

# Anaemia awareness, beliefs and practices among pregnant women: A baseline assessment at Brosankro community in Ghana.

Bismark Dwumfour-Asare (Corresponding author)

Environmental Health & Sanitation Department; College of Agriculture Education, University of Education,  
Winneba; Asante-Mampong Campus, Ghana.

Tel.: +233-209-777-318, E-Mail: [dwumfourasare@gmail.com](mailto:dwumfourasare@gmail.com)

Mavis A. Kwapong

Brosankro Health Centre; P. O. Box 205, Brosankro, Brong Ahafo.

E-Mail: [kwapongmavis@yahoo.com](mailto:kwapongmavis@yahoo.com)

## Abstract

Anaemia in pregnancy is among the top health threats in developing countries. Ghana has adopted several strategies over the years against anaemia but it remains a major cause of infant and maternal deaths. This paper assesses anaemia awareness levels, beliefs and practices among pregnant women of an endemic community. A baseline survey was conducted on 28 pregnant women randomly selected from first 100 consistent antenatal attendees from August to October 2011 at Brosankro Health Centre. The results show high anaemia consciousness with few respondents claiming no knowledge of the causes (3%) and effects (14%). The easily known cause of anaemia is poor diet (63%) followed by malaria (26%), worms (5%) and others (6%). Meanwhile, food sources that can fight anaemia are poorly known (18%). Cultural and religious beliefs in food restrictions exist and fairly a significant number of women (38%) are denied potential dietary nutrients. There are potential health risks (including anaemia) associated with existing practices since barriers to parasitic infections like malaria and worms via use of insecticide treated bed nets, intermittent preventive treatment, improved drinking water sources and effective handwashing are compromised. Respondents' understanding on effective barriers against anaemia in pregnancy needs to be deepened.

**Keywords:** anaemia awareness; beliefs; practices; pregnant women, drinking water

## 1. Introduction

The fight against anaemia seems to be a daunting task across the globe especially in developing countries. Anaemia's devastating effects could take a significant toll on national economies. It is estimated that 58% of pregnant women in developing countries are anaemic; anaemia is the cause of 20% maternal deaths; and further to that 50% of all maternal deaths are linked to anaemia [1, 2]. It is believed that half of all pregnant women in Africa are anaemic [3]. In fact, anaemia and malaria are the leading causes of morbidity and mortality in children in sub-Saharan Africa [4]. Baidoo et al. [5] in their recent study in Ghana reveals that 55% of pregnant women are anaemic. Anaemia is considered as harmful and compelling as epidemics of infectious diseases [2]. Anaemia can generally affect all but the worst affected are infants, school-age children, and women of reproductive age [6, 2]. In Ghana, recent facts show anaemia as the third cause of all deaths representing 7.3% proportional mortality rate and also the second cause of both under five morbidity (12.8%) and mortality (6.3%) after malaria (GHS, 2012).

Unfortunately, the aetiology of anaemia is considered as more complex in developing than in developed countries. An exhaustive list on the causes of anaemia in developing countries includes: (i) insufficient dietary intake; (ii) poor iron bio-availability - from low consumption of absorption enhancers and high consumption of absorption inhibitors; (iii) increased requirements at certain stages in the life cycle, notably during pregnancy and rapid early childhood and adolescent growth; (iv) blood loss due to menstruation and childbirth among women; (v) parasites, mostly hookworm; and chronic and recurrent infections such as diarrhoeal disease, malaria, sickle-cell diseases and human immunodeficiency virus [5, 6, 2, 3, 7, 8, 9]. Iron deficiency is responsible for about 95% of anaemic pregnancy in Ghana usually due to inadequate dietary intake, previous pregnancies or

normal loss of iron in blood during menses, and interference of iron stores by parasites [5]. Meanwhile, parasitic infections are strongly linked to multiple and inter-related risk factors that include: poverty, exposure to contaminated water and soil, poor hygiene practices especially in rural communities lacking improved water, sanitation and hygiene services [10, 11]. These causes of anaemia in pregnancy are also common in West Africa in addition to pica [12]. Pica or geophagy [3, 12] is the ingestion or eating of special type of clay (earth or soil) of the kaolinite group as a result of the craving for soil. According to the authors pica or geophagy is associated with an increased risk of anaemia.

