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Health Personnel in the Central Region Perceptions of Anemia in Pregnancy

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Abstract: *The review paper visualizes health personnel in the Central Region's perceptions of anemia in pregnancy. The review presented the context of the key concepts of the research study. Knowledge of health professionals on AIP, health professionals' perceptions of the management of AIP, and effects of the knowledge on the management of AIP, The review begins with the definition of AIP and AIP, prevalence, and AIP as a public health problem in Ghana. Further, there was a review on the treatment and management of AIP with observed prose. The causes of AIP include environmental, behavioral, and social factors that limit the adequate nutrient intake and absorption or exposure to infectious diseases. However, the observed literature and the results of this research may be enriched by doing a study that is a replication of this study and that investigates this issue utilizing the mixed methods methodology. In addition, qualitative research might be carried out to investigate the reasons behind the negative association that was shown to exist between home characteristics, socio-cultural belief patterns of health workers, and the management of AIP in certain health facilities in Ghana and elsewhere.*

Keywords: *anemia, AIP, anemia in pregnancy, health personnel, Central Region*

1. Introduction

Anaemia in pregnancy (AIP) has been defined as a condition of a pregnant client having less than the normal number of red blood cells or less than the normal quantity of hemoglobin in the blood. The oxygen carrying capacity of the blood is therefore decreased (WHO, 2016). In clinical terms, AIP is manifestations of Hemoglobin< 11g/dl and some pale manifestations in the pregnant woman. Further, WHO (2016), defines AIP as the state whereby a pregnant woman is disagnosed of an Hb concentration below 11 g/dl in the first half of pregnancy or 10.5 g/dl in the second half of pregnancy. Additionally pregnant women with categorised AIP into mild AIP (Hb = 10-10.9g/dl), moderate AIP (Hb = 7.0-9.9g/dl) and severe AIP (Hb < 7g/dl). AIP has both short- and long-term consequences such as preterm, low birth weight, morbidity and mortality (Black, et al., 2011; World Health Organization, 2015 & 2016; Kassa, Muche, Berhe & Fekadu, 2017). In 2016, WHO estimated that AIP affected 38.2% of pregnant women globally, with the highest prevalence in South-East Asia (48.7%) and Africa (46.3%) (WHO, 2016; Tadesse, et al, 2017). AIP affects about 1.62 billion people, 56 million of whom are pregnant women (WHO, 2016).

In Ghana, a national Demographic and Health Survey in 2014 determined that 42% of pregnant women were anaemic compared to 70% in rural parts of the country (Ghana Statistical Service, Ghana Health Service, and ICF International, 2015). Several causes have been attributed to AIP (WHO, 2016). In addition, AIP risk is related to household-level factors such as access to water and sanitation, availability of health services, access to diverse food sources, use of insecticide treated nets and knowledge about AIP prevention. Other household- or community-level factors include socioeconomic status, culture, wealth – status and education attainment (Ngnie-teta, Kuate-defo & Receveur, 2008; WHO, 2016).

Urassa, Carlstedt, Nystrom, Massawe & Linmark (2002) established a causal relationship between ANC attendances, AIP cases in a health facility and competent management of AIP by health professionals. This study affirmed the findings of Venkatramana, Nazia and Ismail (2017) and Adokiya, Aryeetey, Yost, Jones & Wilson (2019) that there are causal linkages between the above variables as investigated by Urassa, Carlstedt, Nystrom, Massawe & Linmark (2002).

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From the DHMIS 2 (2018) the Central region has experienced rising levels of ANC attendance and simultaneous increase in anaemic cases in their health facilities, Which goes back to support the findings of Venkatramana, Nazia and Ismail (2017) and Adokiya, Aryeetey, Yost, Jones and Wilson (2019), Urassa, Carlstedt, Nystrom, Massawe & Linmark (2002).

