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Prevalence of low birth weight, macrosomia and stillbirth and their relationship to associated maternal risk factors in Hohoe Municipality, Ghana

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ABSTRACT

Introduction: birth weight is vital to the development potential of the newborn. Abnormal birth weight (such as low birth weight and macrosomia) is an important determinant of child survival, disabilities, stunting, and long-term adverse consequences for the onset of non-communicable diseases in the life course and therefore demands appropriate public health interventions. Stillbirths are also considered one of the most important, but most poorly understood and documented adverse outcomes of pregnancy. Therefore, this study aimed to assess the prevalence of abnormal birth weight and related maternal risk factors, as well as pregnancy outcomes, such as stillbirth.

Methods: a retrospective study design was used to analyze 4262 delivery records for singleton pregnancies from January 2013 to December 2014 seen at the Hohoe municipal hospital, Volta region in Ghana. The data on birth weight and related factors were derived from the delivery book. Data was analyzed using STATA. Multinomial logistic regression was used to assess the association between maternal factors such as parity, age and intermittent preventive treatment of malaria, sex of infant and abnormal birth weight. Association between stillbirth and related factors was assessed using logistic regression.

Results: prevalence of low birth weight (<2.5 kg) was 9.69% and macrosomia (≥ 4.0 kg) was 3.03%. There was an increased risk of a first born being of low birth weight than second or third born (RR; 2.04, CI; 1.59–2.64, $p<0.0001$). There were also an increased risks of mothers <20 years giving birth to low-birthweight infants (RR; 1.46, CI; 1.11–1.93, $p=0.007$) compared to mothers who were within the age ranges of 20–30 years and also among those who took only one (RR; 1.57, CI; 1.02–2.39, $p=0.039$) or no intermittent preventive treatment for malaria during pregnancy (RR; 1.57, CI; 1.24–1.98, $p=<0.0001$) compared to those who took three doses. Risk of macrosomic birth was particularly high among 5th born (RR; 2.66, CI; 1.43–4.95, $p=0.002$) compared to first or second born. Stillbirth rate was 27/1000 births. Thirty-two percent of the stillbirths ($n=38$) had low birth weight whereas 6.8% ($n=8$) were macrosomic. There was a greater than fivefold (AOR; 5.6, CI; 3.6–8.7) and greater than twofold (AOR; 2.4, CI; 1.1–5.3, $p=0.025$) increase in odds for stillbirth among low birth weight and macrosomic infants respectively.

Conclusion: macrosomia and low birth weight co-existed among infants in Hohoe municipality, both of which are associated with adverse pregnancy outcome such as stillbirth. Given the apparent association between maternal age <20 years and increased risk, health promotion strategies aimed at preventing pregnancies among teenagers could be implemented to aid the reduction of stillbirth rates.

Introduction

The burden of adverse pregnancy outcomes (APOs), which consists of both stillbirths and abnormal birth weights (Beck et al., 2010; Lee et al., 2013), is considerably high in both developed and in low and middle-income countries (Beck et al., 2010; Blencowe

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et al., 2012; Lee et al., 2013). The WHO guidelines define an APO as an event of low birth weight, preterm birth, stillbirth, perinatal death or abortion (WHO, 2004).

Low birth weight (LBW) is defined by WHO as a birth weight less than 2500 g (WHO, 2010). Two processes determine it; duration of gestation and intrauterine growth (WHO, 1995, Urquia and Ray 2012). Therefore LBW is caused by either a short gestation period (<37 weeks) or retarded intrauterine growth (or a combination of both) (Kramer, 1987, Urquia and Ray 2012). It is however important to state that, not all small babies/preterm births result from disease process and not all babies affected by IUGR are small (Urquia and Ray 2012). This notwithstanding the proportion of infants weighing less than 2.5 kg at birth in a particular country generally reflects the health status of the population (Maana et al., 2013). Low birth weight is an important determinant of child survival, disabilities, stunting, and long-term adverse consequences for the onset of non-communicable diseases in the life course and therefore demand appropriate public health interventions (Lee et al., 2013, Lawn et al., 2005). These morbidities are often chronic and have long-term repercussions on the child, family, schools and communities. It contributes to about 75% of deaths that occur in the first week of life (Kirch, 2008).

Globally, about 14 million infants are born at term (>37 weeks gestation) with low birth weight due to intrauterine growth restriction (IUGR). Eleven percent (11%) of all newborns in developing countries are born at term with low birth weight, a prevalence which is six times more than in developed countries (Bergmann et al., 2008). According to UNICEF (UNICEF, 2013), the prevalence of LBW deliveries in Ghana is 13.0%. However in some parts of Ghana, the prevalence is higher. For instance, a study conducted in the Northern region in 2015 found prevalence of 26% (Abubakari et al., 2015) and in the Ashanti region of Ghana, a prevalence of 21% was found in 2013 (Michael et al., 2013).