Other inescapable causes of anaemia also include cultural and/ or religious beliefs and practices in food restrictions that deprive pregnant women of relevant dietary nutrition [9]. According to Nag [13] all societies have traditional and/ or religious beliefs regarding harmful and beneficial food and even food quantity for pregnant women. Food classifications may not be clear and also beliefs may not conform to modern maternal nutrition. For instance, in India major food considered as harmful to pregnancy include eggs, fish, meat, papaya, banana, eggplant, beans, peas etc [13]. Though beliefs and practices could be harmful or beneficial, they are adhered to because of respect for tradition and/ or advice of elders [14]. Also in Ghana, serving husbands with nutritious part of meals deny pregnant women of dietary nutrition and this is practiced purposely to please husbands [8]. One study in Pakistan indicates that most women (84%) know certain food to avoid during pregnancy [15]. The reasons given are deficient nutritional knowledge and poverty, and the authors believe that enough education could avert the situation. An eight-country study claims that women recognize most of the consequences of anemia in pregnancy [1]. Notable consequences of anaemic pregnancies include maternal and fetal morbidity and mortality (vulnerability to diseases, risk of spontaneous abortion, stressed labour or other delivery complications); infant anaemia with low birth weight and greater than average risk of early death; child impaired mental and motor development and apathy which can be irreversible, etc [2, 3, 8,16].

Anaemia in pregnancy needs prompt attention by adopting strategies that can comprehensively fight the disease [12]. Several interventions are noted to be effective in combined forms, which may range from nutrient (iron) supplement through to fighting infections (especially malaria and worms), and influencing positive beliefs and practices. Thus, employing iron supplementation for certain well-defined groups; food fortification; nutrition education; promotion of exclusive breast feeding; social marketing for improved available iron in the diet; use of insecticide treated bed nets and Intermittent Preventive Treatment (IPT) against malaria; effective deworming; education and awareness creation; and provision of improved water, sanitation and hygiene services [2, 18, 19, 10]. Use of IPT with education reduces placental malaria and maternal anaemia and this is key since in sub-Saharan Africa malaria is the main cause of severe anaemia in pregnancy [16, 20, 21]. It is noteworthy that increasing antimalarial drug resistance has warranted use of insecticide treated bed nets (ITBNs) as complementary preventative strategy to IPT [21]. More so, the combined interventions of IPT and ITBNs are more effective [22]. Thus, explaining the probable reason why the World Health Organization (WHO) recommends ITBNs to be an integral part of antenatal care though progress towards increasing coverage is insufficient [16]. Meanwhile, the drivers of effective use of ITBNs include: parity; hot weather; perceived absence of mosquito bites; individual knowledge, behaviour and attitude towards malaria; social and cultural factors [16, 22, 23]. Apart from IPT and ITBN interventions, health education and awareness creation relating to hygienic practices, improved sanitation and water supply contribute to decreasing parasitic infections [10]. Since water, sanitation and hygiene (WASH) are linked to child and maternal health, access to improved water and sanitation are key to Millennium Development Goals (MDGs) targets of addressing child and maternal mortality [24].

Anaemia has long been recognized in Africa as a major health problem and it has been prevalent in Ghana [8]. Ghana has been at the forefront with several approaches to prevent and control anaemia [8, 18]. Several efforts by the Government via the Ministry of Health to help overcome anaemia in pregnancy include education and awareness creation, nutrient supplementation, and controlling and preventing parasitic infections. However, it is not clear the level of influence of such interventions on awareness level, attitude, beliefs and practices among pregnant women. This paper therefore assesses pregnant women's anaemia awareness level; beliefs and practices towards anaemia; drinking water sources; and handwashing practices at critical times using one of anaemia endemic communities in Ghana.

## 2. Profile of study area and data collection

Brosankro is a community in the Tano South District of the Brong Ahafo region of Ghana. The community has a Health Centre that serves an estimated population of about 5,813 and other near-by communities. The main occupation is farming like other settlements within the District. The District Health Management Team has Micronutrient Deficiency Control Programmes on iodated salt, iron and vitamin A supplementary feeding [25]. Anaemia is commonly noted to be the leading cause of death [25]. Data available from the Brosankro Health Centre indicates 540 anaemic pregnancies from 974 attendances, thus 55% prevalence rate from January to June 2011 alone. This situation stimulated the assessment of anaemia awareness level and practices relating to the risks of anaemia among the pregnant women.