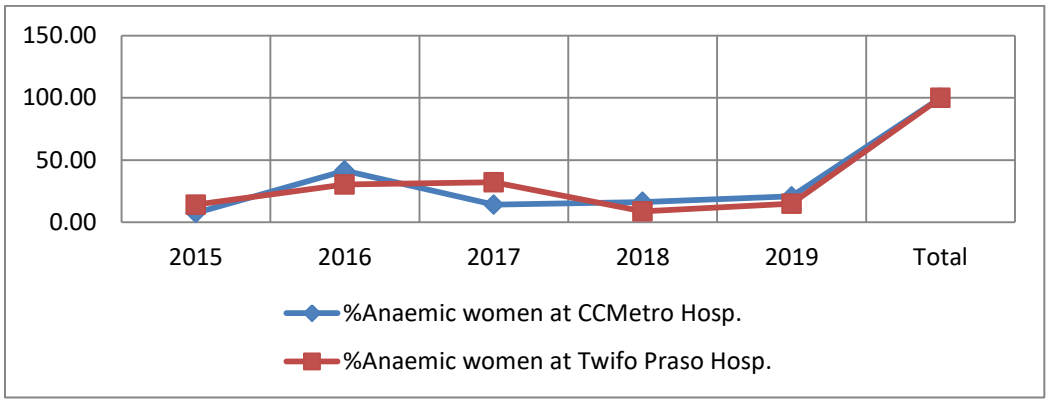

Figure 1: Percentage of anaemic women who attended ANC clinic between 2015 – 2019 at Cape Coast Metro Hospital and Twifo Praso Hospital.

The Cape Coast Metro Hospital and Twifo Praso Hospital has also seen a rise in ANC attendance and simultaneous rise in anemic cases from 2015 – 2019 as depicted in Figure 1 and 2 respectively.

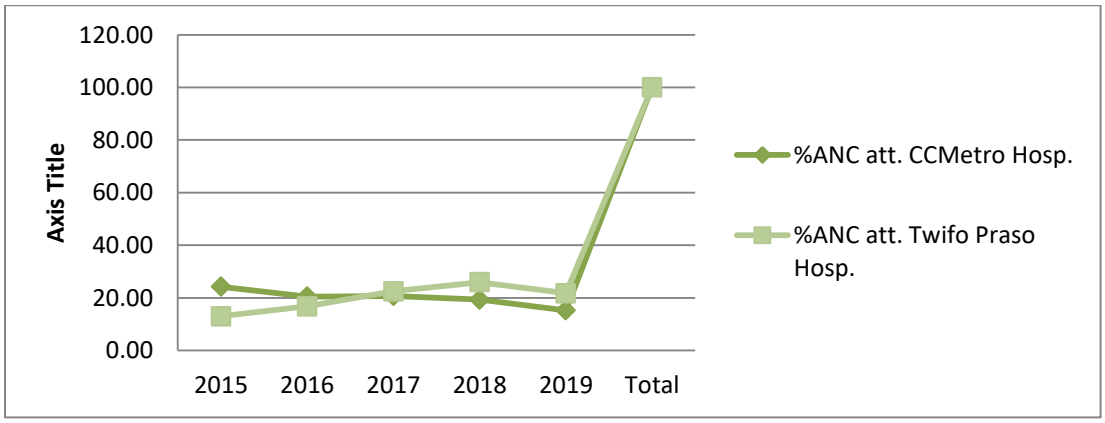

Figure 2: Percent of women who attended ANC clinic between 2015 – 2019 at Cape Coast Metro Hospital and Twifo Praso Hospital

As indicated by the figures 1 & 2 the causal linkages established in prior studies reviewed in the background show that the missing link had been the perception of health professionals on management of AIP as argued succinctly by Venkatramana, Nazia and Ismail (2017). Therefore, this study was investigating the perception of health professionals in the selected health facilities in the Central region (i.e Cape Coast metro and Twifo Praso Hospital). This study is to fill the empirical gap identified from the empirical literature reviewed in the background of this study.

2. Anaemia AND Anaemia in Pregnancy (AIP)

Defining Anaemia

AIP is described based on either haemoglobin (Hb) or haematocrit (Hct) concentration in an individual (Mackerras & Singh, 2007). Nonetheless WHO (2015) explains AIP as a medical disorder in which the number and size of RBC, or the Hb concentration falls below an established threshold. In other words, if the oxygen carrying capacity of the blood is insufficient to meet physiologic needs in an

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individual, AIP develops. In a study to provide clear-cut definition of AIP, it was documented that pregnancy, altitude, cigarette smoking and possibly ethnicity must be accounted for whenever Hb is used to define AIP (Sullivan, Mei, Grummer-Strawn & Parvanta 2008).

