Factors influencing the prevalence of anaemia among Pregnant Women in western Uganda. A cross-sectional study at Kabale Regional Referral Hospital.

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Abstract

Background:

Anaemia is a global health problem affecting 1.62 billion people where by 41.8% (56 million people) of the general population are pregnant women. It's more prevalent among pregnant women because during pregnancy, iron requirements increase much more significantly as compared to non-pregnant women. The aim of conducting this study was to determine the factors influencing the prevalence of anaemia among pregnant women attending antenatal care (ANC) services at Kabale Regional Referral Hospital (KRRH) in Kabale district.

Methods :

A hospital based cross-sectional study was conducted among pregnant mothers. Data was collected using a systematic random sampling technique. Blood samples were collected from 200 pregnant women and analyzed using a CBC analyzer sysmex Xs1000 to determine the Haemoglobin concentration. Interviews were conducted with mothers to determine factors influencing the prevalence of anaemia.

Results:

Findings showed that the general prevalence of anaemia was 27% whereby 31% were mildly anaemic, 50% were moderately anaemic and 19% were severely anaemic. Concerning the socio-economic factors influencing the prevalence of anaemia among pregnant women, it was found out that the prevalence of anaemia was higher among participants who were peasants, rural dwellers, those having low education and low monthly income. The level of awareness about anaemia among pregnant women was 68% whereby the majority (25.5%) had heard it from ANC clinic.

Conclusion:

The overall prevalence of anaemia (27%) among pregnant women attending antenatal care services at Kabale Regional Referral Hospital in Kabale district was found to be a moderate health problem in the area of study.

1. BACKGROUND

Anaemia is a global health problem affecting over 1.62 billion people globally and this problem is affecting both developed and developing countries with major adverse effects on human health (1) and (2). Anaemia affects all age groups of people and is particularly more prevalent in pregnant women (3) and a category specific prevalence study showed that 41.8% of pregnant women were affected compared to prevalence among non-pregnant women which was 30.2%, 25.4% for school age children, 23.9% for the elderly and 12.7% for men (4). Globally, anaemia in pregnancy increases maternal, fetal and neonatal mortality and morbidity(5) and about 4-16% of maternal death is due to anaemia (6) and it is estimated that about 20% of maternal deaths are directly related to anemia and another 50% of maternal deaths are associated with it(7)and(2) . Furthermore, anaemia is among the indirect causes of maternal death. It therefore predisposes to the three main causes of death that is hemorrhage, sepsis and pregnancy induced hypertension (6).

According to the global data, it is shown that 56% of the pregnant women in low- and middle-income countries (LMIC) have anaemia (8). The greatest burden of anaemia is in Asia and Africa where it is estimated that anaemia (Hb<7g/dl) is associated with women of age 20 years, third trimester of pregnancy, rural residents and multiparous women. The highest anaemia prevalence among pregnant women is reported to be in Sub-Saharan Africa (SSA) (57%), followed by pregnant women in South east Asia (48%) and lowest prevalence (24.1%) was found among pregnant women in south America (9)

In Uganda, the prevalence of anaemia among pregnant women was reported at 34.3% in 2016 according to World Bank Collection of Development indicators, compiled from officially recognized cases (8). Also, according to (10), the

prevalence of anemia among child bearing age, has been reported to be 24% as the overall and 13.1% and 18.8% in northern and western Uganda respectively. Anaemia is apriority nutritional problem because of economic, social and other negative consequences associated with it. It is associated with fatigue, weakness, breathless and perceived paleness of the skin (11). As regards to (12) and (13), the cause of anemia is multifunctional including nutritional deficiencies, iron, folate and vitamin B12 and also parasitic infections like malaria and hook worms. The relative contribution of these factors varies greatly by geographical location, season and dietary practice. This study reports findings of the prevalence of anaemia, the level of awareness about anaemia and the socio-economic factors influencing the prevalence of anaemia among pregnant mothers attending antenatal care at Kabale regional referral hospital (KRRH).