The data collection (baseline survey) involved interviewing 28 randomly selected pregnant women from the first 100 who consistently reported at the Brosankro Health Centre for antenatal care from August to October 2011. Ethical clearance was granted from the District Health Management and informed consent was also sought from the respondents surveyed. The questionnaire, which was designed as semi-ended, focused on key themes like respondents' knowledge about anaemia, attitude and beliefs towards anaemia, drinking water sources, and handwashing practices. Responses on the taking of IPT and dewormer were confirmed from the maternal health records from the Health Centre. The data was analysed using descriptive statistics built in Microsoft Excel.

## 3. Results and Discussion

### 3.1. Demographics

The average age of respondents is 31 years with 42 and 18 being the maximum and minimum ages respectively. The ages are within the childbearing age (15 – 49 years) of Ghanaian women [26]. Respondents already have between 1 and 7 children, giving an average of 3 children per a woman, which is close to the national average of 4 children per a Ghanaian woman. The average birth interval is 2 years with 3 and 2 years as maximum and minimum respectively. The last child into the current pregnancy is between 2 and 5 years old with an average of 3 years. This is acceptable because spacing children at least 24 months apart reduces risk of infant death and this average figure is around the national median birth interval of 40 months [26]. Most of these pregnant women (86%) are farmers and the minority as traders (11%), other (3%). Thus, confirming that farming is the main livelihood of the district's inhabitants [25]. Meanwhile, a significant number of the women (29%) have no formal education, indicating a relatively higher figure than the national figure on women (21%) given by GSS et al. [26].

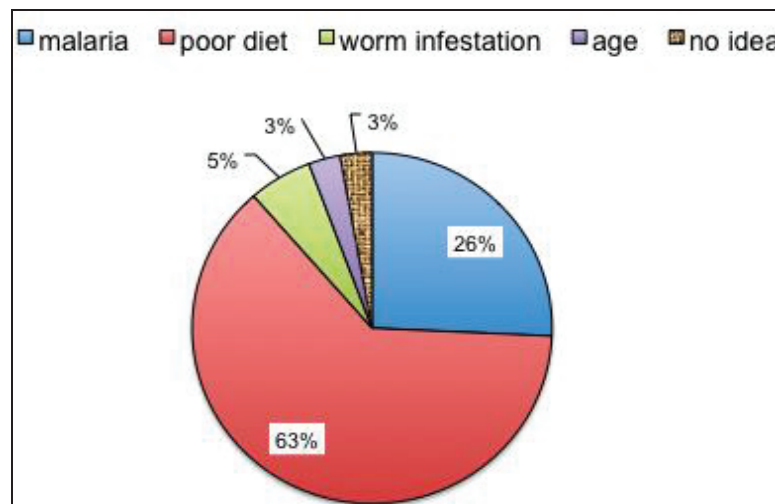
### 3.2. Anaemia awareness level – perceived description & causes

All respondents (100%) were able to define anaemia to the best of their understanding as laypersons, and their definitions are commonly translated as follows: “shortfall of blood”, “drop in blood level”, “blood dried up”, and “low blood level”. The definitions attempt to satisfy the WHO's definition quoted as “anemia in pregnancy is hemoglobin concentration below 11 g/dL” [3, 12]. To a layman, blood is simply blood, and for that matter components distinction like hemoglobin and others are hardly known or completely unknown. Thus, “Shortfall of blood”, “low blood levels” or the other terms could simply mean low hemoglobin levels. On signs or symptoms that indicate anaemic pregnancy, all respondents were able to give at least one. Moreover, few (29%) were able to give more than one symptom perceived to be an anaemic condition. It is mostly easier for respondents to give just a single symptom or sign of the disease. Among the symptoms given, 79%, 18% and 3% represent first, second and third responses respectively. Respondents are more familiar with signs like pale palm & conjunctiva, pale conjunctiva, and pale palm all constituting 70% of the signs enumerated (see Table 1). These symptoms are among conditions accepted in literature to be associated with anaemia. The clinical term for anemia is mostly not known by laypeople but the disease is recognised by its symptoms where most women commonly refer to as headache, dizziness, paleness, fainting, “low blood”, weight loss, loss of appetite etc [1].

**Table 1:** Respondents' perceived signs or symptoms of anaemia in pregnancy

Perceived signs of anaemia	Distribution of responses (%)
Pale palm	20%
Pale conjunctiva	26%
Pale palm & conjunctiva	26%
Paleness	6%
Dizziness	3%
Palpitation	9%
Tiredness/body weakness	9%
Short of breath	3%
<b>Total</b>	<b>100%</b>

There is quite high awareness level of the causes of anaemia in pregnancy among respondents. Only 3% of the people claim no knowledge of the causes the disease. The high awareness level is a plus to antenatal caregivers since it could be attributed to education during antenatal care services, which respondents may have benefited from at least their three successful pregnancy time points. The finding also shows the need to sustain educating antenatal attendees since some women could forget or miss concepts altogether. Meanwhile, the number one cause of anaemia identified from the women (see Figure 1) is poor diet (i.e. unbalanced diet), followed by malaria infections, then worm infestation and finally age. These are also among the top causes of anaemia identified in literature [2, 7, 12, 16, 22]. However, age by itself is unlikely to lead to anaemia except other primary causes like chronic diseases exist [27].



