Kabarak Journal of Research & Innovation Volume 8 Number 1 (2019)
ISSN 2305-784X (print) ISSN 2410-8383 (online) http://eserver.kabarak.ac.ke/ojs/

Maternal Determinants of Iron Deficiency Anaemia among Pregnant Women in Migratory Community, Narok county, Kenya

Violah Chepkorir[1,3,*] Wesley Bor[1] and Chebiwot Kipsaina[2]

[1]Department of Human Nutrition and Dietetics, Kabarak University.
[2] Department of Public Health, Kabarak University.
[3] Department of Health, Narok County.

Submitted: 22nd October 2019; Accepted: 20th November 2019; published online: 28th November 2019

Abstract

Globally, Iron Deficiency Anaemia (IDA) has been known to have negative effects on the lives of more than 2 billion people. In addition, studies have reported that anaemia contributes to 20% of all maternal deaths. The main objective of the study was to identify maternal determinants of Iron Deficiency Anaemia, among pregnant women in migratory community of Narok County. A cross-sectional study design was adopted for the research study, and the study was conducted in Antenatal Clinic at Ewaso Ngiro Health Centre in Narok County. The study Participants were pregnant women aged 15-49 years. However, statistical significance was reported with P-values of <0.05. Further, there was a statistical significance between age and IDA with a P-value of 0.032, there was also a statistical significance between education and IDA with a P-value of 0.034. In addition, the study also reported a statistical significance between parity with IDA with a P-value of 0.041. In conclusion, maternal determinants of IDA according to the study were; age, educational status and parity status. Therefore, there is need for longitudinal studies on the effect of socio-cultural practices on Iron deficiency anaemia.

Key words: Maternal determinants, Iron Deficiency Anaemia, Pregnant Women, Migratory Community

Introduction

According to World Health Organization (WHO), anaemia during pregnancy has been defined as haemoglobin concentration less than 11 g/dl (World Health Organization, 2011). Anaemia is considered severe when haemoglobin concentration is less than 7.0 g/dl, moderate when haemoglobin falls between 7.0 and 9.9 g/dl, and mild when haemoglobin is from 10.0 to 10.9 g/dl (World Health Organization, 2011).

Currently, pregnant women are the most vulnerable population corresponding to 24.8% of 3.7 billion people (Kaur, 2016). Maternal determinants that affect mothers and their pregnancy outcomes include; poor maternal nutrition, maternal age (less than 18 years), birth spacing, inadequate prenatal care, lifestyle behaviors and poverty (Getachew, Yewhalaw, Tafess, Getachew, & Zeynudin, 2012).

The determinants of IDA may vary according to the status of the population or the geographical location of a place of study. In Ethiopia, a study showed that the odds of getting anaemia in pregnant women was higher among mothers whose birth interval was less than two years (Mekonnen, Ambaw, & Neri, 2018). Furthermore, in pregnancy, anaemia is usually seen as a determinant factor for the poor pregnancy outcome and can lead to complications that threaten the life of both the mother and the fetus. The other important variable significantly associated

[*] *Corresponding author:* chep.vio2@gmail.com

with anaemia is the number of pregnancies (gravidity). Further, it was reported that the risk of developing anaemia in pregnant women with 3–5 pregnancies is increased when compared with those who have less than 3 pregnancies (Mekonnen et al., 2018). This could be as a result of loss of iron and other nutrients during increased and repeated pregnancies and also the possibility of sharing nutrient resources with the fetus.

Moreover, it was observed that pregnant housewives were more likely to develop anaemia than those who were employed or with self-employment (Mekonnen et al., 2018). The possible reason for this may be that housewives may have financial constraint and workload, hence may not have the ability to access health care services. Therefore housewives do face a lot of challenges that impact negatively on their nutritional status as well as increasing the possibility of having IDA.

Iron Deficiency Anaemia remains the leading single nutrient deficiency in the world, as it is estimated to affect 1 to 2 billion people, with women of childbearing age, infants, and young children particularly at risk (World Health organization (WHO), 2013). Around 50% of pregnant women worldwide are anaemic, with at least half of this burden due to IDA (World Health organization (WHO), 2013). In addition, IDA during pregnancy is not just a problem in low and middle-income countries, but it is also common in high income countries. (Ante et al., 2014) states that, about 25 to 40% of pregnant women in Western societies are estimated to have IDA, with this problem being more pronounced in lower socio-economic groups. In Denmark, for example, 42% of women of childbearing age were found to have small iron reserves (Milman, 2011).