2. METHODS

2.1. Study design and study area

Researchers employed a cross-sectional descriptive study design using quantitative methods of data collection. The study was conducted at Kabale Regional Referral Hospital found in Kabale district in the south western region of Uganda in Kigezi sub-region. Kabale district is boarded by Rubanda district to the west, Rwanda country to the east and south and Kanungu district to the north-west. It was originally part of Kigezi district before the districts of Rukungiri, Kanungu and Kisoro were excised to form separate districts. Kabale district is located 420 km by road south-west of Kampala, the capital city of Uganda. The town is located 65.7km from Lake Bunyonyi and lies 2000 meters (6600ft) above the sea level. There is paucity of researchers about anaemia among pregnant mothers in this setting, thus these findings bring into light the current status of anaemia burden in Kabale.

2.2. Study population

The study population included pregnant women who attended antenatal care services

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at Kabale Regional Referral Hospital from 2nd January 2020 to 2nd February. The researchers chose pregnant women because they are mostly affected by anaemia during pregnancy due to increased maternal iron needs and demands from the growing fetus and the placenta.

2.3. Sample Size

The sample size was determined by using the Kish and Leslie formula (1965) of sample size determination and we considered 95% confidence interval and 5% margin of sampling error. The prevalence for anaemia in Kigezi region was 16% (UDHS, 2016) was used as the proportion for calculating the sample size that amounted to 200 participants.

2.4. Sampling technique

A systematic random sampling technique was employed so as to provide equal opportunities for every individual to be selected. All the pregnant women who came for ANC registered in the registration book based on the order of arrival. The first mother was purposively selected and a sampling interval of three was taken to select subsequent participants of the study for that day.

2.5. **Data collection methods**

The study employed quantitative methods of data collection. A standard semi- structured questionnaire was used for data collection. A questionnaire was used because large amounts of information could be collected from a large number of people in a short period of time and in a relatively cost-effective way. It was designed based on the study specific objectives to capture information about factors influencing the prevalence of anaemia and level of awareness about anaemia. The questionnaire was translated into the local dialect (Rukiga- Runyankole) for pregnant women who were not be able to read and write English. Data collection tools were pre-tested at Kigongi Health Care Clinic laboratory whereby a sample of 20 participants was interviewed using the designed questionnaire. Findings from the pilot were used to make necessary corrections and adjustments to the questionnaire so as to adequately respond to the study objectives. In order to determine the prevalence of anemia, laboratory test for haemoglobin level was done using a calibrated CBC analyzer. Standard operating procedures (SOPs) were followed carefully and the results were double checked by the laboratory technician and the supervisor at the hospital as well. In order to avoid the errors during hematological estimation of haemoglobin, the venous blood sample were well mixed such that micro clots do not form since they can lead to false results and can also cause mechanical problems to the CBC analyzer.

2.6. Assessment of anaemia

Blood samples were withdrawn from pregnant women whereby, the vein puncture site was cleaned using a swab containing 70% alcohol and a septic method. An appropriate vein was identified and a hypodermic needle introduced into the vein. About 3-4 militres of venous blood were drawn into the syringe and then transferred into a sterile vacutainer tube containing EDTA and was then transported to the main laboratory for analysis. It was analyzed using an automatic hematological analyzer Sysmex Xs 1000.The analyzer was quality controlled to assess the reliability of the test results. The results were expressed in g/dl and were then compared to the normal reference ranges to determine the severity of anaemia. Additional information about the participants was obtained from the registers such as age, clinical history, address and the Haemoglobin test results. Data collected from the registers was captured in the data abstraction tool.

2.7. Data analysis and presentation

Data was entered into Ms excel, cleaned and was analyzed manually. Univariate analysis was done to determine the prevalence of anaemia and frequency of the responses per variable. Bivariate analysis to stratify the prevalence of anaemia by the variable to determine which factors influenced anaemia. Descriptive statistics were reported and presented in form of tables, figures, percentage pie charts and graphs.

December 17, 2022

2.8. Ethical consideration

Researchers obtained clearance of the research committee from the school of medical laboratory Technology of the Uganda Institute of Allied Health and Management Sciences. Permission to collect data was sought from the District Health Officer (DHO) of Kabale District and the Medical superintendent KRRH. Access to participant was granted by the in-charge of ANC and all respondents signed on the informed consent form before taking part in the study. Honesty and confidentiality were maintained throughout the study as the identity of the respondents was concealed.

3. RESULTS

The total of 200 mothers participated in the study. 6 of the 206 anticipated respondents withdrew in the middle of the interview thus their information was incomplete and hence removed from the analysis.