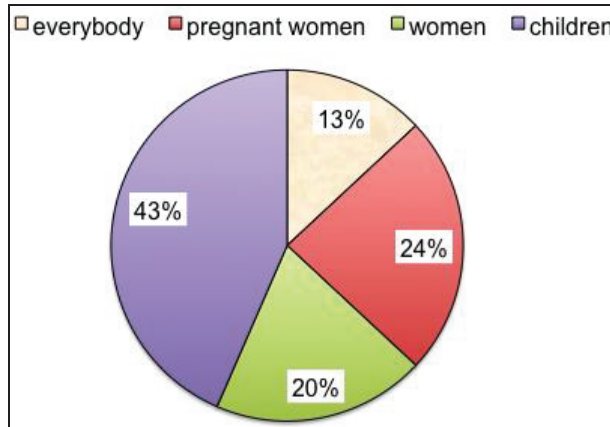
**Figure 1:** Perceived causes of anaemia in pregnancy among pregnant women

### 3.3. Anaemia awareness – perceived vulnerability and effects

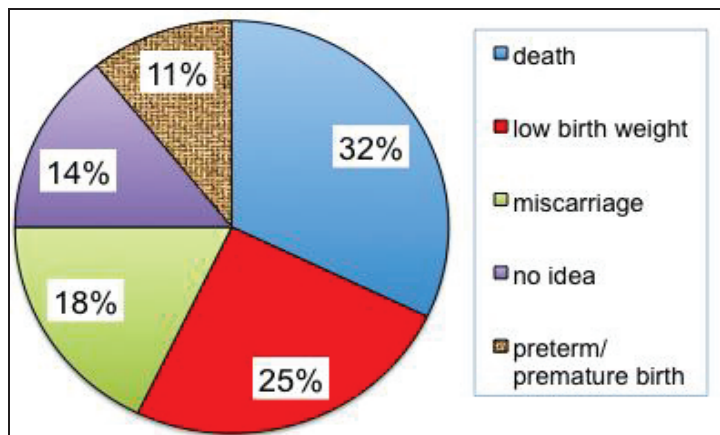
Most respondents believe that children are vulnerable to anaemia than any other group. The perception about children's vulnerability to anaemia is comparable to pregnant and ordinary women combined (see Figure 2). While both women and children are vulnerable, Balducci [27] sticks up for the stance that women are more susceptible to anaemia due to menstrual blood loss and childbearing iron loss. Moreover, evidence from developing, industrialized and WHO countries show that the most vulnerable group to anaemia is pregnant women followed by school-aged children [9]. Respondents' perception suggests that they would pay attention to children at the expense of safeguarding their lives against anaemic pregnancy. Also they could miss or ignore the point that the survival of an unborn child depends on mother's survival. Undoubtedly, iron stores in infants at

birth depend on maternal iron status and healthy term babies have adequate iron stores if born to mothers that are not iron deficient during pregnancy [9]. In fact, a key message that has to stay with these pregnant women is that “an anaemic mother begets an anaemic baby/child”.

The perceived consequences of anaemia in pregnancy reported by respondents are death, low birth weight, miscarriage and preterm (see Figure 3). These perceptions agree with some of those reported in literature [1, 16]. Unfortunately, some women (14%) claim no knowledge of any effects or consequences associated with anaemia in pregnancy. This indicates the need for sustained education and awareness creation targeting pregnant women since they could have missed or forgotten about any education already given them.



