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Persistence of a high prevalence of anemia in rural areas among pregnant women in Burkina Faso. A cross-sectional study

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Abstract. Despite WHO recommendations to reduce the global prevalence of anemia among women of reproductive age by 2025, anemia remains a truly global public health problem, especially among pregnant women. The objective of our study was to examine the relationship between anemia and the place of residence in pregnant women. This cross-sectional study was conducted in six health facilities between December 2018 and March 2019. Anemia was diagnosed using HemoCue HB 301 and a hemoglobin concentration <11 g/dl was classified as anemic. Adjusted logistic regression analysis was performed to examine relation between anemia and the place of residence in pregnant women. A total of 1027 pregnant women were included in the study. The average age of females was 25.79±6.02 years. The prevalence of anemia was 57.2% (585/1023). In logistic regression analysis adjusted for age, wealth, education and parity, women living in rural areas were more likely to be anemic compared to women living in urban areas (ORa=1.33; 95% CI [1.01-1,74]. Rural women are more likely to be anemic. Strategies to prevent anemia among pregnant women need to be strengthened in rural areas.

Introduction

Anemia is a condition in which the concentration of hemoglobin drops below a floor level, affecting the ability of the blood to carry oxygen from the lungs to all organs of the body and provide the nutrients that the fetus needs for its growth and development.

According to the World Health Organization (WHO), a pregnant woman is anemic when the hemoglobin content in her blood is less than 11 g/dl. Similarly, to define the public health significance of anemia based on prevalence in a given population, WHO has selected four classes: severe (40% and above), moderate (20 to 39.9%), mild (5 to 19.9%) and normal (4.9% or less) (1).

The most common cause of anemia is iron deficiency caused by prolonged deficiency due to inadequate dietary iron intake, increased requirements during growth or pregnancy and increased losses due to menstruation or helminthiasis (intestinal worms) (2).

Anemia in women of reproductive age in general and pregnant women in particular remains a major public health challenge for low- and middle-income countries with a long-term negative impact on the health of women, their children and the economic growth of society (3).

Globally, the prevalence of anemia among women of reproductive age is about 29.4% and anemia affects about 40% of pregnant women and more than 20% of non-pregnant women (4).

In India, about 58% of pregnant women are anemic and anemia is estimated to be the underlying cause of 20-40% of maternal deaths. From this perspective, Grover *et al* conducted a study of pregnant women in an urban slum in Haryana, and this study confirmed the fact that prevalence remains high in India. Indeed, 85.3% of participants were anemic with 19.6% for mild anemia, 59.8% for moderate anemia and 5.9% for severe anemia (5).

In East Africa, the work of Ab *et al* showed that the prevalence of anemia among women of reproductive age is high (34.85%) and is clearly increasing from 19.23% in Rwanda to 53.98% in Mozambique (3).

In addition, West Africa also has a high prevalence of anemia among pregnant women. In a 2020 systematic review conducted by Ugwu and Uneke, including all original scientific surveys, studies conducted in Nigeria between 1968 and 2017, and studies written in English, it appears that all studies reported a high prevalence of iron deficiency anemia in pregnant women (6). Similarly, in the same period, Ayensu *et al* conducted a study of pregnant women living in rural and urban areas of the Ashanti region of Ghana and recorded an estimated prevalence of anemia of 56.5% (7). According to World Bank estimates, the prevalence of anemia among pregnant women is high in Burkina Faso and is 58% (8).

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With the current trend, even though the World Health Organization has targeted a global 50% reduction in anemia among women of reproductive age by 2025, it is unlikely to achieve this goal. Faced with this alarming situation, we set ourselves the goal of studying anemia in the Kaya health district to estimate the prevalence of anemia and to assess the impact of the place of residence on anemia in pregnant women.

Materials and methods

Our study involved pregnant women in six health centers in Sanmatenga province. This is a cross-sectional study that was held from December 15, 2018, to April 15, 2019. The study population was pregnant women followed for antenatal consultations in the three largest urban health centers of the Kaya Health and Demographic Surveillance System (the health center of sector 4 and 6, the medical center of sector 1) and in the 03 largest rural health centers which are: the health center of Boussouma, Pissila and Korsimoro (Fig. 1).