3.1. *Demographic characteristics of respondents*

These included the following; Age, occupation, residence and education level

In this study, out of the 200 participants, the highest number of participants were in the age group between 21 and 29 years while the least were aged 20 years and below. More than half of the participants were rural dwellers, the highest number had attained primary level of education, whereas in terms of occupation, the highest number were peasants/farmers.

3.2. *General prevalence of anaemia among pregnant mothers attending antenatal care at Kabale regional Referral Hospital.*

Out of the 200 pregnant mothers that participated in the study 27% (54/200) were anaemic with a hemoglobin concentration of 11.0 g/dl and below.

Of these 54 anaemic pregnant mothers, 10 (19%) were severely anemic with hemoglobin concentrations of 7g/dl and below, 27 (50%) were moderately anemic with hemoglobin concentrations of 7-8.9 g/dl and 17 (31%) were mildly anemic with hemoglobin concentrations of 9-10.9 g/dl as indicated above.

3.3. *Socio-economic factors influencing the prevalence of anemia in pregnancy among pregnant women at Kabale Regional Referral Hospitals*

According to the age group, the highest percentage of anaemic pregnant women (58.8%), were below 20 years of age while the least was (22.7%) was in the age group of 21-29. Most of these pregnant women were rural residents 115 (57.5%) and there was a higher percentage (38.3%) of anaemic mothers among the rural residents than the urban residents. In relation to the educational level, there was a larger percentage of anaemic mothers among those who had not attained any level of formal education (54. 8%). The results showed a higher prevalence of anaemia (38.6%) in women in the first trimester than other trimesters. More so there was a greater percentage of aneamic pregnant mothers (38.6%) among the peasants/farmers when compared to other kinds of occupation. Concerning antenatal visits, a high percentage of aneamic pregnant mothers was noted among those who had had only one antenatal visit (64.9%) (Table 2).

3.4. *Level of awareness about anaemia*

The data about the level of awareness about aneamia in pregnancy captured using structured interview questionnaires was analyzed as presented in Table 3. The results suggested that; out of the 200 pregnant mothers who participated in the study, 136 (68.0%) had heard about anaemia and therefore could define the term anaemia and out of theses, only 17 (12.5 %) had aneamia and 119 (87.5%) did not have it. Concerning the 64 who had never had about anaemia, 37 (57.9%) were aneamic.

The 136 pregnant mothers who had heard about anaemia, had heard about anaemia from different sources whereby 44 (22.0%) had heard about it over the radio, 34 (17.0%) had heard about it from friends, 7 (3.5%) had read about

Table 1: Demographic characteristics of respondents

Factors	Category	Frequency (%)
	≤ 20	17 (8.5%)
Age (years)	21-29	119 (59.5%)
	≥ 30	64 (32.0%)
Residence	Rural	115 (57.5%)
	Urban	85 (42.5%)
Education levels	None	31 (15.5%)
	Primary	105 (52.5%)
	Secondary	34 (17.0%)
	Tertiary	30 (15.0%)
Occupation	Civil Servant	44 (22.0%)
	Self employed	68 (34.0%)
	Peasants/farmer	88 (44.0%)