**Figure 2:** Perception about vulnerability to anaemia



**Figure 3:** Perceived effects of anaemia in pregnancy

#### 3.4. Anaemia awareness –beliefs & practices

It is identified in this study that cultural and/ or religious beliefs prevent pregnant women from eating certain food types. Typical food sources forbidden by their beliefs and/ or religion are eggs, snail, and beans (cowpea) with ripe plantain (see Table 2). Quite significant women (38%) claim their beliefs instill food restrictions. Though this is by far less common compared to about 66% of women in Pakistan who practice food restrictions during pregnancy because of their beliefs [15], but our finding shows an equally a worrying situation. For instance, it is worrying that half of the women do not take egg during pregnancy (see Table 2); meanwhile, egg is known to be a source of high biologic quality protein [9]. Also African snails have high values of iron, magnesium, calcium, phosphorus, potassium and sodium as minerals and also serve as good source of animal protein [28]. The staple food cowpea with ripe plantain is a good balanced diet with protein and energy, meanwhile, it is not taken by a significant number of women (33%) (see Table 2). Certainly, it is time for intensive education and awareness creation to stimulate use of locally available low-cost nutritious food and

avoiding undue food restrictions [15].

**Table 2:** Food forbidden by beliefs (culture & religion) during pregnancy

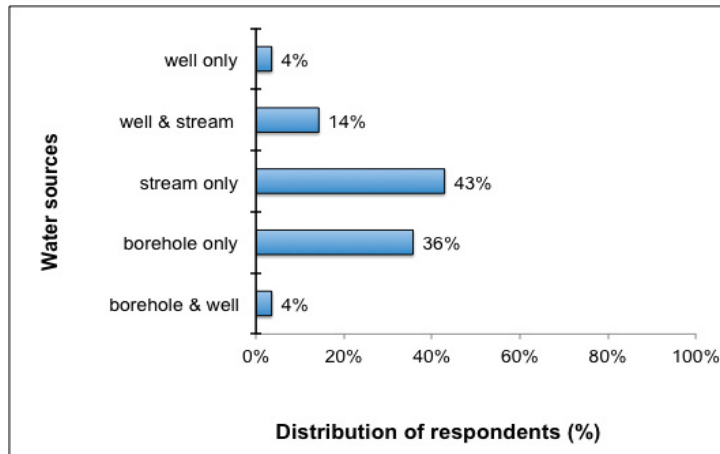
Food types forbidden	Distribution of responses (%)
Beans (cowpea) & ripe plantain	33%
Egg	50%
Snails	17%
<b>Total</b>	<b>100%</b>

The awareness levels of the causes and effects of anaemia in pregnancy are expected to correspond to relatively improved knowledge of certain approaches and practices that serve as barriers to the disease. These barriers include eating nutritious meals and preventing parasitic infections via use of intermittent preventive treatment (IPT), insecticide treated bed nets (ITBNs), deworming, improved drinking water sources and effective handwashing at critical times.

On nutrition or diet, there is very low awareness level (18%) of food sources that can fight against anaemia apart from food restrictions associated with beliefs. Meanwhile, respondents identified poor diet as the leading cause of anaemia in pregnancy. Some food sources the few respondents mentioned include animal sources (fish, meat, and eggs) and crops sources (beans, pear, cocoyam leaves and “dawadawa”). Food sources enriched with iron include fruits, meat, fish, peanuts, grains, green vegetables and others [8]. More so, consumption of fruits and vegetables can help to address the double burden of micronutrient deficiencies and chronic diseases [29, 30]. Thus, some food sources reported by respondents are potential sources of nutritional iron and other micronutrients. A very uncommon food mentioned is “dawadawa” known for not nutritional iron but other nutrients. “Dawadawa” is a local spice of fermented African locust bean (*Parkia sp.*) commonly used as a source protein (lysine), riboflavin, and fat rich flavoursome ingredient of traditional soups and stews [31, 32]. Paradoxically, among those few respondents who claim knowledge of food sources capable of fighting anaemia, most (60%) do not eat them often confirming the claim that women in Ghana hardly enjoy the best of these rich food sources [8]. Only 40% revealed that they eat the food about twice and/ or thrice in a week during pregnancy.

Most respondents (71%) reported that they have insecticide treated bed nets (ITBNs) though the best practice is all should have the nets. The situation confirms that universal ITBNs coverage is a challenge [16]. However, ITBNs ownership is higher than that found in the two largest Ghanaian cities (28% and 33%) [33], and also higher than the national ownership (20% to 47%) [26]. Among the pregnant women who have the nets, 75% do use them, thus, sleeping in the net at least the previous night before the survey day. The findings show that more education is needed on the need to own and also use ITBNs to reduce and/ or avoid malaria in pregnancy, a risk factor of maternal anaemia. Most of the pregnant women in the study have neither taken any IPT (54%) nor dewormer (61%) (their status also verified from the maternal health records) though the age of their pregnancy was not ascertained. Thus, most of the respondents are potentially at risk of parasitic infections (i.e. malaria and worm infestations). This supports the low level of national IPT and deworming status (56% and 35% respectively) of pregnant women in Ghana [26], which also makes them more vulnerable to the parasitic infections.