The data were collected on the day of the participants' consultation after signing the informed consent in duplicate. A room was identified in each site and each woman was invited after identification and signature of consent to go there for the administration of the questionnaire. A structured questionnaire was used for data collection. Health workers who had experience in data collection and spoke the local language were recruited for data collection. Data were collected using a structured questionnaire pre-tested by face-to-face interview.

Study variables. The dependent variable was anemia (with modalities: 0 for 'non-anemic' and 1 for 'anemic'). Hemoglobin was measured with an HB301© hemocue on the day of the antenatal visit. A hemoglobin level <11 g/dl was considered anemia in pregnant women.

The exposure variable was coded residential setting (0 for semi-urban and 1 for rural).

The independent variables were age, education level, household wealth level, parity and iron plus folic acid supplementation.

Collection and analysis of individual blood samples. Hemoglobin analysis was performed at the station. The hemoglobin concentration was measured by taking one finger-prick blood sample from each pregnant woman using a HemoCue Hb 301. A prick was made on the tip of the middle finger after the site was cleaned with a disinfectant. The first drop of blood was cleaned, and the second drop was collected to fill the microcuvette which is then placed in the tank holder of the hemoglobin concentration measuring device. The performance of the meter was verified daily using a control standard to increase the reliability of the test. First, the microcuvette holder was pulled to its loading position and when the reader was ready to use capillary blood, the sample to be examined was filled in one continuous process. Within 10 min of filling, it was placed in the holder and pushed into its measuring position. Finally, after 15 to 60 sec, the result was displayed and recorded using WHO field survey recommendation techniques (9).

Data processing and analysis. The data were processed and analyzed with STATA 14.2 software. Two methods of statistical analysis were essential: descriptive analysis and explanatory analysis. Bivariate analysis determined the prevalence of anemia and investigated the association between anemia and place of residence. An adjusted multiple logistic regression was used to examine the relationship between anemia and place of residence.

Ethical considerations. The protocol was submitted to the ethics committee for health research in Burkina Faso for review and received ethical approbation under the number: 2018/12/146. For ethical reasons, patients in whom severe anemia was noted were transferred to the medical department for better management. To ensure anonymity, the information collected was kept in a secure cabinet in a closed office. Free and informed consent was sought from each participant prior to participation in the study. The research was conducted in accordance with the Declaration of Helsinki.

Results

Basic characteristics of the sample. A total of 1,027 pregnant women participated in this study. The mean age was 25.8±6.0 years. 246/1027 (23.9%) of women were over 30 years of age. The proportion of women who did not take iron and folic acid supplementation was 4.8%. For most women, 650/1027 (63.3%) were not attending school. 42.6 per cent of women live in rural areas. Primiparous represented 487/1027(47,4) (Table I).

Distribution of anemia prevalence by setting of residence. Analysis of the data showed that of the 1,027 pregnant women selected, 1,023 were able to benefit from a hemoglobin sample. Of these, 585 were anemic, an overall prevalence of 57.2%. Women living in rural areas accounted for 42.5% (437/1027) and those living in urban areas 57.5% (590/1027). The distribution of anemia by place of residence showed that women in rural areas were more anemic than those in urban areas 266/434 (61.3%) were anemic compared to 319/589 (54.2%) in semi-urban areas. This difference was statistically significant (Table II).

Relationship between anemia and home environment in pregnant women. In logistic regression analysis adjusted for age, wealth, education and parity, iron and folic acid supplementation, women living in rural areas were more likely to be anemic compared to women living in semi-urban areas (ORa=1.33; 95% CI [1.01-1.74] (Table III).

Discussion

Limitations. Cross-sectional surveys are the primary means of measuring the burden of health problems, but they have limitations in revealing the temporal sequence between factors and the outcome variable. In addition, micronutrients such as folate, vitamin B12 and vitamin A were not evaluated in this study.

Table I. Basic characteristics of the sample according to the place of residence.