Defining Anaemia in Pregnancy

During pregnancy, AIP is defined as Hb concentration below 11.0 g/dl or haematocrit level below 33% at sea level (WHO, 2002). It is usually two standard deviations below the mean Hb expected (Goonewardene et al., 2012). Hb levels differ within pregnancy due to physiological heamodilution which is highest during 20 to 24 weeks of gestation (Goonewardene et al., 2012).

According to WHO (2002) AIP is Hb concentration below 11 g/dl in the first half of pregnancy or 10.5 g/dl in the second half of pregnancy. WHO additionally categorised AIP into mild AIP (Hb = 10-10.9g/dl), moderate AIP (Hb = 7.0-9.9g/dl) and severe AIP (Hb < 7g/dl).

Clinical Features of AIP

Many AIP initially are asymptomatic. Usually diagnosis of AIP is achieved through antenatal routine Hb check, but AIP may exist over a long period since pregnant women adjust to the symptoms without realising it (Sam-Wobo, Akinboroye, Anosike, & Adewale, 2008). The signs and symptoms are non-specific and difficult to detect. The clinical symptoms are severe in the presence of comorbid conditions (Peterson, Cornacchia, & General, 2017). Tissue hypoxia due to low Hb in pregnancy accounts for symptoms such as fatigue, dyspnoea, lack of appetite and paleness of skin and mucous membranes with more severe manifestations of tachycardia, congestive heart failure and jaundice (Peterson et al., 2017).

Types of AIP

The various types of AIP identified from literature include nutritional AIP, iron deficiency AIP, folic ac id deficiency AIP, vitamin B12 deficiency AIP, vitamin A deficiency AIP, sickle cell AIP and AIP due to soil transmitted helminth, malaria, HIV, and schistosomiasis (Balarajan, Ramakrishnan, Özaltin, Shankar, & Subramanian, 2011).

Nutritional AIP

According to Bendich (2008), nutritional AIPs are consequences of inadequate consumption of nutrients or their non-availability to support the production of erythrocytes and Hb in the individual. Inadequate nutrient intake could be due to changes in food preparations overtime or physiological changes in women such as pregnancy (Freire, Kahn, McGuire, & Post, 2003). Cereal and green leafy diets are being exposed to more heat during food preparations, thereby loosing nutrients such as iron, vitamin B12, and folic acid, which support Hb production (Karaoglu et al., 2010). Also, studies have shown that nutrients such as vitamin C that helps in the absorption of iron are inadequately consumed (Ramakrishnan, 2017). Besides other food products such as polyphenols (for example spices, coffee and tea), phytates (for example whole grains and legumes) and calcium from dairy food products inhibit iron absorption but are increasingly consumed by people who may even be at risk of AIP (Hurrell, Reddy, & Cook, 1999). Also micronutrient absorption that supports production of Hb and RBCs may be inhibited in the presence of some disease processes (e.g. peptic ulcer disease) (Muhsen & Cohen, 2008).

Iron Deficiency AIP

The iron deficiency usually results from imbalanced iron levels due to poor consumption of nutritious foods, higher iron demands in pregnancy, iron loss through menstruation and poor absorption of iron and worm infestation (WHO, 2014, Keshav & Stevens, 2017). Iron plays very significant role in various biological processes. It is an essential component of Hb molecule. Non-availability of iron leads to very low haemoglobin levels and this result in hypochromic microcytic AIP (Pavord et al., 2012). Usually children and women are susceptible to AIP due to developmental demands and physiological need of more iron for growth, but iron is inadequately absorbed. Majority of these women tend to loose large amounts of iron during their monthly menstruation (Nguyen et al., 2015). Also pregnancy physiology requests

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more iron to sustain the placental unit for foetal survival (Bothwell, 2000). AIP is widely being experienced by women in richer countries compared to poorer countries, but inadequate iron consumption especially in pregnancy aggravates its severity (Arifulla et al., 2013).

Folic Acid Deficiency AIP

According to Perry and Morrison (2004), folic acid is essential for the production and growth of RBC but inadequate levels of folate in the individual change the structure and function of red blood cells and even its death leading to megaloblastic AIP. Studies show that, pregnant women need more folate in pregnancy because those who had low folate prior to pregnancy develop megaloblastic AIP (Goonewardene et al., 2012).