Meanwhile potential sources and/ or means of worm infestation are identified with the women. Such sources include use of unimproved water sources and ineffective handwashing at critical times. About 64% of the pregnant women use unimproved water sources for drinking (see Figure 4), which totally contradicts the national figure where it is quoted that between 11% and 14% depend on unimproved sources like rivers, streams, ponds, etc [34, 35]. The improved water source available is borehole and this is used by only 36% of respondents. Close to 18% of the women mix their drinking water sources, thus combining unimproved ones and/ or with the improved source (see Figure 4). In fact, the 4% who mix improved source (borehole) with well (unimproved) are considered as using unimproved water source as well. There is therefore potential health risk (i.e. worm infections) with overdependence on unimproved drinking water sources [10, 11]. Majority of the women need to be educated and sensitised to use improved water sources for good health since at least an improved water source is available.



**Figure 4:** Main drinking water sources for respondents

Most respondents (82%) do not practice effective handwashing, which involves washing of hands with water and soap or soap alternatives especially at critical times. Only 18% is found practicing effective handwashing and this figure is within the range 1 – 20% [36] as the rate of handwashing with soap after defecation (one of the critical times) in developing countries. Beside the low level of effective handwashing, most (81%) practice handwashing at only one critical time. For handwashing at multiple critical times, only 11%, 4% and 4% practice handwashing at two, three and four critical times respectively. In all, four critical handwashing times were identified with “after defecation” as the commonest (see Table 3). This study strongly shows that handwashing with soap is not a priority though it is a major strategy for infection control [36]. It is also important to note that effective handwashing is hygiene and according to Ziegelbauer et al. [11] hygiene is one of the pillars of health. Antenatal caregivers must urgently adopt and/ or intensity effective handwashing campaigns targeting behavioural change among pregnant women.

**Table 3:** Hand washing at critical times

Critical times	Distribution of responses (%)
After defecation	76%
Before eating	15%
Before cooking	6%
After farm	3%
<b>Total</b>	<b>100%</b>

#### 4. Conclusions

The pregnant women fall within the national reproductive age group and on the average they have three successful births with normal birth intervals. Respondents largely show high anaemia awareness levels by attempting to: define the disease in their laypersons’ understanding; giving some symptoms; and also identifying some causes and effects as well. Few have no idea about the causes and effects of anaemia. Poor diet is the commonest known cause of the disease followed by malaria, then worm infestations and others. Contrary to the high consciousness that poor diet is the number one cause of anaemia in pregnancy, there is limited knowledge of food sources that can help fight the disease. Also among the minority who claim knowledge of food sources against anaemia, less than half of them eat such food during pregnancy. Cultural and religious beliefs on food restrictions exist among the pregnant women. Such beliefs are identified as robbing fairly a significant number of women of essential nutrients including iron via their food restrictions. The levels of ownership and use of insecticide treated bed nets (ITBNs) are not impressive. Over a quarter of respondents do not have the bed nets and among those who have the bed nets a quarter do not use them. Meanwhile, most of the women have not taken their intermittent preventive treatment (IPT). There is also overdependence on unimproved drinking water

sources coupled with significant lack of effective handwashing practices (i.e. washing with soap or soap alternatives) at critical times. On top of that, most respondents have not been dewormed yet, predisposing them to infections from poor water sources and ineffective handwashing practices.

There is therefore health risks (including anaemia) among the pregnant women given the existing practices since barriers to malnutrition (knowing and eating nutritious food); and parasitic infections like malaria and worms (especially hookworm) via use of ITBNs, IPTs, deworming, improved drinking water sources and effective handwashing are compromised. Though anaemia awareness levels are high, the women's understanding on the barriers that can be used to fight against the disease has to be deepened. Continuous education and sensitization on locally available and low cost nutritious food, avoiding parasitic infections, and discouraging undue food restrictions from beliefs is highly recommended. Subsequent studies of this nature should attempt to establish anaemia status of pregnant women existence of any relationships with awareness level and practices.

### Acknowledgment

The authors wish to acknowledge the support of District Health Management Team and the Senior Midwife Mrs. Alice Nkrumah, who is also the officer in charge of the Health Centre. We are also grateful to the respondents who willingly participated in the survey by allowing us to follow them to their houses.