	Semi-Urban		Rural	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)
Wealth quintile				
Very poor	124	21.1	81	18.5
Poor	99	16.8	106	24.3
Medium	115	19.5	91	20.8
Rich	105	17.8	100	22.9
Very rich	147	24.9	59	13.5
Age (years)				
Under 20	72	12.2	76	14.4
20 to 30	360	61.1	273	62.5
More than 30	158	26.8	88	20.1
School attendance				
None	310	52.5	340	77.8
At least primary	280	47.5	97	22.2
Iron and folic acid supplementation				
Yes	566	95.9	412	94.3
No	24	4.1	25	5.7
Parity				
Primiparous				
Yes	315	53.4	172	39.4
No	275	46.6	265	60.6

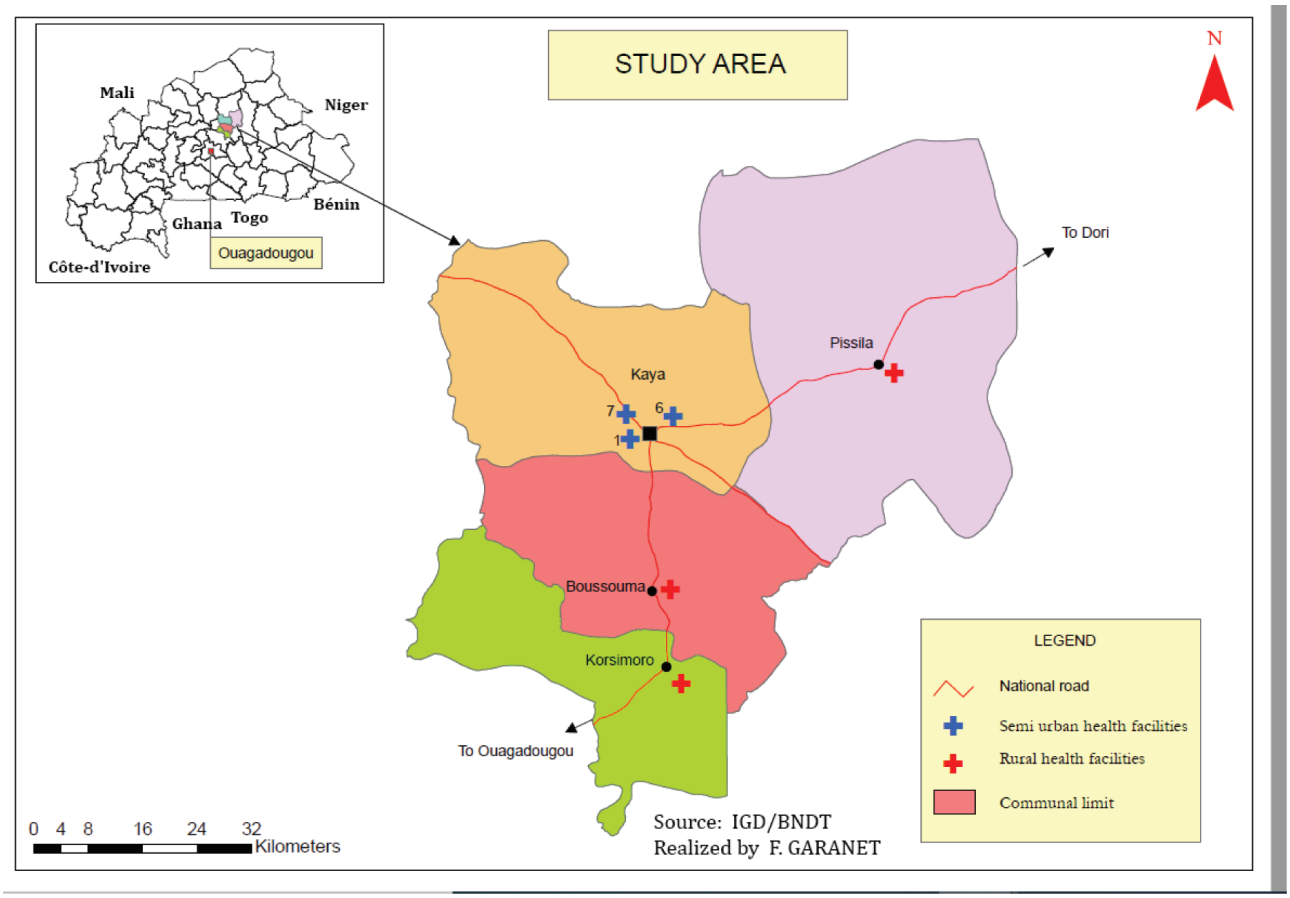

Figure 1. Study aera.

