00%)	79 (15.13%)	0.08
20–35	370 (77.57%)	32 (71.11%)	402 (77.01%)	0.03
> 35	37 (7.76%)	4 (8.89%)	41 (7.85%)	0.56
Maternal Age [mead (sd)]				
Number of pregnancies	302 (63.31%)	36 (80.00%)	338 (64.75%)	0.03
4 and below	302 (63.31%)	36 (80.00%)	338 (64.75%)	0.99
5 and above	175 (36.69%)	9 (20.00%)	184 (35.25%)	0.45
Inter pregnancy interval				
0. 0–23	127 (26.62%)	12 (26.67%)	139 (26.63%)	0.08
1. 24 and above	256 (53.67%)	18 (40.00%)	274 (52.49%)	0.60
Physical Activity				
Moderate	399 (83.65%)	39 (86.67%)	438 (83.91%)	

Variables	Nourished (n = 477)	Undernourished (n = 45)	Total (n = 522)	P-value
Vigorous	78 (16.35%)	6 (13.33%)	84 (16.09%)	0.08
Malaria in Pregnancy				
No	424 (88.89%)	36 (80.00%)	460 (88.12%)	0.07
Yes	53 (11.11%)	9 (20.00%)	62 (11.88%)	0.64
Nutritional Knowledge				
0. Yes	216 (45.28%)	22 (48.89%)	238 (45.59%)	
1. No	261 (54.72%)	23 (51.11%)	284 (54.41%)	0.16
Meal Frequency				
1	13 (2.73%)	3 (6.67%)	16 (3.07%)	
2	333 (69.81%)	34 (75.56%)	367 (70.31%)	
≥ 3	131 (27.46%)	8 (17.78%)	139 (26.63%)	0.07
HIV Status of the pregnant woman				
Negative	445 (93.29%)	45 (100.00%)	490 (93.87%)	0.76
Positive	32 (6.71%)	0 (0.00%)	32 (6.13%)	0.67
Gestation				
First trimester	30 (6.29%)	3 (6.67%)	33 (6.32%)	
Second trimester	147 (30.82%)	11 (24.44%)	158 (30.27%)	
Third trimester	300 (62.89%)	31 (68.89%)	331 (63.41%)	0.35
Husband's Education				
No formal education	47 (9.85%)	2 (4.44%)	49 (9.39%)	
Primary	187 (39.20%)	16 (35.56%)	203 (38.89%)	
Secondary and Tertiary	243 (50.94%)	27 (60.00%)	270 (51.72%)	0.54

Variables	Nourished (n = 477)	Undernourished (n = 45)	Total (n = 522)	P-value
Household food security				
Food Secure	69 (14.47%)	5 (11.11%)	448 (85.82%)	0.76
Food insecure	408 (85.53%)	40 (88.89%)	184 (35.25%)	
Wealth Index				
1	206 (43.19%)	21 (46.67%)	227 (43.49%)	
2	170 (35.64%)	14 (31.11%)	184 (35.25%)	
3	91 (19.08%)	10 (22.22%)	101 (19.35%)	
P-values by t-test for continuous variables and Chi2 test for binary/categorical variables.				

Prevalence Of Undernutrition Among Pregnant Women In Lamwo District, Northern Uganda

In this study, the prevalence of undernutrition was 8.6% [95% CI (6.4%, 11.4%)]. [Figure 1]

Factors Associated With Undernutrition Among Pregnant Women In Lamwo District, Northern Uganda

In this study, we found that, single mothers were 4.2 times more likely to be undernourished compared to married women [OR = 4.24, 95%CI (1.73, 10.35)]. Women who had three or more meals were 86 percent less likely to be undernourished compared to those who had one meal [OR = 0.14, 95% CI (0.02, 0.78)]. [Table 2].

Table 2
Factors associated with undernutrition among pregnant women in Lamwo District, Northern Uganda.

Bivariable and multivariable analysis of factors associated with undernutrition among pregnant women				
Variables	**COR**	**P Value**	**AOR**	**P Value**
Marital Status				
Married	1		1	
Single	3.97 [2.10, 7.49]	0.000	4.24 [1.73, 10.35]	0.002
Maternal Age				
<=19	1		1	
20–35	0.67 [0.31, 1.47]	0.321	1.35 [0.14, 12.89]	0.792
> 35	0.84 [0.24, 2.92]	0.785	3.86 [0.28, 52.41]	0.311
Number of pregnancies				
4 and below	1		1	
5 and above	0.43 [0.20, 0.92]	0.029	0.55 [0.20, 1.55]	0.261
Inter pregnancy interval				
0–23	1		1	
24 and above	0.74 [0.35, 1.59]	0.446	0.86 [0.38, 1.94]	0.721
Physical Activity				
Moderate	1		1	
Vigorous	0.79 [0.32, 1.92]	0.599	0.60 [0.17, 2.12]	0.426
Malaria in Pregnancy				
No	1		1	
Yes	2.00 [0.91, 4.38]	0.083	2.67 [0.91, 7.82]	0.073
Nutritional Knowledge				
Yes	1		1	
No	0.87 [0.47, 1.60]	0.643	1.30 [0.56, 3.01]	0.534
Meal Frequency				
1	1		1	
2	0.44 [0.12, 1.63]	0.220	0.26 [0.06, 1.10]	0.068