### References

1. Gallowaya, R., Duschb, E., Elderc, L., Achadid, E., Grajedae, R., Hurtadoe, E., Favinf, M., Kananig, S., Marsabanh, J., Medai, N., Mooref, K. M., Morisonj, L., Rainak, N., Rajaratnaml, J., Rodriquezm, J. & Stephenn, C. (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. *Social Science & Medicine*, 55, 529-544.
2. Mannar, M. G. V. (1999). Designing effective programmes to prevent and control iron deficiency anaemia. *SAMJ*, 89, 23-26.
3. Thomson, J. (1997). Anaemia in pregnant women in eastern Caprivi, Namibia. *SAMJ*, 87, 1544-47.
4. Kweku, M., Liu, D., Adjuik, M., Binka, F., Seidu, M., Greenwood, B. & Chandramohan, D. (2008). Seasonal intermittent preventive treatment for the prevention of anaemia and malaria in Ghanaian children: a randomized, placebo controlled trial. *PLoS One*, 3, e4000.
5. Baidoo, S. E., Tay, S. C. K., Obiri-Danso, K. & Abruquah, H. H. (2010). Intestinal helminth infection and anaemia during pregnancy: A community based study in Ghana. *Journal of Bacteriology Research*, 2, 9-13.
6. Hurrell, R. F. (1997). Preventing Iron Deficiency Through Food Fortification. *Nutrition Reviews*, 55, 210-222.
7. Mockenhaupt, F. P., Rong, B., Günther, M., Beck, S., Till, H., Kohne, E., Thompson, W. N. A. & Bienzle, U. (2000). Anaemia in pregnant Ghanaian women: importance of malaria, iron deficiency, and haemoglobinopathies. *Trans R Soc Trop Med Hyg.*, 94, 477-483.
8. Agyei, L. A. (2004). Anaemia in pregnancy is preventable [online]. Ghana News Agency Thursday, 29 April 2004.
9. Lammi-Keefe, C. J., Couch, S. C. & Philipson, E. H. (eds.). (2008). *Handbook of nutrition and pregnancy*. Humana Press: New Jersey, USA; pp. 307-357.
10. Balen, J., Raso, G., Li, Y. S., Zhao, Z. Y., Yuan, L. P., Williams, G. M., Luo, X. S., Shi, M. Z., Yu, X. L., Utzinger, J. & Mcmanus, D. P. (2011). Risk factors for helminth infections in a rural and a peri-urban setting of the Dongting Lake area, People's Republic of China. *Int J Parasitol*, 41, 1165-73.
11. Ziegelbauer, K., Speich, B., Mausezahl, D., Bos, R., Keiser, J. & Utzinger, J. (2012). Effect of sanitation on soil-transmitted helminth infection: systematic review and meta-analysis. *PLoS Med*, 9, e1001162.
12. Dim, C. C. & Onah, H. E. (2007). The Prevalence of Anemia Among Pregnant Women at Booking in Enugu, South Eastern Nigeria. *MedGenMed.*, 9, 11.
13. Nag, M. (1994). Beliefs and practices about food during pregnancy: Implications for maternal nutrition. *Economic and Political Weekly*, 29, 2427-2438.
14. Raven, J. H., Chen, Q., Tolhurst, R. J. & Garner, P. (2007). Traditional beliefs and practices in the postpartum period in Fujian Province, China: a qualitative study. *BMC Pregnancy Childbirth*, 7, 8.
15. Mahmood, S., Atif, M. F., Mujeeb, S. S. A., Bano, N. & Mubasher, H. (1997). Assessment of Nutritional Beliefs and Practices in Pregnant and Lactating Mothers in an Urban and Rural Area of Pakistan. *JPMA*, 47.
16. Pell, C., Straus, L., Andrew, E. V., Menaca, A. & Pool, R. (2011). Social and cultural factors affecting uptake of interventions for malaria in pregnancy in Africa: a systematic review of the qualitative research.



