

## Scourge of intra-partum foetal death in Sub-Saharan Africa

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### Abstract

Intra-partum foetal death has been variously defined.

However, a definition adopted at a technical consultation in 2006 is employed in this review. The quality of intra-partum care is a crucial factor for pregnancy outcome for both mothers and new-borns. Intra-partum stillbirth is defined as late foetal death during labour, which clinically presents as fresh stillbirth. The largest proportion of the world's stillbirths occurs in the late preterm, term and intra-partum periods. The Western Pacific region has the greatest reduction in stillbirth with a 3.8% annual decline between 1995 and 2009; however, the annual decline in the African region is less than 1%. Caesarean delivery is still uncommon, especially in rural areas: 1% of births in rural Sub-Saharan Africa and 5% in rural South Asia are by caesarean delivery; 62% of stillbirths occurred during the intra-partum period; 61.4% of stillbirths are attributable to obstetrical complications. Preventive measures aimed at reducing the incidence of intra-partum foetal death entail all measures aimed at improving quality antenatal care and preventing intra-partum asphyxia. This review discusses intra-partum foetal deaths from a Sub-Saharan African perspective. It explores the contribution of research within the region to identifying its impact on new-born health and potential cost-effective policy interventions.

**Key words:** Intra-partum; Foetal; Death; Sub-Saharan; Africa

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**Core tip:** Intra-partum foetal death includes intra-uterine deaths that occur within 12 h of delivery of a new-born weighing more than 1000 g, or that had more than 28 wk of gestation, but could not be resuscitated. Sub-Saharan Africa has the lowest recorded decline of intra-partum foetal deaths; however, this region recorded a doubling of her annual rate of reduction to 3.1% during 2000-2011, from 1.5% during 1990-2000. Impacts of research within the region towards improved new-born health and cost-effective policy interventions are examined.

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## INTRODUCTION

Intra-partum foetal death is a subset of perinatal mortality: macerated stillbirths; lethally and congenitally malformed neonates as well as new-borns that died after the first 24 h of life are excluded. It basically refers to intra-uterine foetal deaths that occurred within 12 h of delivery of a new-born whose weight is more than 1000 g or which has gone beyond 28 wk of gestation<sup>[1]</sup>. It is a health indicator which measures the quality of obstetric care on one hand, and the association between maternal and neonatal health on the other hand; it is a determinant of the quality of intra-partum care.

According to the International Classification of Diseases, Revision 10, a stillbirth or late foetal death is that which occurs after 22 wk of gestation, or when the crown-heel length is 25 cm or more, and the weight is at least 500 g<sup>[2]</sup>. For the purpose of international comparison, stillbirth is better described as foetal death at a gestational age of 28 completed weeks or a crown-heel length of 35 cm or more and birth weight is at least 1000 g<sup>[3]</sup>. Gestational age measures are not as reliably documented as birth weight, especially in the low resource countries.

The greatest risk to life for the mother and baby is noted during childbirth<sup>[4]</sup>. Intra-partum related death accounts for over 2/5 of the world's annual maternal deaths; the death of 1.02 million babies during labour, and 904000 neonatal deaths around delivery are inter-related<sup>[1,4,5]</sup>.

The quality of intra-partum care is therefore a crucial factor for the pregnancy outcome for both mothers and new-borns. Timely and appropriate care rendered by skilled attendants in an atmosphere that is conducive will prevent or at least reduce morbidity for both mothers and newborns.

The foetal mortality rate for gestations of at least 20 wk (6.2 foetal deaths per 1000 live births)<sup>[6]</sup> and infant mortality rate (6.9 infant deaths per 1000 live births)<sup>[7]</sup> in the United States in the year 2005 were similar. Depending on the definition used, 40% to 60% of perinatal mortality is due to foetal mortality<sup>[8]</sup>. According to the World Health Organization (WHO)<sup>[9]</sup>, 8 out of every 1000 babies die during labour worldwide. In 2000, intra-partum mortality rate was estimated at 15 per 1000 births in Middle and Western Africa, while it was only 0.6 per 1000 births in developed countries<sup>[9]</sup>.