Vitamin B12 Deficiency AIP

Vitamin B12 is mainly derived from animal products. The body needs Vitamin B12 for erythropoiesis and studies show that lack or inadequate vitamin B12 levels lead to erythrocyte loss resulting in megaloblastic AIP (Satyam & Khushbu, 2015). A study conducted by Casey et al. (2010) measured vitamin B12 levels to determine whether it contributes to AIP or not. The result was that 25% of those with low vitamin B1 levels were anaemic (Casey et al., 2010). Vitamin B12 deficiency affects many individuals, but a real global estimate has not been identified. However, some studies reported at least 40% and 70% prevalence in both children and adults in South America and Africa respectively (Casey et al., 2010; de Silva, Sirisena, Gunasekera, Ismail, & de Silva, 1999). Furthermore, it is unknown how vitamin B12 contributes to development of AIP especially in pregnancy though some information points to its haematological effect in the general population (de Silva et al., 1999).

Vitamin A Deficiency AIP

Vitamin A deficiency is due to inadequate consumption carotenoids from fruits, vegetables and meat (Freire et al., 2003). A study reported 21% children and 6% pregnant women lack vitamin A, leading to higher mortalities among children and pregnant women globally (Scholl, 2011).. Studies have shown that Vitamin A is very crucial in erythropoiesis, improvement of Hb concentration and increase effectiveness of iron consumption (Oppenheimer, 2001). Unfortunately this mechanism is also unclear though studies suggested that vitamin A helps in iron absorption which stimulates the bone marrow for the production of RBCs (Perry & Morrison, 2004).

Prevalence of AIP

In Africa, AIP affects 57% pregnant women and 48% non-pregnant women exposing women to higher risk of morbidity and mortality (Munasinghe & Broek, 2006). Sub-Saharan African countries with the highest AIP prevalence include Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Niger, Senegal, and Togo (Stevens et al., 2013). A study in Dhaka city on associated factors with maternal AIP, reported that 63% of study participants had normal Hb level but 37% had Hb below 11g/dl, 26% were mildly anaemic while 11 % were moderately anaemic (Chowdhury et al. 2015). There was no record of severe AIP.

According to Meda et al. (1999), prevalence of AIP in Burkina Faso was 66%. Those who had mild AIP were 30.8%, 33.5% participants were moderately anaemic and 1.7% had severe AIP. Another study in Enugu, Southeast Nigeria on the prevalence of AIP at ANC registration to determine factors associated with its occurrence, reported 64.1% prevalence of AIP (Ezugwu, Mbah, Chigbu, & Onah, 2013). About 95% of pregnant women in this study were mildly anaemic, 4.3% were moderately anaemic and 1.1% was severely anaemic (Ezugwu et al., 2013). A similar study on prevalence of AIP and sociodemographic factors in Aurangabad city, India also identified 87% prevalence AIP (Lokare, Gattani, Karanjekar, & Kulkarni 2012).

In Ghana, WHO estimated 56% of women in their reproductive age (15-49) to be anaemic whereas those pregnant with AIP were estimated at 62% prevalence, classifying Ghana as one of the countries with severe public health implication (WHO, 2015). Moreover, Ghana Demographic Health Surveys (GDHS) in 2003, 2008 and 2014, recorded 65%, 70% and 45% prevalence of AIP respectively (GSS, GHS, & ICF International, 2015b; GSS, GHS, & ICF

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Macro, 2009; GSS, NMIMR, & ORC Macro, 2003). A study in Sekyere West district of Ghana on AIP determinants using Hb threshold of Hb <10g/dl, indicated that 57.1% of respondents were anaemic (Owusu, Akanmori, & Glover-Amengbor, 2005). Another study among pregnant women at Sunyani municipal hospital using a cut-off value of Hb<11.0g/dl showed 41.5% prevalence of AIP (Anlaakuu & Anto, 2017).