Bivariable and multivariable analysis of factors associated with undernutrition among pregnant women				
≥ 3	0.26 [0.06, 1.12]	0.071	**0.14 [0.02, 0.78]**	**0.025**
Gestation				
First trimester	1		1	
Second trimester	0.75 [0.20, 2.85]	0.670	1.50 [0.17, 13.25]	0.715
Third trimester	1.03 [0.30, 3.58]	0.959	2.12 [0.25, 17.65]	0.488
Husband's Education				
No formal education	1		1	
Primary	2.01 [0.45, 9.05]	0.363	1.09 [0.20, 5.88]	0.923
Secondary and Tertiary	2.61 [0.60, 11.35]	0.201	0.73 [0.13, 4.22]	0.727
Household food Security				
Food Secure	1		1	
Food insecure	1.35 [0.52, 3.55]	0.539	0.92 [0.29, 2.92]	0.892
Wealth Index				
1	1		1	
2	0.81 [0.40, 1.64]	0.554	0.95 [0.38, 2.39]	0.918
3	1.08 [0.49, 2.38]	0.853	1.07 [0.34, 3.31]	0.910
P-values by t-test for continuous variables and Chi2 test for binary/categorical variables				

Discussion

In this study, the prevalence of malnutrition was 8.6 percent. This was almost similar to findings of a study conducted in Uganda from 2015–2018 that found a prevalence of 10 percent in Acholi sub-region [14]. The findings were also almost similar to those of a study conducted in southern Ethiopia where 9.2 percent of pregnant women were undernourished [18]. In addition, Uthman and Aremu, in a meta-regression analysis found that 10.4 percent of the rural women were more underweight compared to 6.0 percent of the urban counter parts [19]. The prevalence in our study is lower than the overall prevalence of undernutrition among women of reproductive age in Uganda, found to be 12% [20]. This indicates a significant recovery from the effects of the war. This significant recovery in the region is attributed to rehabilitation by humanitarian agencies in the district. In other sub-regions in Northern Uganda, the prevalence is still higher; for instance, Karamoja and Lango sub-regions with a prevalence of 21 and 17 percent respectively [14] and other low- and middle-income settings such as in Indonesia and Ethiopia with prevalence rates of 21.3 percent and 28.6 percent respectively [21–23]. Secondly, this study found

that married pregnant women had reduced chances of getting undernourished compared to their unmarried counter parts. This is consistent with findings by Mihretie who in a review reported that women who were unmarried or divorced were more likely to be undernourished [24]. Partners provide financial and nutritional support to their pregnant wives. However, an Ethiopian study found that, undernutrition as well can be prevalent among the married when a woman is in a poor marital union and the spouse cannot afford to provide support to the wife [25]. Thirdly, the study found that women who had three meals or more daily were less likely to be undernourished. This was similar to findings of a systematic review and analysis report done in Ethiopia in which it was concluded that the more meals the mother gets per day, the higher the chances of improved nutritional status [26]. Nonetheless, it is also evident that dietary diversity matters as well. Even if the mother has enough meals daily, but lacks diet diversification, she might end up undernourished [26].

Conclusion

The prevalence of undernutrition among pregnant women in Lamwo, a rural post conflict district in Northern Uganda was 8.6 percent compared to 12.0 percent in the general population in Uganda. Spousal support and having a diversified diet at least three times daily might reduce undernutrition among pregnant women.

Study Limitations

1. Being across sectional study that assesses anthropometric parameters at single point in time, it may not give a very detail picture of the nutrition status of the pregnant women.
2. Information on factors associated with malnutrition was self-reported which is subject to recall bias, however this was minimized by limiting the recall time to 4 weeks for household food insecurity.