prevalence of anaemia among pregnant women
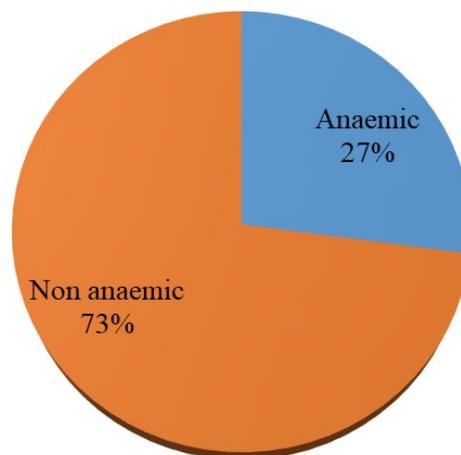
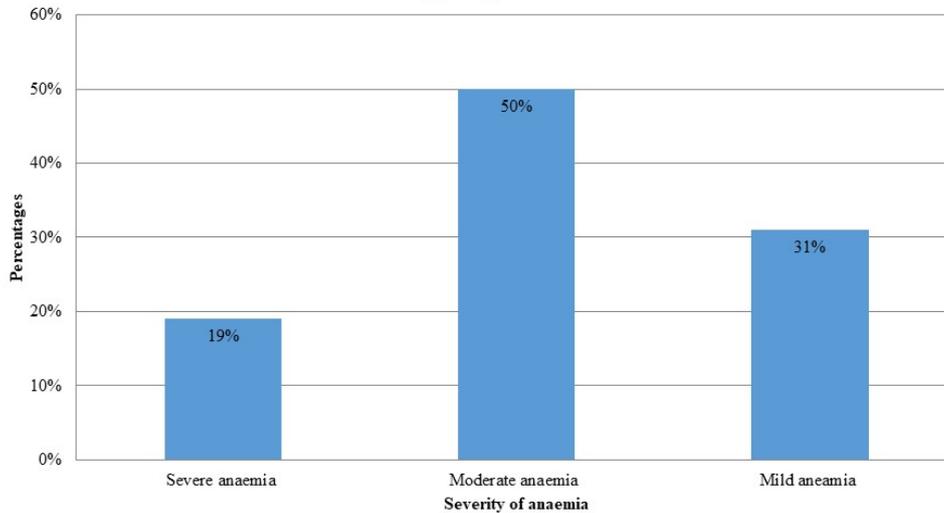Figure 1: Pie chart showing general prevalence of aneamia

Figure 2: **Bar graph showing severity of aneamia**

it from the newspapers and 51 (25.5%) from antenatal care. Among the 44 who had heard about anaemia from the radio, 17 (38.6%) were aneamic. Out of the 34 who had heard about it from friends, 24 (70.6%) were anaemic. None of the 7 who had read about anaemia in the newspapers was anaemic and out of the 51 who had heard about it from antenatal care clinic, 14 (27.5%) were anaemic.

Out of the total number of participants, only 81 (40.5%) knew the causes of anaemia. Among the 81 who knew the causes, 20 (24.7%) were anaemic and among the 119 who did not know the causes, 34 (28.6%) were anaemic. Out of the 200 who participated in the study, 64 (32.0%) knew the signs and symptoms of anaemia, among which 17 (26.6%) were anaemic while 136 did not know anaemia signs and symptoms where 37 (27.2%) were anaemic. Of all the participants, only 44 (22.0%) knew the preventive measures of anaemia and among these, 10 (22.7%) were anaemic whereas 156 (78.0%) did not know about the preventive measures among which 44 (28.2%)

were anaemic. Only 75 (37.5%) knew the consequences of anaemia during pregnancy out of the total number of the participants. Among these, 20 (26.7%) were anaemic. The remaining 125 (62.5%) did not know anything concerning the consequences of anaemia among pregnant women. A greater percentage of women who had not taken malaria and anaemia prophylaxis were anaemic that is 51 (27.4%) and 34 (47.9%) respectively as compared to their counterparts who had not taken the prophylaxis of malaria and anaemia.

4. DISCUSSION

4.1. General prevalence of aneamia

The study found that the general prevalence of aneamia was 27 % among pregnant mothers at Kabale Regional Referral Hospital with 19% of the pregnant mothers severely anaemic, 50% moderately anaemic and 31% mildly anaemic. The findings of this study are slightly lower than Uganda's national prevalence of anaemia among pregnant women of 32% as reported in(14)

Table 2: Distribution of between Socio-economic factors and anemia during pregnancy

Factors	Category	Frequency (%) (N=200)	Anemic (%) N=54	Non anemic (%) N=146
	≤ 20	17 (8.5%)	10 (58.8%)	7 (41.2%)
Age (years)	21-29	119 (59.5%)	27 (22.7%)	92(77.3%)
	≥ 30	64 (32.0%)	17 (26.6%)	47 (73.4%)
Residence	Rural	115 (57.5%)	44 (38.3%)	71 (61.7%)
	Urban	85 (42.5%)	10 (11.8%)	75 (88.2%)
Education levels	None	31 (15.5%)	17 (54.8%)	14 (45.2%)
	Primary	105 (52.5%)	27 (25.7%)	78 (74.3%)
	Secondary	34 (17.0%)	7 (20.6%)	27 (79.4%)
	Tertiary	30 (15.0%)	3 (10.0%)	27 (90.0%)
Trimester	First	44(22.0%)	17 (38.6%)	27 (61.4%)
	Second	58 (28.8%)	13 (22.4%)	45 (77.6%)
	Third	98 (49.2%)	24 (24.5%)	74 (75.5%)
Occupation	Civil Servant	44 (22.0%)	6 (13.6%)	38 (86.4%)
	Self employed	68 (34.0%)	14 (20.6%)	54 (79.4%)
	Peasants/farmer	88 (44.0%)	34 (38.6%)	54 (61.4%)
No. of ant. Visits	One	37 (18.6%)	24 (64.9%)	13 (35.1%)
	Two	44 (22.0%)	3 (6.8%)	41 (93.2%)
	Three and above	119 (59.3%)	27 (22.7%)	92 (77.3%)