Annually, there are 287000 maternal deaths<sup>[10]</sup> and over 3 million stillbirths, of which about a million die in the course of labour and about four million neonatal deaths, half of which happen on the day of birth<sup>[11]</sup>.

Although stillbirths are underreported in developing countries, 97% of the cases occur in the region, and it accounts for 50% of worldwide perinatal deaths. It is hoped that the problem of stillbirths will be given due attention in these regions with a view to reducing the effect on the society<sup>[9,12]</sup>. A Nigeria based study posited that of the recorded perinatal deaths, 51.2% were fresh stillborns, while 39.1% were macerated<sup>[13]</sup>. This finding conforms to the Wigglesworth classification of perinatal death (Table 1). The high proportion of intra-partum foetal death is a reflection of poor-quality intra-partum care in the study-country, however, another study conducted in Nigeria recorded 73% macerated and 27% fresh stillbirths<sup>[14]</sup>, which reflects variations noted from one centre to the other, even within the same country.

The neonatal period is a crucial part of the infant's life, as up to 40% of deaths of children younger than 5 years occurred within the period; also, neonatal death was observed to increase in relation to a rapid fall in postnatal deaths<sup>[1,15]</sup>. The need for concerted efforts from health practitioners and policy makers can never be overemphasized.

Twenty-five percent of neonatal deaths in low income countries and 8% of all deaths among children younger than 5 years during the 4-year period of 2000 to 2003, were attributed to birth asphyxia by the WHO<sup>[16]</sup>. A major focus on birth asphyxia is important in reducing child mortality; this will immensely contribute to the attainment of the Millennium Development Goal<sup>[17]</sup>. Tracking of stillbirths, however, is often incomplete and variable.

The global burden of disease literature gives insight into the prevalence of death during the peri-partum period<sup>[17]</sup>. The relatively insufficient resource allocation to the health sector, especially in Africa, which is identified as a bane, was addressed by the World bank in 1993; the bank issued a guide on resource allocation in the health sector to assist the developing countries in that perspective.

Intra-partum related neonatal death deserves prominence in global health programming and policy because it has a significant contribution to the under-5 child mortality rate. Early neonatal deaths are intertwined with maternal health, therefore, effective maternal cum neonatal health services are key to reversing the poor outcomes. The reduction of intra-partum-related neonatal deaths is a daunting challenge and success will depend on provision of effective and efficient care delivery<sup>[3,11,16]</sup>.

Vital registration systems are weak in developing countries where more than 97% of neonatal deaths occur<sup>[12]</sup>, therefore little is known about the causes of most of these deaths. Furthermore, autopsies on the dead fetuses, as well as placenta histological studies are rarely carried out in the region. This review discusses intra-partum foetal deaths from a Sub-Saharan African perspective. It explores the contribution of research within the region to identifying its impact on new-born health and potential cost-effective policy interventions.

**Table 1** Perinatal deaths by Wiggles worth classification<sup>a</sup>

Birth weight (g)	No. of perinatal deaths					Total (%)
	Macerated stillbirths	Congenital malformations	Immaturity	Asphyxia	Other	
1000 ( <i>n</i> = 34)	18	2	14	0	0	34 (5.2)
1001-1500 ( <i>n</i> = 42)	16	7	16	3	0	42 (6.4)
1501-2000 ( <i>n</i> = 65)	35	4	18	8	0	65 (9.9)
2001-2500 ( <i>n</i> = 55)	20	7	11	16	1	55 (8.3)
N2500 ( <i>n</i> = 464)	151	5	49	250	9	464 (70.3)
Total (%)	240 (36.4)	25 (3.8)	108 (16.4)	277 (41.9)	10 (1.5)	660 (100.0)

<sup>a</sup>Birth weight data missing for 61 neonates. Adapted from Fawole *et al*<sup>[13]</sup>, Determinant of Perinatal Mortality in Nigeria.