Table II. Prevalence of anemia by place of residence.

	Rural		Semi-urban		
	Number (n)	Percentage (%)	Number (n)	Percentage (%)	Total (%)
Anemia					
Yes	266	61.3	319	54.2	57.2
No	168	38.7	270	45.8	42.8

Table III. Relationship between place of residence and anemia.

Variables	ORa[a]	P-value	(95% CI)	
Place of residence				
Urban	1			
Rural	1.4	0.011[a]	1.1	1.8

ORa Odd adjusted ratio, CI, confidence interval, [a]: adjusted for age, wealth level, education level and parity and iron and folic acid supplementation.

Persistently high prevalence of anemia. Maternal anemia is associated with maternal and newborn mortality and morbidity, including risks of termination, stillbirth, prematurity and low birth weight (10). Aware of this situation and the realities that are intrinsically linked to anemia in pregnant women, the World Health Organization has set itself the global goal No. 2, to 'Reduce anemia among women of reproductive age by 50% by 2025' compared to the 2012 baseline of 30.3%. To achieve this goal, several recommendations were made regarding pregnancy monitoring, including iron and folic acid supplementation (11).

Despite these recommendations, according to World Bank estimates, the prevalence of anemia among pregnant women in Burkina Faso remains high at 58% (8). Our goal was to study anemia in the Kaya health district (a city in Burkina Faso) to estimate the prevalence of anemia and assess the impact of the place of residence on anemia in pregnant women.

In the description, this study revealed in detail that the prevalence of anemia is very high in Kaya Health District and is estimated at 53.75%. This prevalence is higher than those found in studies conducted in Ethiopia by Woldegebriel *et al* and Helion Belay *et al* with values of 41 and 32.4% respectively (9,12). However, anemia is a real public health problem in the Kaya health district. According to the WHO, such prevalence suggests that our study population has severe anemia. However, it deserves much more attention.

These always high and different prevalence's could be explained to you by the disparities in level and/or living conditions related to the place of residence. In other words, this is due to women's low level of education, women's low standard of living and low participation in antenatal consultations, which are an obstacle to compliance with WHO health measures for anemia (13,14).

Rural women more anemic than those living in urban areas and other associated factors. Residential setting is statistically associated with anemia and pregnant women living in rural areas are about 40 and 41% more likely to be anemic respectively than those in urban areas.

Our results are like those of Dicko *et al* (2003), who reported that pregnant women in rural areas have a higher risk of anemia than pregnant women in urban areas (OR=3.55; 95% CI 1.46-8.62) (15).

On the one hand, this could be explained by the fact that the spouses of these rural women are unaware or unaware of the importance of eating iron-rich foods and the importance of antenatal consultations. Indeed, the rural environment is an unfavorable factor for women's participation in decision-making within their household. As well, women have little involvement in decisions about their health care, major household purchases and visits to parents. It should also be noted that about 21.7% of women in the Centre-Nord region believe that they do not use care because they must have their husband's permission before going for treatment (16,17).

On the other hand, we could emphasize the growing financial inaccessibility in rural areas, leading to the inability to obtain foods rich in micronutrients such as iron etc. It should also be mentioned that villages or concessions are sometimes far from health services. In detail, fear of spending keeps many sick or pregnant women away from health services and what they need to eat (18). As a result, in the context of the Centre-North region, about 78.6 and 46.9% of women do not use care, respectively because of a lack of financial means and because of the geographical accessibility of health facilities (17).

In addition, the estimate of the adjusted model showed that women who had more than one pregnancy (the multigestes) were about 40% less likely to be anemic than those who had recorded at most one pregnancy. These results are consistent with those of Koura *et al* (2011), who found in their study that pregnancy is associated with a decreased risk of maternal anemia (OR=0.58 [0.34-0.99]) (19).