Further, about 20% of maternal deaths are caused by iron deficiency anaemia and this is considered an important determinant factor which considered alone, is able to contribute to about 50% of all maternal deaths (Khaskheli, Baloch, Sheeba, Baloch, &Khaskheli, 2016). The three main reasons for death that are attributed to anaemia are first, anaemia results from excessive blood loss during or after delivery which results in low hematology reserves. Second, due to severe anaemia, resistance is decreased and susceptibility to infection is increased; and third, haemoglobin (Hb) level of less than 4 g/dl is associated with high risk of cardiac failure and death particularly during delivery or soon after.

Age factors of pregnancy (trimester) are important things to consider, as they are highly associated with Iron Deficiency Anaemia. This is because it is believed that the risk of developing anaemia increases with the age of pregnancy i.e. trimester (Addis Alene & Mohamed Dohe, 2014). In Eastern Ethiopia, it was reported that the risk of developing anaemia was higher in third and second trimester when compared with those in the first trimester (Kumar, Asha, Murthy, Sujatha, & Manjunath, 2013). This could be due to the fact that when the gestational age increases the mother becomes weak and the iron in the blood is shared with the fetus in the womb therefore, decreasing the iron binding capacity of the mother’s blood.

Nevertheless, Narok County reports a high number of early teenage pregnancies, as well, many unplanned pregnancies happen soon after the mother delivers, mostly because of low uptake of family planning services (Lennox, Petrucka, & Bassendowski, 2017). This exposes the pregnant mother to extraordinary stress that affects her nutritional status and result in depletion of the micronutrient stores of the mother, to the extent that the mother becomes anaemic from first trimester in the next pregnancy. It is also important to note that psychological and social factors also contribute to IDA in pregnant women (Tran et al., 2013). Therefore, the main objective of the study was to identify maternal determinants of iron deficiency anaemia among pregnant women in migratory community, Narok County.

In migratory community, pregnant women are always known to be more vulnerable, because during seasons of drought; men keep migrating from time to time in search of pastures for their animals, often leaving the women and children behind without food and financial support. Thus, pregnant women being the most vulnerable group are left alone to take care of the households and look for food on their own, in addition to attending to more expending activities like building houses, fetching water, fetching firewood as well as taking care of the whole family. In this case, pregnant women become much overwhelmed with many responsibilities and are unable to access nutritious foods, which in turn may predispose them to Iron Deficiency Anaemia.

Further, late antenatal care visits are still highly documented in Narok County (Pell et al., 2013). This may be attributed by the pastoralists unique nature of the community, whereby majority migrate from one place to another seasonally in search of pastures for their animals (Lincetto, Mothebesoane-anoh, Gomez, & Munjanja, 2013). Therefore, most pregnant women end up missing the opportunities for timely clinical appointments and interventions. Also, compliance to nutrition interventions become a challenge due to seasonal migrations (National Bureau of Statistics-Kenya and ICF International, 2015).

Moreover, IDA in Narok County, among pregnant women remains a major public health concern, because of the various socio-cultural difficulties like illiteracy, poverty, lack of awareness, cultural and religious taboos, and poor dietary habits. Consequently, most of the population's dietary patterns and diversity worsen, with households concentrating mainly on cereals more than other food groups and a number of households reducing the number of meals consumed per day from the usual three to two times a day (Presidency & Devolution, 2017). This therefore predisposes the vulnerable groups in this case, pregnant women to IDA thus contributing to the problem.

In addition, early marriages are still common in Narok County, and often this is associated with early child bearing, thus young pregnant women may not build enough iron stores to carry out pregnancy to term, hence predisposing them to low stature and malnutrition (Mutugi, 2012). Consequently, the use of herbal remedies is also a common practice among pregnant mothers in Narok County, which may cause drug nutrient interaction and can reduction of iron bioavailability and its overall absorption hence resulting to IDA (Lennox et al., 2017). These are also some of the unique characteristics of the migratory community, in addition to other factors mentioned earlier.

The aforementioned factors predispose the migratory community women to IDA during pregnancy and even after delivery. The existing literature reveals that most studies have been conducted in clinical urban set ups with limited studies having been conducted among the migratory population. In fact, to the best knowledge of this study, this is the first study in Narok County looking at IDA among pregnant in the migratory community.

Materials and Methods

Study design and setting

A cross-sectional study design was adopted for the study. It was conducted in Ewaso Ng'iro Health centre, at Maji-Moto Naroosura ward in Narok County, which is situated in an arid and semi-arid place. Majority of pregnant women who attend the Antenatal clinic at the health facility come from the wider migratory community, whereby low haemoglobin levels are frequently reported on a monthly basis and hence the need to conduct the study.

Study population

The study population was pregnant women aged 15-49 years.