Macrosomia is another pregnancy outcome associated with increased risk of adverse maternal and perinatal outcomes (Wendland et al., 2012) yet little attention is paid to this condition in most developing countries. Traditionally macrosomia is defined as birth weight greater than or equal to 4.0 kg (Lu et al., 2011; Koyanagi et al., 2013; Ye et al., 2015). Macrosomia prevalence in developed countries is between 5% and 20% although an increase of 15% to 25% has been reported in the past decades, which is driven by an increase in maternal obesity and diabetes (Henriksen, 2008). In developing countries however, published studies on the changing prevalence of macrosomia appear rare. For example, a study in China (Lu et al., 2011) reported an increase from 6.0% in 1994 to 7.8% in 2005. In Ghana, we could not find data on the overall prevalence though a recent study on macrosomic births among obese and overweight women in a specialist hospital in Kumasi reported a prevalence of 10.9% in this high-risk group (Addo, 2010). Macrosomia, which is linked to obesity later in life (Oken and Gillman, 2003), could lead to complicated delivery (Koyanagi et al., 2013). This could pose additional threat to mothers and newborns in resource-scarce Ghana because of the challenges associated with providing essential obstetric care services.

The high rate of stillbirths in many developing countries is a matter of concern (Lawn et al., 2005; Liu et al., 2012). For instance, almost all (97–99%) of the estimated 3 to 4 million stillbirths and 3 million neonatal deaths that occur each year globally are in low- and middle-income countries (Stanton et al., 2006; Liu et al., 2012). The causes of stillbirth and neonatal death are generally inseparable (Bhutta et al., 2011). The main risk factors for stillbirth include intrapartum complications, maternal infection in pregnancy, maternal disorders (such as hypertension and diabetes), fetal growth restriction and congenital abnormalities (Lawn et al., 2005). Other risk factors for neonatal death include preterm birth, low birth weight and neonatal infection (WHO, 2011; Liu et al., 2012).

The Volta region of Ghana is among the regions with better than average health indicators including antenatal care coverage, facility based deliveries, use of bed nets against malaria carrying mosquito and lower malnutrition indices such as stunting, wasting and underweight and these factors might be expected to mitigate against low birth weight. There is an apparent improvement in health indicators in the Volta region compared to other regions, observed in the Ghana demographic and health survey (GSS/GHS, 2014). However, the Volta region is one of the regions with the highest proportion of teenagers who start childbearing early (22%) (GSS/GHS, 2014), a recognised risk factor for low birth weight and stillbirth (UNICEF, WHO, 2009). Given apparent variation in the LBW rate between different regions in Ghana as revealed by previous research coupled with the limited research in the region on pregnancy outcomes it was important to study the prevalence of abnormal birth weight, stillbirth and the relative impacts of various risk factors, in order to inform preventive public health initiatives to improve pregnancy outcomes. Therefore the main aim of this study was to assess the prevalence of abnormal birth weight and related maternal risk factors, as well as pregnancy outcomes, such as stillbirth.

Materials and methods

Study area

The study was conducted at the Hohoe Municipal Hospital. Hohoe municipality, situated in the heart of the Volta region of Ghana, constitutes one of the 25 administrative districts in the region and is one of the fastest growing commercial hubs in the region. The Hohoe Municipal Hospital with a bed capacity of over 200 does not only serve the almost 200,000 inhabitants resident in the municipality but is also a referral facility providing secondary and sometimes tertiary health care services to clients outside the municipality. The total fertility rate for the municipality is 3.3 (Ghana Statistical Service, 2010; GSS/GHS, 2014). The reproductive and child health unit of the municipal hospital provides antenatal, perinatal including basic and comprehensive emergency obstetric services and postnatal services to the 42,220 women in their reproductive years (15–49 years). Annually, the facility provides antenatal care to about 2000 women, with an average of 6 antenatal consultations per women.

Study design and population

The cross-sectional study investigated all delivery records over a 2-year period from January 2013 to December 2014 in Hohoe municipal hospital, Ghana. The data covered 4359 pregnant women between the ages of 12 and 51 years who delivered 4477 babies in the Hohoe municipal hospital. All the pregnant women with a documented delivery record in the delivery book were reviewed. After excluding multiple births, 4262 infant-mother pairs were included in the study. Maternal information that was extracted from the labour ward delivery book included maternal age, gravidity (number of pregnancies in her lifetime), parity (number of live children), number of doses of Sulfadoxine–pyrimethamine (SP) taken as part of Intermittent Preventive Treatment (IPT) for Malaria in Pregnancy, HIV status, partner involvement during labour and mode of delivery. Newborn information extracted included birth weight, sex and whether alive or dead at birth. All the 4262 were considered in the analysis and no cases were left out because of missing information. The study did not include home deliveries because health professionals do not supervise home