AIP as Public Health Problem in Ghana

Globally AIP is known as a public health challenge that affects the health and wellbeing of women and children and socioeconomic development of nations (Scott, Chen-Edinboro, Caulfield, & Murray-Kolb, 2014). Studies have shown that, all countries have some level of AIP as a public health problem (McLean, Cogswell, Egli, Wojdyla, & De Benoist, 2009). More than 80% of countries worldwide have moderate to severe public health significance of AIP (McLean et al., 2009). The prevalence of AIP as a public health challenge is categorized into mild, moderate and severe. Countries with less than 5% prevalence have no public health problem, but those with 5% -19.9% prevalence of AIP have mild public health problem and others with 20% - 39.9% prevalence, have moderate public health problem (McLean et al., 2009). Significantly, those countries with higher than 40% prevalence are classified as countries with severe public health problem, of which Ghana is one (McLean et al., 2009). The table 2.1 below shows classification of AIP as public health problem.

Table 1: Classification of AIP as Public Health Problem

Prevalence of AIP (%)	Category of Public Health Significance
≤4.9	No public health problem/Normal
5.0–19.9	Mild public health problem
20.0–39.9	Moderate public health problem
≥40.0	Severe public health problem

Source: Lynch (2007) as cited in Scott, Chen-Edinboro, Caulfield and Murray-Kolb (2014)

Determinants of AIP

AIP is not considered a disease but a crucial indicator of many disease conditions (McLean, Cogswell, Egli, Wojdyla, & De Benoist, 2009). There are many underlying factors contributing to AIP in pregnant women (Onyeneho & Igweonu, 2016).

Knowledge of these factors is very crucial in prevention and control of AIP effectively among vulnerable groups (Ikeanyi & Ibrahim, 2015). AIP results from varied causes that can be isolated, but generally coexist. Largely, 50% of all cases of AIP are assumed to occur from iron deficiency, however different populations report different proportion according to numerous indigenous contributing factors/causes (World Health Organization, 2014). Several studies however recognise iron deficiency as the most common cause of AIP (Anlaakuu & Anto, 2017; Macdonald et al., 2010).

Other causes of AIP pregnancy include antepartum haemorrhage, parasitic infections like hookworms and schistosomiasis (WHO, 2013). Other infectious diseases such as TB, HIV/AIDS and malaria also reduce blood Hb concentrations (Balarajan et al., 2011; Goonewardene et al., 2012). The risk of AIP is increased by the presence of haemoglobinopathies and micronutrient deficiencies (McLean et al., 2009).

Helminth Infections in Pregnancy

Balarajan et al. (2011) reported that approximately one billion people are infected with hookworms which results in intestinal bleeding. This significantly contributes to moderate and severe AIP (Gillespie & Johnston, 1998). In worm infestation, there is attachment of the adult worm to the linings of the small intestine leading to destruction of capillaries and arterioles. The worm then secretes anticlotting agents and ingests blood. When the loss of blood becomes more than iron reserve of the individual through the activities of the worm, hookworm infection results leading to iron deficiency AIP (Goonewardene et al., 2012). Goonewardene et al. (2012), reported on hookworm infection in 12

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studies that considered deworming during pregnancy. They reported that those women who had light hookworm infection had lower Hb level compared with women without hookworm infection (OR=0.24, 95% CI: 0.36 – 0.13). Pregnant women with helminth infections in Ethiopia had higher odds of AIP (Mengist et al., 2017).

In Ghana, helminth infections were identified as factors associated with AIP (Strengthening Partnerships, Results, and Innovations in Nutrition Globally & Ghana Health Service, 2016). Studies reported that prophylactic treatment of hookworms using single dose Albendazole (400mg) reduces the occurrence of AIP in localities where AIP is a severe public health problem (Smith & Brooker, 2010; WHO, 2016).

Malaria in Pregnancy

It was reported that women with their first pregnancy in vulnerable localities of malaria infection are more susceptible to severe AIP (WHO, 2014). Malaria is known to cause an overwhelming burden on Africa (Menaca et al., 2013). According to Munasinghe and Broek (2006), about 1-3 million deaths occur due to malaria in Africa. It was estimated that malaria accounts for 10% of diseases in Africa (Getahun et al., 2017).

In endemic regions such as Ghana, malaria infection has been known as the most cause of parasitic infections in our hospitals accounting for higher morbidity among pregnant women and children (Strengthening Partnerships, Results, and Innovations in Nutrition Globally & Ghana Health Service, 2016). Malaria causes unpredictable AIP with Hb below 5g/dl or a little less than 11g/dl. This is due to weakened immunity and frequent breakdown of RBCs during malaria infection in pregnancy. It has been found that the simultaneous increased RBCs breakdown and low production of RBCs in pregnancy aggravates AIP (Douglas et al., 2013).