Inclusion criteria

The study included all pregnant women aged 15-49 years who actively attended their antenatal clinic and were willing to voluntarily participate in the study. It also included pregnant women who reported to be residing in Maji-Moto Naroosura ward, in Narok County.

Exclusion criteria

Pregnant women aged 15-49 years who had documented advanced medical conditions like Diabetes, Cancer, Tuberculosis and HIV/AIDS and those pregnant women who were unable to provide informed consent to participate were excluded from the study.

Sample size and sampling procedures

The Fischer et al., 1998 formula, was used to obtain the desired sample size when p**o**pulation is greater than 10,000 ;

$$n = \frac{z^2 pq}{d^2}$$

where;

z= was the normal deviate set at 1.96 which corresponds to 95% confidence interval

p=was the estimated proportion of pregnant women who are anaemic. Since there was no reasonable estimate of IDA in Narok County, the national prevalence of 0.55 was used

q=was the 1-p estimated proportion of pregnant women who are anaemic assuming p=0.55 (maximum variability) 95% confidence interval was desired ±5% precision. Hence q=0.45

d=was the degree of accuracy desired, set at 0.05, corresponding to the 1.96

Therefore, $n = (1.96)^2 \times (0.55)(0.45) / (0.05)^2 = 380$

When N is less than 10,00**0**, the final sample estimate *nf* can be obtained by using the by using the ffor**m**ula;

$$nf = \mathrm{n}/(1 + (\frac{\mathrm{n}}{\mathrm{N}}))$$

The estimate of the population size from Antenatal Care attendance from The Ministry of Health register for antenatal care attendance for the last six months was 3600 (N=3,600).

Hence: $nf = \frac{380}{1+\left(\frac{380}{3600}\right)}$

nf =346

Assuming an attrition rate of 10% (0.1)

nf = 346/ (1-0.1)
nf = 384 (study participants enrolled for the study).

The participants were randomly enrolled into the study using the clinic registers (Ministry of Health register for antenatal attendance) and table of random numbers was generated using Micro Soft Excel, 2007 (Started & Excel, 2007), until the desired sample size was achieved.

Instrumentation
A structured and validated questionnaire was administered to participants to collect data on maternal determinants while the Mission Plus HB machine was used to measure the Haemoglobin levels for the pregnant women.

Pilot Study
Pre-testing of the research instruments was conducted at Ewaso Ng'iro Dispensary because it had similar geographical characteristics with the study area. It also ensured that the participants who had been selected were not in any way going to be enrolled for the main study. The purpose of this pilot study was to check for reliability of the tools, clarity of question, their sensitivity, and any other information that could hinder the instrument's ability to collect data in an economical and systematic approach.

Data Collection Procedure and Technique
A structured pre-tested and validated questionnaire, was used to collect data on socio-demographic information including; age, marital status, educational status, residence and occupation. Additionally, potential risk factors, including the number of children, were also collected.

Data processing and Analysis
The data was cleaned, edited, coded and checked for completeness using Microsoft excel. It was then analysed using Statistical Packages for Social Sciences (SPSS version 25.0). Data analysis involved descriptive characteristics including demographic characteristics, socio-economic and socio-cultural. Descriptive statistics including measures of central tendency was used to express the variables by cross-tabulation. In addition, Pearson's correlation was used to examine the

relationship between dietary iron consumption and haemoglobin levels, after controlling for age and education as the confounding factors. The significance was accepted at a P-value, of less than 0.05 and data was presented using tables.

Ethical consideration

Prior to data collection, ethical clearance was sought out from the Institutional ethical review committee of Kabarak University. A research permit was also obtained from NACOSTI (National Commission for Science Technology and Innovation). In addition, approval was obtained from Ministry of Health, Narok County. The study participants gave a consent form and an assent form was also obtained from the study participants who were below 18 years before the commencement of the research work. To ensure confidentiality, participants' data was linked to a code number.

Results

Table, (Table 1), shows maternal determinants of pregnant women in migratory community, in Narok county.