and also the prevalence of anemia among pregnant women attending Kisugu Health Centre IV, Makindye Division Kampala, in Uganda which revealed a prevalence of 25.8%(15). This could have been because the results of this study indicate that most of the pregnant women were already taking iron supplements and also the majority were aware about the prevention mechanisms for aneamia through the massive health education programs. These programs about attending ANC services via media such television and radio stations were provided by Uganda's government. This could have been also a reason why more than a half of the study participants 136 (68.0%) had heard about aneamia in pregnancy. Moreso, the prevalence of this study was much lower than the one for the study that included all the antenatal mothers visiting the Urban Health and Training Centre (UHTC) of Dr.

B. R. Ambedkar Medical College in india for regular antenatal checkup where it was found out that among 300 study subjects, the prevalence of anemia was 68.6% where 60.6% and 8.0% were mild and moderately anaemic, respectively and none of the study subjects were severely anaemic. (16). This could have been largely due to the local vegetarian diet in india.

However, the prevalence of anaemia in pregnancy of this study was higher than the one for the study that was conducted in northern Ethiopia in Adigrat General Hospital which was 7.9% (17).

Also, the prevalence of anaemia in pregnancy of this study was higher as compared with the one of the whole of Kigezi region which was 16.9% (18).This variation could be attributed to the fact that in this study, only one hospital (KRRH) was considered whereas the one of UDHS, the study was carried out in most of the health centers in

Table 3: Level of awareness of anaemia among pregnant women attending antenatal care

Variables	Category	Frequency n=200 (%)	Anaemic n=54 (%)	Non anaemic n=146 (%)
Having heard about anaemia in pregnancy	Yes	136 (68.0%)	17(12.5%)	119 (87.5%)
	No	64 (32.0%)	37 (57.8%)	27 (42.2%)
If Yes, From which source	Radios	44 (22.0%)	17 (38.6%)	27 (61.4%)
	Friends	34 (17.0%)	24 (70.6%)	10 (29.4%)
	News papers	7 (3.5%)	0 (0.0%)	7 (100.0%)
	ANC	51 (25.5%)	14 (27.5%)	37 (72.5%)
Know causes of anaemia during pregnancy	Yes	81 (40.5%)	20 (24.7%)	61 (75.3%)
	No	119 (59.5%)	34 (28.6%)	85 (71.4%)
Knows the signs and symptoms of anaemia during pregnancy	Yes	64 (32.0%)	17 (26.6%)	47(73.4%)
	No	136 (68.0%)	37 (27.2%)	99 (72.8%)
Knows the preventive measures of anaemia during pregnancy	Yes	44 (22.0%)	10 (22.7%)	34 (72.3%)
	No	156 (78.0%)	44 (28.2%)	112 (71.8%)
Knows the consequences of anaemia	Yes	75 (37.5%)	20 (26.7%)	55 (73.3%)
	No	125 (62.5%)	30 (24.0%)	95 (76.0%)
Sleeps under mosquito nets	Yes	85 (42.5%)	14 (16.5%)	71 (83.5%)
	No	115 (57.5%)	41 (35.7%)	74 (64.3%)
Take malaria prophylaxis	Yes	14 (7.0%)	3 (21.4%)	11 (78.6%)
	No	186 (93.0%)	51 (27.4%)	135 (72.6%)
Take iron supplements	Yes	129 (64.5%)	20 (15.5%)	109 (84.5%)
	No	71 (35.5%)	34 (47.9%)	37 (52.1%)

Kigezi region. The relatively high prevalence of aneamia among pregnant mothers in this study could as well be a result of ignorance of some pregnant mothers most especially in village areas about aneamia and overdependence of the area population on irish and sweet potatoes as a staple food which limits the chances of eating balanced diet.