Primigravidae women stand the highest risk of developing malaria in pregnancy, and its subsequent morbidity patterns. The risk decreased with increased number of the etiologic factors responsible for AIP. The findings from studies that prophylactic treatment of malaria in pregnancy with IPTp-SP reduces severe AIP, suggests that malaria and AIP are significantly related (Verhoeff et al., 1999).

The most causative organism of malaria that leads to severe AIP, and subsequent hypoxia and congestive heart failure is Plasmodium falciparum (Douglas et al., 2013). The use of ITNs while pregnant is advantageous in controlling AIP (Messick, 2015). Pregnant women who had malaria infections in Ethiopia had higher odds of AIP (Mengist et al., 2017). Studying predictors of AIP in Uganda, the odds of AIP was 1.32 for pregnant women who had malaria infection (Ononge, Campbell, & Mirembe, 2014). Studies in Ghana revealed that malaria in pregnancy contributed more to AIP because most mothers who tested positive for malaria in pregnancy were also seen to be anaemic (Intiful et al., 2016; Stephens et al., 2014).

HIV/AIDS in Pregnancy

There is a strong association between HIV infection and AIP, mainly in Africa; those who have HIV/AIDS have higher chance of developing severe AIP (Uneke, Duhlinska, & Igbinedion, 2007). More than 70% of individuals who are anaemic had acquired immunedeficiency syndrome (AIDS) (Ramakrishnan, 2017). Women and children in sub-Saharan Africa are more vulnerable to developing HIV/AIDS related to AIP (Garg & Bharambe, 2015).

AIP may develop among HIV/AIDS patients due to chronic diseases, anti-red cell antibodies, medication overdose and lack or inadequate intake of nutritious foods (Parinitha & Kulkarni, 2012). Those who were haemotransfused to treat AIP were at higher risk of HIV infection from donors' blood where adequate systems are not in place to screen blood before transfusion, but over a decade ago the risk had greatly reduced due to improved screening strategies adopted by health facilities (Parinitha & Kulkarni, 2012).

Nandlal et al. (2014) in their study found out that HIV infection was associated with AIP as AIP was common among women whose cluster of differentiation 4 (CD4) count was below 200 cells/mm3. In another study to determine the effect of HIV severity on AIP, Meda et al. (1999)

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reported that AIP was more common among women with HIV (78.4%) than women without HIV (64.7%).

Consequences of AIP

A reduction in Hb concentration below acceptable levels can be detrimental to mother and foetus (McLean et al., 2009). Asphyxia, preterm delivery, neonatal AIP, low birth weight, intrauterine growth restriction and perinatal mortality are associated with AIP (Kalaivani, 2009). Pregnant women experience low physical activity and they are at bigger risk of morbidity and mortality, especially in those with severe AIP (De Benoist, McLean, & Egli, 2005).

A study in northern Tanzania noticed that birth weight of babies born to women with severe AIP was 2.30kg less than women without AIP. The risk of LBW increased with severity of AIP. Compared with non-anaemic women, the risk for low birth weight was 1.3 times higher in women with mild AIP, 1.7 times higher among moderately anaemic women and 5.3 times increased in women with severe AIP (Msuya, Hussein, Uriyo, Sam, & Stray-Pedersen, 2011). Severe AIP needs critical medical treatment and attention but Hb < 4.0g/dl in pregnancy is an emergency situation which puts the pregnant woman at risk of congestive cardiac failure (Goonewardene et al., 2012).

Management and Treatment of AIP

Public health interventions which are effective at controlling AIP include iron supplementation, malaria control interventions and de-worming. Iron supplementation programs have been found to reduce AIP even though evidence from their success is not conclusive (Stoltzfus, 2001, Scholl, 1994, Palupi, 1997). Iron supplementation during pregnancy reduces AIP and improves infant outcomes. Children of Indonesian mothers taking iron supplements during pregnancy had a decreased risk of dying in their first five years of life with a 40% decreased risk of dying in the first day of life (Dibley et al., 2012).