Table 1: Maternal Determinants of Pregnant women, in Migratory Community

Variables	**Haemoglobin outcome**		**Pearson* chi2 P value**
	Normal(n=160) n (%)	Abnormal(n=213) n (%)	
Age (Years)			
Mean(24.98),SD(6.541)			
Below 18	17 (10.6)	22 (10.3)	**0.032***
18-24	50 (31.3)	69 (32.4)	
25-33	66 (41.3)	78 (36.6)	
34-44	25 (15.6)	41 (19.3)	
45-47	2 (1.30	3 (1.4)	
Marital status			
Monogamous	52 (32.5)	75 (35.2)	0.975
Polygamous	75 (4.9)	99(46.5)	
Separated/Divorced	4 (2.5)	5 (2.4)	
Widowed	9 (5.6)	10(4.7)	
Single	20 (12.5)	24 (11.3)	
Occupation			
Salaried employee	12 (7.5)	17 (8.0)	0.924
Business	40 (25.0)	47 (22.1)	
Housewife	71 (4.4)	98 (46.0)	
Casual labourer	23 (14.4)	28(13.2)	
Student	14 (8.8)	23(10.8)	
Education Level			
Informal	46 (28.8)	47 (22.1)	**0.034***
Primary	40 (25.0)	81 (38.0)	
Secondary	46 (28.8)	45 (21.1)	
Post-secondary	28 17.5	40 (18.8	
Parity			

Para 0	23 (14.4)	33 (10.2)	**0.041***
Para 1	23 (14.4)	25 (11.7)	
Para 2	40 (25.0)	41 (19.3)	
Para 3-5	45 (28.1	54 (28.2)	
Para >6	29 (18.1	60 (30.6)	

*Statistical significance at p< 0.05

Haemoglobin levels below the cut off points for normal levels were more common between 18-24 years (32.4%) and 25-33 years (36.6%). Between 34-44 years, Haemoglobin was below normal at 19.3% and much lower at 45-47 years (1.4%). This showed that women at a younger reproductive age were more likely to suffer from IDA, than those who were a bit older.

The study established that low Haemoglobin levels were more common with lower levels of education such as attaining primary education. This is because, the low Haemoglobin levels for those with Informal education was 47 (22.1%) and 81 (38.0%) for pregnant women with primary education. On the other hand, Haemoglobin levels were lower for those who had secondary education 45 (21.1%) and post-secondary education 40 (18.8%). This finding meant that higher education levels might have contributed to the knowledge of IDA and its ways of prevention unlike low education levels, which meant lack of awareness about IDA.

In addition, the study findings showed that Haemoglobin levels below the normal range was found mostly in pregnant women who had more than 3-5 children 54 (28.2%). In addition, it was way higher for those who had more than 6 children 60 (30.6%). This showed that as parity status increased, there was likelihood to have IDA. This may be because of losing much blood during every delivery of a child.

Discussion

From the current study findings, chronological age, education level and parity status were found to be significant with Iron deficiency anaemia of pregnant women. This findings was similar to a study that was conducted in South India by Little et al in 2018, which demonstrated that increased age of the study participants was highly associated with IDA (Little et al., 2018).

In addition, the findings were also similar to studies that were conducted in Pumwani Maternity hospital in Kenya, by Okube et al in 2016 , and in Nigeria by Owerri, 2015, which reported that maternal age and parity status were significantly and independently associated with IDA in Pregnant women (Okube, Mirie, Odhiambo, Sabina, & Habtu, 2016) and (Owerri, 2015).

However, the findings contrasted with those of a study conducted in North Shoa zone in Ethiopia, which reported that occupation of pregnant women was significantly associated with IDA (Mekonnen et al., 2018), which was quite different with the current findings that stated no significant association between occupation and IDA. Further, the study findings also contrasted with studies conducted in Durame town in Ethiopia, which stated that occupation of the pregnant women and marital status were some of the determinants of IDA (Weldekidan, Kote, Girma, Boti, & Gultie, 2018) and in Mbagathi hospital by (C, 2010).

Acknowledgements

My gratitude goes to the almighty God for bringing me to this far. I am also, highly indebted to my supervisors, Dr. Bor and Dr. Chebiwot. I equally thank the entire school of Medicine and Health Sciences and the department of Human Nutrition and Dietetics of Kabarak University.

Conflict of interest

There was no conlict of interest regarding the publication of this paper.

Reference

1. Addis Alene, K., & Mohamed Dohe, A. (2014). Prevalence of Anemia and Associated Factors among Pregnant Women in an Urban Area of Eastern Ethiopia. https://doi.org/10.1155/2014/561567

2. Ante, A., Care, N., Health, B., Ayenew, F., Abere, Y., & Timerga, G. (2014). Women's Health Care Pregnancy Anaemia Prevalence and Associated Factors among Women, *3*(5). https://doi.org/10.4172/2167-0420.1000173

3. C, W. (2010). Title : Antenatal Clinic At Mbagathi District Hospital, 2–60.

4. Getachew, M., Yewhalaw, D., Tafess, K., Getachew, Y., & Zeynudin, A. (2012). Anaemia and associated risk factors among pregnant women in Gilgel Gibe dam area, Southwest Ethiopia. *Parasites & Vectors*, *5*(1), 296. https://doi.org/10.1186/1756-3305-5-296

5. Kaur, S. (2016). Iron Deficiency Anemia (IDA): A Review. *International Journal of Science and Research*, *5*(4), 1999–2003.