Nevertheless, in the view of these findings and according to our own observation, some of the pregnant women seem to have been falsely negative of anaemia. This is because, Kabale district is observed to be a mountainous area and the town lies 2000 meters (6600 ft) above the sea level while other areas off town go beyond this level. People at high altitude always have higher haemoglobin levels than those at lower altitudes. At high altitude, due to the fall in the atmospheric pressures, the partial pressure of inspired oxygen also decreases. Therefore, the bodies of these mothers living in high altitude produce low blood oxygen levels. As a result, their bodies adjust to the oxygen deprived condition of high altitude by building new red blood cells making it easier to supply oxygen to the muscles and vital organs. This results into increased haemoglobin in blood in order to increase the amount of oxygen that can be carried. This is one of the features of acclimatization.

4.2. Socio-economic factors influencing the prevalence of anaemia.

The results of this study revealed that there is a relationship between the socioeconomic status of pregnant women and anaemia during pregnancy. This is because the socioeconomic status has an impact on the Nutrition, education and health seeking behavior of pregnant women during pregnancy (19). In regards to occupation, the largest percentage of the participants 88 (44%) were peasants whereby few of them had very little monthly income while the majority did not

have any monthly income at all. Therefore, the prevalence of anaemia was higher among peasants as compared to the employed.

However, the findings of this study were in agreement with the ones which were from the study that was conducted in Mpigi –Uganda (20). This could have been due to the fact that they all included pregnant women who lived in rural areas whereby majority of them cannot afford feeding on various food stuffs which are rich in iron, folate and vitamin B12 of which some of them may require buying. In addition to this, it was found out that aneamia was more prevalent among women who had meals once a day. This could be due to lack of enough nutrient supply in the maternal body yet it is recommended for pregnant women to eat more than four times a day (20). These findings were in agreement with the ones from the study about anaemia among women attending ANC at the university of Gonda Comprehensive Specialized Referral Hospital in North west Ethiopia (21).

Aneamia was most prevalent in pregnant mothers aged 20 years and below at 58.8% followed by those above at 30 years at 26.6% and was least prevalent in pregnant mothers between 21-29 years at (22.7%). This may be due to increased demand for iron by the young women's growing bodies together with the fetus for those aged 20 years and below and also due to decreased erythropoiesis in older women aged 30 years and above. It was also in line with the WHO report of 2016 which stated that aneamia was twice as much prevalent in pregnant women aged 20 years and below compared to the rest of the age groups. Aneamia was also mostly common in the first trimester (38.6%) followed by the third trimester (24.5%) and then the second trimester (22.4%). This maybe because some pregnant women had not yet started prophylaxis or had not taken iron supplements in the first trimester and because the iron requirements were increased in the third trimester respectively.

Other factors that were found to be influencing the prevalence of aneamia in pregnancy were; Aneamia was more prevalent in rural dwellers (38.3%) as compared to urban dwellers (11.8%) which may be due to better feeding, improved healthcare services and better standards of living in urban areas. Aneamia was also more common in pregnant mothers who had had less antenatal visits maybe because they still knew little or nothing about aneamia in pregnancy. These findings were connected to the ones of a cross-sectional study was conducted to find out the prevalence of anemia and factors among pregnant women in Southern Ethiopia(22). Other factors like low education, poor occupations which leads to low monthly income and failure to take iron supplements were found to be directly related to increased anaemia as detailed in the table of results.

These results directly correlate with (8) who stated that women who have secondary or higher education and doing formal jobs are less likely to become anaemic during pregnancy compared to the uneducated ones because educated ones have higher incomes, eat nutritious foods, make frequent antenatal visits and take supplements compared to their uneducated counter parts. Factors like failure to take iron and folic acid supplements, failure to take malaria prophylaxis and failure to sleep under insecticide treated mosquito nets were also found to contribute both directly and indirectly to aneamia in pregnancy.