Studies that administered iron supplements during pregnancy resulted in substantial impacts–reducing neonatal mortality by half in China (Zeng et al., 2008) and tremendously decreasing the risk of death in the first seven years of life (Christian et al., 2009). To achieve results in preventing the consequences of AIP, an integrated package of interventions needs to be delivered at-scale to address all the causes of AIP. Adequate micronutrient intake has important benefits for both mothers and their children. Breastfeeding children benefit from micronutrient supplementation that their mothers receive, especially iron supplementation and vitamin A for women during pregnancy. Iron supplement protect the mother and infant against AIP. And it is considered a major cause of perinatal and maternal mortality.

Folic acid is of crucial importance in early pregnancy to help protect against neural tube defects (Andrew et al., 2015) as there is an inverse dose relationship between folate status and risk of neural tube defects (Messina et al., 2014). It is recommended that women planning to get pregnant should take daily dose of 5mg of folic acid. Rich sources of folate include meat, mushrooms, green leafy vegetables, yam, roots, etc. (Thomas & bishop, 2007).

The management of iron deficiency AIP also includes intake of fish, meat, and poultry and decrease intake of coffee and tea (Zeng et al., 2012). There is a considerable potential to reduce the impact of AIP by treating pregnant women with anthelminthic drugs in areas where hookworm infestation is common (Getachew, 2013).

Malaria and AIP treatment

Infection is the next common cause of AIP and malaria is of significant public health concern. This is common in sub-Sahara Africa with significant risk to both mother and foetus. Malaria is a life-threatening condition caused by parasites that are spread to people through the bites of infective female mosquitoes. About 3.2 billion persons, almost half of the world's population are vulnerable to malaria and pregnant women, young children, and non-immune travellers who reside in malaria-free areas are most vulnerable to getting the disease when they become infected (WHO, 2005). For pregnant women living in moderate to high transmission settings, WHO recommends

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intermittent preventive treatment (IPT) with sulfadoxine-pyrimethamine (SP) after quickening at each scheduled antenatal visit after the first trimester and Coartem for use in the second and third trimesters (WHO, 2012).

In pregnant women, there is sequestration of infected erythrocytes in the inter-villous space which causes local inflammatory process which is usually referred to as inflammatory placental malaria (Nosten et al., 2004). This process disturbs exchange between mother and foetus leading to abortions, still birth, low birth weight and infant mortality (Menendez et al., 2000). A study conducted in Congo by Messina et al., (2013) to investigate factors that drive AIP revealed that AIP is common among pregnant women with malaria. In this study the majority of pregnant women (60%) with malaria had AIP compared to their no pregnant counterparts.

Every year, up to 200,000 infant deaths are attributed to malaria during pregnancy (Ismail et al., 2000). Maternal AIP consequently leads to increase incidence of maternal mortality during pregnancy. It is estimated that about 25% of pregnant women are infected with malaria parasite with the greater risks to primiparous young adults and comorbidity such as infection with HIV (Shantz Dunn et al., 2009). Malaria during pregnancy reduces birth weight, and low birth weight is a major determinant of infant mortality. Between 1993 and 1996, a cohort of 1,495 mothers and their infants were followed weekly from admission of the mother to antenatal clinics until the infant is one year of age. Both falciparum malaria and vivax malaria during pregnancy were associated with low birth weight but did not shorten gestation. Febrile illness in the week before delivery was associated with premature birth. Preterm and full-term low birth weight and fever in the week before delivery were associated with neonatal mortality.

Maternal fevers close to term were also associated with the deaths of infants aged between 1 and 3 months, whereas no risk factors could be identified for deaths that occurred later in infancy. Thus, malaria during pregnancy increased neonatal mortality by lowering birth weight, whereas fever in the week before birth had a further independent effect in addition to inducing premature birth. The prevention of malaria in pregnancy and, thus, of malaria-attributable low birth weight should increase the survival of young babies (WHO, 2008).

The major adverse effect of malaria in pregnancy on the mother is AIP. In malaria prone areas, malaria and AIP are likely to act together to reduce birth weight. Their independent effects are difficult to distinguish. In a study conducted in a highly malarious area of Papua New Guinea, severe maternal AIP was associated with low birth weight in primigravidae, whereas there was no obvious consistent association between parasite positivity and low birth weight (Brabin, 1990). A more recent study that was conducted in the same country, which attempted to quantitate the separate effects of AIP- and malaria attributable low birth weight, concluded that, in malarious areas, malaria was a more important risk factor for low birth weight than was AIP (Brabin, 2017).