## **PATHOLOGIC CONSIDERATIONS AND TERMINOLOGIES**

Most foetal deaths, intra-partum or immediately post-partum, are caused by birth asphyxia, which is mainly due to mismanaged obstetric conditions. The causes of foetal deaths are: obstructed labour, infections, asphyxia, maternal haemorrhage, severe pre-eclampsia and eclampsia, maternal/foetal malnutrition, congenital anomalies and umbilical cord complications<sup>[18,19]</sup>.

Congenital anomalies, diabetes, and infections associated with preterm birth and post-term pregnancy, which are preventable causes of stillbirth, contribute immensely to a high foetal death rate, however, the causes have been virtually eliminated in high income countries (HIC)<sup>[20]</sup>; the contributions from these important causes in the Sub-Saharan Africa region are scarcely documented.

"Birth asphyxia" according to WHO in 1997, is a condition in new-borns who had breathing abnormality at birth<sup>[21]</sup>. Non-specific terminologies such as foetal distress, Apgar score and foetal acidosis are not favoured; these terminologies are not predictive of outcome on the long run<sup>[22]</sup>.

Post-asphyxia encephalopathy, birth asphyxia, hypoxic-ischaemic encephalopathy, foetal distress or perinatal asphyxia should not be used loosely, except when there is evidence of acute intra-partum causation<sup>[22-24]</sup>. Intra-partum stillbirth presents as fresh stillbirth when it is due to intra-partum hypoxic injury<sup>[25]</sup>.

Intra-partum neonatal death is the death of a baby born alive within 28 d of life from evidenced intra-partum injury, with or without neonatal encephalopathy<sup>[3,11,20,21]</sup>; acute hypoxia superimposed on chronic hypoxia in a growth restricted foetus could easily lead to foetal death<sup>[22]</sup>. There is a limit to the ability of the foetus to tolerate excessive reduction in oxygen partial pressure, though a healthy foetus is conditioned to physiological hypoxia that regulates foetal circulation through unhindered oxidative metabolism<sup>[26]</sup>.

The immediate response to acute hypoxia by the foetus and the new-born is shallow breathing followed by cessation of respiration, called primary apnoea, which leads to deep gasping and irregular respirations. It progresses to terminal apnoea when all respiratory efforts cease<sup>[26]</sup>.

In the course of apnoea, the heart rate progressively decreases to a halt few minutes after the onset of secondary apnoea. Primary and secondary apnoea presents with bradycardia and dyspnoea<sup>[26]</sup>.

Prompt tactile stimulation and/or assisted ventilation always lead to a restoration of the heart rate to normalcy; any delay in resuscitation is accompanied by slow recovery. The importance of institutionalization of the concept of emergency obstetric care (EMOC), increased skilled birth attendance and neonatal intensive care in all facilities charged with pregnancy care cannot be over-emphasized.

## **DEMOGRAPHIC TRENDS**

Over 1 million stillbirths occur during labour<sup>[23]</sup>; a number of studies from some low income countries showed that up to 70% of stillbirths occur in the intra-partum period and are due to obstetric emergencies<sup>[4,22]</sup>, while in advanced countries, half of all stillbirths occur in non-anomalous babies at > 28 wk gestation<sup>[20]</sup>. A WHO review of vital registration showed that the estimated number of global stillbirths was 2.6 million in 2009 and 3.0 million in 1995<sup>[27]</sup>. The worldwide stillbirth rate has declined by 14% between 1995 and 2007<sup>[27]</sup>.

The Western Pacific region recorded the greatest reduction in stillbirths, with a 3.8% annual decline between 1995 and 2009, while the African region posted only an annual decline of less than 1% (0.7%)<sup>[24]</sup>. There is a wide variation in stillbirth rates among countries; South-East Asia and Africa had two-thirds of all stillbirths.