4.3. Level of awareness about anaemia

The findings of this study indicate that the level of awareness of pregnant women about aneamia during pregnancy was 68.0 % whereby out of 200 participants, only 136 were aware about anaemia. Among those who were aware about anaemia, majority 51(25.5%) had heard about aneamia from ANC clinic followed by 44 (22.0%) who had heard about aneamia from over the radio followed by 34 (17.0%) who had heard about it from friends and the least 7(3.5%) had read about it in the newspapers. Out of these pregnant women who were aware about anaemia during pregnancy, 81(40.5%) and 75(37.5%) had had comprehensive awareness about the causes and the consequences of anaemia during pregnancy respectively. While more than a quarter,64 (32.0%) of the pregnant women had also received comprehensive aware-

ness about the signs and symptoms of anaemia in pregnancy. This could have been due to provision of better ANC services nearer to the people by conducting community outreaches and continuous sensitization of pregnant women by the service providers at the hospital, in the outreaches and on radio stations. These findings were in agreement with the ones which were from the study that was conducted in North Shoa Zone, Ethiopia (23) and the one conducted at Yrga Cheffe health center, South Ethiopia (24). However, the results of this study suggest no significant association between the level of education and anaemia in pregnancy since majority of the participants, 105 (52.5%) had attained only primary level of education but most of them were aware about anaemia in pregnancy which was 136 (68.0%). The level of awareness about anaemia of this study was greater than the one of a related study which was conducted in Mbulu district in Tanzania, where 65% of the participants had poor knowledge about anaemia and therefore and therefore could not even define anemia while only 35% had adequate knowledge and thus were able to define anaemia (25).

4.4. *Study limitations*

This study is limited by the analysis method. Being a diploma level study, results were descriptively analysed and therefore we did not assess the factors that were statistically significantly associated with the anaemia among participants. The study being a cross-sectional one, it could not identify the cause-and-effect relationship.

5. Conclusions

This study involved 200 pregnant mothers of whom 54 were found to be anaemic hence the general prevalence of aneamia among pregnant mothers attending antenatal care at Kabale regional Referral hospital was 27% which is a moderate public problem. Severe aneamia was at 19%, moderate aneamia at 50% and mild aneamia at 31%. Factors like age differences, trimester of pregnancy, dietary intake of iron, standards of living, frequency of antenatal visits, and iron supplements uptake were investigated and found to be

either directly or indirectly influencing aneamia prevalence among pregnant mothers at Kabale Regional Referral hospital. Most of these factors result into poor health conditions thus leading to anaemia. The findings of this study indicate that the level of awareness of pregnant women about aneamia during pregnancy was 68%.

In Uganda, the current strategy for reducing anaemia in pregnancy include provision of iron and folate tablets, massive health education about anaemia, free supply of mosquito nets to pregnant women, early diagnosis and treatment of malaria among pregnant women.

However, despite of the WHO and Uganda National Guidelines, the results of this study indicated that there is more effort still needed to avert this public threat through strengthening the implementation of the above strategies which have already been put in place.

6. Recommendations:

The study was institutional based study. Further study should be conducted based on community level to make this finding stronger and also be able to find out the predictors of anaemia among pregnant women in the villages. It was not possible to classify anaemia based on red cell morphology, further research is therefore needed to determine the most prevalent type of anemia in this population. Community health education especially among the youths should be encouraged to prevent early pregnancies as teenage pregnancies contributes much to aneamia in pregnancy. Pregnant mothers should be sensitized more about the causes, signs and symptoms, control and preventive measures and effects of aneamia in pregnancy as well as how it can be prevented or controlled. Also pregnant women should be encouraged to engage in some income generating projects such as poultry, piggery and Vegetable growing such that they may be able to earn some Income and buy various food stuffs rich in iron, folate and vitamin B12 since pregnancy is the most nutritionally demanding stage.

7. Abbreviations:

ANC: Antenatal care, HIV: Human Immunodeficiency Virus, IDA: Iron deficiency anaemia, KRRH : Kabale Regional Referral Hospital, MOH: Ministry of Health, WHO: World Health Organization, UBOS: Uganda Bureau of Statistics

8. Acknowledgement:

9. Conflict of interest

The authors declare no conflict of interest

10. Source of funding

11. Author contribution

AB prepared the proposal, collected data, wrote the report and served as the senior author of the manuscript, DLE supervised the entire research proof read the manuscript, MN and BP participated in designing the study and administered questionnaires while SH and SM did statistical analysis of data as well as addressing the typographical and grammatical errors.

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December 17, 2022