- PLoS One*, 6, e22452.
17. GHS, Ghana Health Service (2012). The Health Sector in Ghana: Facts and Figures 2010. Health Service, Ministry of Health: Accra, Ghana.
  18. GHS, Ghana Health Service. (2007). Reproductive Health Strategic Plan 2007-2011. In: HEALTH, R. A. C. (ed.). Ghana Health Service: Accra, Ghana.
  19. Zimmermann, M. B. & Hurrell, R. F. (2007). Nutritional iron deficiency. *The Lancet*, 370, 511-520.
  20. Hommerich, L., Von Oertzen, C., Bedu-Addo, G., Holmberg, V., Acquah, P. A., Eggelte, T. A., Bienzle, U. & Mockenhaupt, F. P. (2007). Decline of placental malaria in southern Ghana after the implementation of intermittent preventive treatment in pregnancy. *Malar J.*, 6, 144.
  21. Shulman, C. E., Dorman, E. K., O.Talisuna, A., Lowe, B. S., Nevill, C., Snow, R. W., Jilo, H., Peshu, N., Bulmer, J. N., Graham, S. & Marsh, K. (1998). A community randomized controlled trial of insecticide-treated bednets for the prevention of malaria and anaemia among primigravid women on the Kenyan coast. *Tropical Medicine and International Health*, 3, 197-204.
  22. Nganda, R. Y., Drakeley, C., Reyburn, H. & Marchant, T. (2004). Knowledge of malaria influences the use of insecticide treated nets but not intermittent presumptive treatment by pregnant women in Tanzania. *Malar J.*, 3, 42.
  23. Browne, E. N. L., Maude, G. H. & Binka, F. N. (2001). The impact of insecticide-treated bednets on malaria and anaemia in pregnancy in Kassena-Nankana district, Ghana: a randomized controlled trial. *Tropical Medicine and International Health*, 6, 667-676.
  24. Cheng, J. J., Schuster-Wallace, C. J., Watt, S., Newbold, B. K. & Mente, A. (2012). An ecological quantification of the relationships between water, sanitation and infant, child, and maternal mortality. *Environ Health*, 11, 4.
  25. Ghana Districts (2006). Brong Ahafo-Tano South: Health Sector. Ghana Districts: Accra, Ghana, 2006. Available at [http://ghanadistricts.com/districts/?r=10&\\_=&sa=1689](http://ghanadistricts.com/districts/?r=10&_=&sa=1689) [accessed 13 September 2013]
  26. GSS, Ghana Statistical Service, GHS, Ghana Health Service & ICF MACRO. (2009). Ghana Demographic and Health Survey 2008: Key Findings. Calverton: Maryland, USA & Statistical Service: Ghana; pp. 1-17.
  27. Balducci, L. (2003). Anemia, Cancer, and Aging. *Cancer Control*, 10, 478-486.
  28. Fagburo, O., Oso, J. A., Edward, J. B. & Ogunleye, R. F. (2006). Nutritional status of four species of giant land snails in Nigeria. *J Zhejiang Univ Sci B.*, 7, 686-9.
  29. Shackleton, C. M., Pasquini, M. W. & Drescher, A. W. (eds.) (2009). *African Indigenous Vegetables in Urban Agriculture*, Earthscan: London, UK; pp. 74 – 88.
  30. Faber, M., A., O., Pj., V. J., Fam, W. & Rensburg, J. V. (2010). African leafy vegetables consumed by households in the Limpopo and KwaZulu-Natal provinces in South Africa. *S Afr J Clin Nutr.*, 23, 30-38.
  31. Campbell-Platt, G. (1980). African locust bean (parkia species) and its west african fermented food product, dawadawa. *Ecol Food Nutr*; 9, 123-132.
  32. Esenwah, C. N. & Ikenebomeh, M. J. (2008). Processing effects on the nutritional and anti-nutritional contents of African locust beans (*Parkia biglobosa* Benth.) seed. *Pakistan Journal of Nutrition*, 7, 214-17.
  33. Klinkenberg, E., Mccall, P. J., Wilson, M. D., Akoto, A. O., Amerasinghe, F. P., Bates, I., Verhoeff, F. H., Barnish, G. & Donnelly, M. J. (2006). Urban malaria and anaemia in children: a cross-sectional survey in two cities of Ghana. *Trop Med Int Health*, 11, 578-88.
  34. GSS, Ghana Statistical Service (2012). 2010 Population & Housing Census: Summary Report of Final Results. Ghana Statistical Service: Accra, Ghana; pp. 16.
  35. UNICEF and WHO (2012). Progress on Drinking Water and Sanitation: 2012 Update. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation: New York, US; pp. 43.
  36. Curtis, V. & Cairncross, S. (2003). Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *Lancet Infect Dis*, 3, 275-81.

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE's homepage:

<http://www.iiste.org>

## CALL FOR JOURNAL PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There's no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** <http://www.iiste.org/journals/> The IISTE editorial team promises to review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request of readers and authors.

## MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Recent conferences: <http://www.iiste.org/conference/>

## IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