Assuming that experience is the best lesson, we will say that this immunity would be due to the experiences of pregnancies that could have a positive influence on the nutritional quality of the woman during future pregnancies, but also on her frequency of prenatal consultations.

Similarly, compared to uneducated women, women with at least primary education are about 28% less likely to be anemic. These results converge with those of Bentley and Griffiths (2003), who showed that women with high school education

are at lower risk than those with less than secondary school (OR=0.65; 95% CI=0.45-0.94) (20).

This could be explained by the fact that a woman's high level of education favors her participation in decision-making within her household and positively influences compliance with WHO recommendations and advice from medical personnel regarding anemia (16).

On the other hand, women who consumed foods rich in vitamin A or iron were respectively 58 and 68% less likely to be anemic compared to those who did not. Our results reflect the same idea as those of Lebso *et al* (2017), which showed that women who were not supplemented with iron and those who had a low dietary diversity score were 1.72 (AOR=1.72, 95% CI: 1.02-2.91) times and 3.18 (AOR=3.18, 95% CI: 1.37-7.37) times more likely to be anemic compared to those who were supplemented with iron and those with a high dietary diversity score (21).

Indeed, the consumption of foods rich in iron or vitamin A helps fight against iron and A deficiency. Hence the decrease in the risk of being anemic.

It also appears that women in the [15-19] bracket were the most vulnerable, but the age variable is not statistically significant at the 5% level. These results are like those of Sass *et al* (2017), who found that the age variable is not associated with anemia at the 5% threshold and that young women under 24 years of age are a risk group (22).

One reason is that pregnant teens have iron needs related to their own growth (in addition to the needs of the fetus) and they tend to rely less on antenatal care (23).

Conclusion

The prevalence of anemia among pregnant women in Kaya Health District remains very high, despite efforts by WHO and the Ministry of Health to reduce the prevalence of anemia among women of reproductive age. The results also showed that the place of residence is associated with anemia in pregnant women. Prevention strategies need to be strengthened to reduce the prevalence of anemia among pregnant women.

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Availability of data and materials

Data and materials are available by the authors.

Contributions

FG, GS, were involved in the design of the study. FG, GS, and AAT participated in the analysis. FG prepared the first project. FG, GS, and AAT revised the different versions of the manuscript. All coauthors read and approved the final manuscript.

Further information

Conference presentation; oral presentation to the first scientific journey of IRSS, Burkina Faso, 2020.

Conflict of interest

The authors declare no conflict of interest. The protocol was submitted to the ethics committee for health research in Burkina Faso for review and received ethical approbation under the number: 2018/12/146. For ethical reasons, patients in whom severe anemia was noted were transferred to the medical department for better management. To ensure anonymity, the information collected was kept in a secure cabinet in a closed office. Free and informed consent was sought from each participant prior to participation in the study. The research was conducted in accordance with the Declaration of Helsinki.