Abbreviations

MUAC: Mid Upper Arm Circumference

UDHS: Uganda Demographic Health Survey

IRB: Institutional Review Board

SHS: School of Health sciences

MOH: Ministry of Health

WHO: World Health Organisation

Declarations

Acknowledgement

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Ethics declarations

Approval from Institutional Review Board (IRB) of the School of Health Sciences (SHS), Makerere University was obtained (Reference number 2018-050).

Written informed consent was obtained from all the study participants.

All methods were carried out in accordance with relevant guidelines and regulations

Consent for Publication

Not Applicable

Availability of data and materials

All data and materials for this study shall be availed whenever requested. The data set can be accessed from one of us (LGA) at: lindalindrace@gmail.com

Competing interest

The authors declare no competing interest

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Authors contribution

LGA, TDN, EA and JKT conceptualized the study, LGA designed the study, collected and analyzed the data. LGA and EMM wrote the manuscript. JKT, DM, and NG provided the overall supervision of the design and implementation of the study. All authors read and approved the manuscript.

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Figures

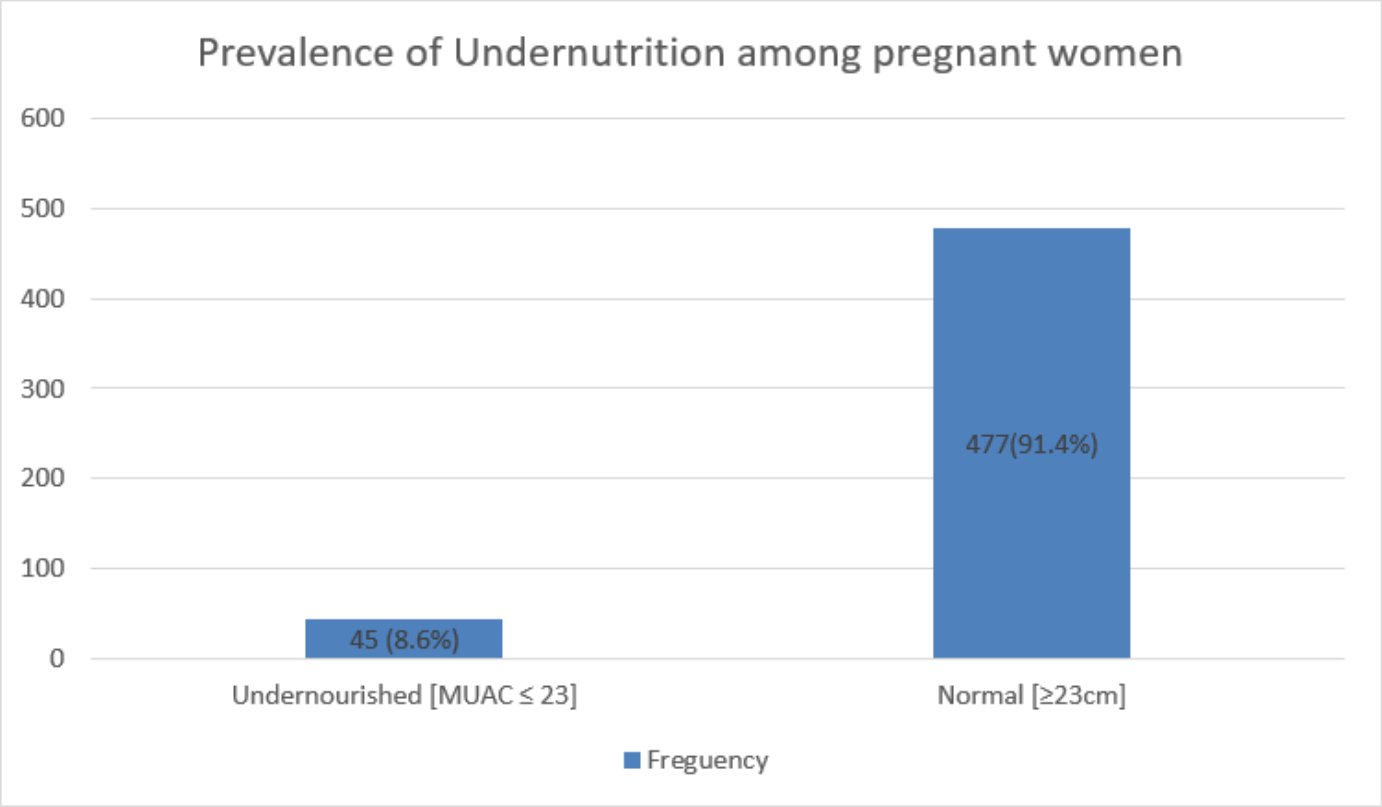

Figure 1

Prevalence of Undernutrition among pregnant women in Lamwo District, Northern Uganda