6. Khaskheli, M. N., Baloch, S., Sheeba, A., Baloch, S., & Khaskheli, F. K. (2016). Iron deficiency anaemia is still a major killer of pregnant women. *Pakistan Journal of Medical Sciences*, *32*(3), 630–634. https://doi.org/10.12669/pjms.323.9557

7. Kumar, K. J., Asha, N., Murthy, D. S., Sujatha, M. S., & Manjunath, V. G. (2013). Maternal Anemia in Various Trimesters and its Effect on Newborn Weight and Maturity : An Observational Study, *4*(2), 193–199.

8. Lennox, J., Petrucka, P., & Bassendowski, S. (2017). Eating practices during pregnancy: perceptions of select Maasai women in Northern Tanzania. *Global Health Research and Policy*, *2*(1), 9. https://doi.org/10.1186/s41256-017-0028-9

9. Lincetto, O., Mothebesoane-anoh, S., Gomez, P., & Munjanja, S. (2013). Antenatal Care: Opprotunities for Africa's Newborns. *International Journal of Scientific & Technology Research*, *2*(2), 51–62.

10. Little, M., Zivot, C., Humphries, S., Dodd, W., Patel, K., & Dewey, C. (2018). Burden and Determinants of Anemia in a Rural Population in South India : A Cross-Sectional Study, *2018*. https://doi.org/10.1155/2018/7123976

11. Mekonnen, F. A., Ambaw, Y. A., & Neri, G. T. (2018). Socio-economic determinants of anemia in pregnancy in North Shoa Zone , Ethiopia, 1–9.

12. National Bureau of Statistics-Kenya and ICF International. (2015). Kenya 2014 Demographic and Health Survey Key Findings. *Kdhs*, *6*, 24. Retrieved from https://www.dhsprogram.com/pubs/pdf/SR227/SR227.pdf

13. Pell, C., Meñaca, A., Were, F., Afrah, N. A., Chatio, S., Manda-Taylor, L., … Pool, R. (2013). Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies in Ghana, Kenya and Malawi. *PLoS ONE*, *8*(1). https://doi.org/10.1371/journal.pone.0053747

14. Presidency, T. H. E., & Devolution, M. O. F. (2017). National Drought Early Warning Bulletin, (January).

15. Tran, T. D., Biggs, B.-A., Tran, T., Casey, G. J., Hanieh, S., Simpson, J. A., … Fisher, J. (2013). Psychological and Social Factors Associated with Late Pregnancy Iron Deficiency Anaemia in Rural Viet Nam: A Population-Based Prospective Study. *PLoS ONE*, *8*(10), e78162. https://doi.org/10.1371/journal.pone.0078162
16. Fischer, A. A., Laing, J. E., Stoeckel, J. E., & Townsend, J. W. (1998). *Handbook for Family Planning Operations Research Design.* New York: Population Council.

17. Milman, N. (2011). Anemia - Still a major health problem in many parts of the world! *Annals of Hematology*, *90*(4), 369–377. https://doi.org/10.1007/s00277-010-1144-5

18. Mutugi, M. P. (2012). Prevalence of low birth weight deliveries and associated factors in Narok district hospital, Kenya.

19. Okube, O. T., Mirie, W., Odhiambo, E., Sabina, W., & Habtu, M. (2016). Prevalence and Factors Associated with Anaemia among Pregnant Women Attending Antenatal Clinic in the Second and Third Trimesters at Pumwani Maternity Hospital , Kenya, (January), 16–27.
20. Started, G., & Excel, C. M. (2007). EXCEL BASICS : MICROSOFT OFFICE 2007, (July 2015)

21. Owerri, T. (2015). Studies on the Predisposing Factors of Iron Deficiency Anaemia among Pregnant Women in a Nigerian Community, (January 2008). https://doi.org/10.3923/pjn.2008.151.156

22. Weldekidan, F., Kote, M., Girma, M., Boti, N., & Gultie, T. (2018). Determinants of Anemia among Pregnant Women Attending Antenatal Clinic in Public Health Facilities at Durame Town : Unmatched Case Control Study, *2018*.

23. World Health Organization. (2011). the Global Prevalence of Anaemia in 2011. *WHO Report*, 48. https://doi.org/10.1017/S1368980008002401

24. World Health organization(WHO). (2013). WHO | Micronutrient deficiencies. *Who*. Retrieved from http://www.who.int/nutrition/topics/vad/en/