AIP perception and management

Anaemia in pregnancy is a widespread public health problem associated with an increased risk of morbidity and mortality especially in pregnant women. The current study was conducted in two of the central regional hospitals in Ghana to assess the perception of health staff the management of anaemia during pregnancy. Abdelhafez and El-Soadaa (2012) study conducted in Saudi Arabia. It was posited that competent management of anaemia is crucial in the elimination of AIP. It was accounted that health staff perceived competence in management of AIP correlate positively to the reduction of AIP. Notwithstanding, the findings from Abdelhafez and El-Soadaa (2012) were reaffirmed in several other studies such as Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016); The Royal Women's Hospital (RWH) (2015); Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) (2013); Bryant and Larsen (2009).

Several empirical studies revealed that environmental, behavioural and social, socio – cultural, household, community, clinical health and AIP management were the factors elicited in the empirical literature as Nadia, Diamond-

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Smith, Gupta, Kaur and Kumar (2016); RWH (2015); RANZCOG (2013); Bryant and Larsen (2009) noted. Though Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016); RWH (2015); RANZCOG (2013); Bryant and Larsen (2009) found that the 62 variables were all inclusive to the factors. However, Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016) indicated that these factors explained just 82.4% of the total variance. That of RWH (2015); RANZCOG (2013); and Bryant and Larsen (2009) found lower variance for the variables as compared to that of Nadia et al. (2016) study.

Noted from, Olubukola, Odunayo and Adesina (2011); Osungbade and Oladunjoye (2012); Abriha, Yesuf and Wassie (2014); Serbesa and Iffa (2018); Margwe and Lupindu (2018) and Kordorwu (2018) studies, variables such as food taboos and mode of abortion, family planning variables were not captured under the current 62 variables of the above cited studies. Empirical studies such USAID (2011); Nadia et al. (2016); Fredanna, M'Cormack and Drolet (2012) reviewed analysed only the relationships between the predictors and AIP management. There were direct relationships between community factors, EBS and Clinical health perception with AIP management. However, there was inverse relationships socio – cultural factors and household factors with AIP management. The report by USAID (2011) indicated that EBS factors were statistically significant and that environmental, behavioural and social factors had direct correlation with AIP management. The USAID (2011) study did not empirical assessed the effect but the correlations of EBS with AIP management.

Also Fredanna, M'Cormack and Drolet (2012) found a correlation between behavioral factors and AIP management. In similar vein, magnitude of the effect of behavioral variables on AIP management was not found to be significant. The studies (USAID, 2011; Fredanna, M'Cormack & Drolet, 2012; Nadia et al., 2016) found that clinical health perception as having direct correlations to management of AIP. Though the reviewed studies (USAID, 2011; Fredanna, M'Cormack & Drolet, 2012; Nadia et al., 2016) did not find correlations among community factors and AIP management directly but the reviewed studies combined the community factors under the environmental, behavioral and social factors. Therefore, it was being assumed that community factors were having positive correlation with management of AIP (USAID, 2011; Fredanna, M'Cormack & Drolet, 2012; Nadia et al., 2016).

From the studies conducted by Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016); RWH (2015); RANZCOG (2013); Bryant and Larsen (2009) there were inverse correlations between household factors and social cultural beliefs with management of AIP. However, it was established from the same studies, Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016); RWH (2015); RANZCOG (2013); Bryant and Larsen (2009) that environmental, behavioural and social factors measured per their studies had positive correlations with management of AIP. These studies Nadia, Diamond-Smith, Gupta, Kaur and Kumar (2016); RWH (2015); RANZCOG (2013); Bryant and Larsen (2009), were correlational studies and that the relationships from such studies did not meant causality as done in this current study.

3. Conclusion

The literature review found a gap in the observed research that pointed to the absence of studies in the perspectives of health professionals especially on their understanding and management of AIP. This was discovered as a result of the evaluation of the relevant literature. The knowledge, management, and practices from the point of view of pregnant and nursing mothers were relied on in a number of the studies that were evaluated from the relevant research literature. As a result, a research of this sort is necessary if it is to contribute to the filling of such a vacuum in the observed literature and provide information on the real understanding and management of AIP from the viewpoint of health professionals.

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