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References

1. Ouzennou N, Tikert K, Belkedim G, Jarhmouti FE and Baali A: Prevalence and social determinants of anemia in pregnant women in Essaouira Province, Moroccoc. Sante Publique 30: 737-745, 2018.
2. Bagla P: Réduire de 50% l'anémie chez les femmes en âge de procréer: 8, 2017.
3. Teshale AB, Tesema GA, Worku MG, Yeshaw Y and Tessema ZT: Anemia and its associated factors among women of reproductive age in eastern Africa: A multilevel mixed-effects generalized linear model. PLoS One 15: e0238957, 2020.
4. Wu Y, Ye H, Liu J, Ma Q, Yuan Y, Pang Q, Liu J, Kong C and Liu M: Prevalence of anemia and sociodemographic characteristics among pregnant and non-pregnant women in southwest China: A longitudinal observational study. BMC Pregnancy Childbirth 20: 535, 2020.
5. Grover K, Kumar T, Doda A, Bhutani R, Yadav S, Kaushal P, Kapoor R and Sharma S: Prevalence of anaemia and its association with dietary habits among pregnant women in the urban area of Haryana. J Family Med Prim Care 9: 783-787, 2020.
6. Ugwu NI and Uneke CJ: Iron deficiency anemia in pregnancy in Nigeria-A systematic review. Niger J Clin Pract 23: 889-896, 2020.
7. Ayensu J, Annan R, Lutterodt H, Edusei A and Peng LS: Prevalence of anaemia and low intake of dietary nutrients in pregnant women living in rural and urban areas in the Ashanti region of Ghana. PLoS One 15: e0226026, 2020.
8. BANQUE MONDIALE, OMS, UNICEF, UNFPA. Prévalence de l'anémie chez les femmes enceintes (%) | Data [Internet]. 2020. Disponible sur: https://donnees.banquemondiale.org/indicateur/SH.PRG.ANEM?most_recent_value_desc=false.
9. Woldegebriel AG, Gebregziabiher Gebrehiwot G, Aregay Desta A, Fenta Ajemu K, Berhe AA, Woldearegay TW and Mamo Bezabih N: Determinants of Anemia in Pregnancy: Findings from the Ethiopian health and demographic survey. Anemia 2020: 2902498, 2020.
10. MS, UNICEF. CADRE MONDIAL DE SUIVI DEL A NUTRITION. pp82, 2018.
11. OMS. Nutrition dans la Région africaine de l'OMS. pp84, 2019.
12. Helion Belay AM, Tariku A, Woreta SA, Demissie GD and Asrade G: Anemia and associated factors among pregnant women attending prenatal care in rural Dembia District, North West Ethiopia: A cross-sectional study. Ecol Food Nutr 59: 154-174, 2020.
13. Sendeku FW, Azeze GG and Fenta SL: Adherence to iron-folic acid supplementation among pregnant women in Ethiopia: A systematic review and meta-analysis. BMC Pregnancy Childbirth 20: 138, 2020.
14. Elmardi KA, Adam I, Malik EM, Abdelrahim TA, Elhag MS, Ibrahim AA, Babiker MA, Elhassan AH, Kafy HT, Elshafie AT, *et al*: Prevalence and determinants of anaemia in women of reproductive age in Sudan: Analysis of a cross-sectional household survey. BMC Public Health 20: 1125, 2020.

15. Dicko A, Mantel C, Thera MA, Doumbia S, Diallo M, Diakité M, Sagara I and Doumbo OK: Risk factors for malaria infection and anemia for pregnant women in the Sahel area of Bandiagara, Mali. Acta Tropica 89: 17-23, 2003.
16. Gnoumou Thiombiano B: Genre et prise de décision au sein du ménage au Burkina Faso. Cahiers Québécois de Démographie 43: 249-278, 2014.
17. Institut National de la Statistique et de la Démographie. Enquête Démographique et de Santé et à Indicateurs Multiples (EDSBF-MICS IV) 2012: 527, 2010.
18. Kouanda S, Boina T, Nikièma L, Doulougou B, Meda B and Sondo B: Facteurs liés à la sous utilisation de la consultation post natale dans un district rural au Burkina Faso. Sciences de la Santé 30: 97-103, 2007.
19. Koura KG, Briand V, Massougbodji A, Chippaux JP, Cot M and Garcia A: Prévalence et étiologie de l'anémie chez la femme enceinte au sud Bénin au moment du changement de politique nationale de prise en charge. Médecine Tropicale 71: 63-67, 2011.
20. Bentley ME and Griffiths PL: The burden of anemia among women in India. Eur J Clin Nutr 57: 52-60, 2003.
21. Lebso M, Anato A and Loha E: Prevalence of anemia and associated factors among pregnant women in Southern Ethiopia: A community based cross-sectional study. PLoS One 12: e0188783, 2017.
22. Sass S, Mohamed MS, Zein A, Elberae A, Khadmaoui A, Khllayoun S, Aicha Lrhorfi L and Bengueddour R: Relation Entre Les Facteurs Socio-Économiques Et L'anémie Au Cours De La Grossesse (Nouakchott-Mauritanie). ESJ 13: 93, 2017.
23. OMS. Cibles mondiales de nutrition 2025 Note d'orientation sur l'anémie. pp8, 2017.