In advanced countries, the third-trimester stillbirth rate is less than 4 per 1000 total births, and this amounts to 25% of the worldwide average and 11% of the average in South Asia and Sub-Saharan Africa<sup>[25]</sup>. Finland has the lowest reported rate of 2.0 per 1000 total births, while Nigeria reported 41.9 per 1000 total births and Pakistan at 46.1 per 1000 total births, had the highest rates<sup>[24]</sup>.

Sub-Saharan Africa registered a 39% decline in the under-five mortality rate. However, the region had an annual rate of reduction to 3.1% during 2000-2011, from 1.5% during 1990-2000<sup>[26]</sup>. There was a dramatic acceleration in the rate of decline in Eastern and Southern Africa; this coincided with a recorded sub-

stantial improvement in effective interventions to combat major diseases, especially HIV, and also measles and malaria<sup>[27]</sup>.

## RISK FACTORS

Utilization of emergency obstetrics care where available, remained low and even worse in the remote areas; 5% of births in rural South Asia and 1% in rural Sub-Saharan Africa are by caesarean delivery<sup>[28]</sup>. Sixty-two percent of stillbirths occurred in the intra-partum period; obstetrical complications accounted for 61.4% of stillbirths. The following significant maternal risk factors were documented: un-booked status, illiteracy, age of 35 years and above in pregnancy, extremes of reproductive age groups, multiple pregnancies and prolonged labour; the foetal risk factors associated with stillbirth are malpresentation, decreased foetal movement, foetal distress, prematurity, small for gestational age, and neonatal infection<sup>[28-30]</sup>. The following independent risk factors were identified: congenital malformations, true knot of cord, meconium stained amniotic fluid, oligo-hydramnios, poly-hydramnios, previous adverse perinatal outcome, placental abruption, advanced maternal age, and hypertensive disorders<sup>[30]</sup>. Jewish ethnicity, gestational diabetes, previous caesarean section, and recurrent abortions were negatively associated with intra-uterine foetal death<sup>[31]</sup>.

An Africa based study identified the following risk factors for perinatal death: un-booked status, lack of prenatal care, duration of schooling, maternal age above 35 years, asphyxia, and prematurity<sup>[12]</sup>. However, the researchers found that when maternal and neonatal factors were considered together, the following are the determinants of perinatal mortality: un-booked status, free maternity service, mother's level of education, mother's age within the range of 26 and 30 years, and mothers older than 40 years, prematurity, asphyxia, lack of prenatal care, mode of delivery and so on<sup>[12]</sup>. Some of the risk factors peculiar to the Sub-Saharan African society are lack of prenatal care, un-booked status, and lack of quality care to mention a few.

The most common patient-related avoidable factors found in a South African study were un-booked patients, patients booked late in pregnancy, patients who delayed before seeking medical assistance, and patients with inappropriate responses to poor foetal movements<sup>[32]</sup>; whereas the most common avoidable factors related to medical care were underestimation of foetal size and lack of response by staff to patients with poor obstetric histories. However, the common administration-related avoidable factors were unavailable operating theatres and lack of transportation between institutions<sup>[32]</sup>.

In a number of countries in the Sub-Saharan Africa, a considerable percentage of deliveries are not supervised by skilled workers, there is a dearth of nurses and midwives, the database in these places is weak for setting priorities, and political willingness to address the

issue is suboptimal.

It is implied by these identified risk factors that developing an algorithm for the management of such conditions, especially for use in the Sub-Saharan African countries, will be a good step towards reducing the scourge.

## PREVENTION

Preventive measures aimed at reducing the incidence of intra-partum foetal death entail all measures aimed at improving quality antenatal care and preventing intra-partum asphyxia.

Appropriate obstetric care in the prenatal and intra-partum periods is vital. Also, close monitoring with readily available appropriate care during labour to enable obstetrical providers recognize conditions such as prolonged labour, placental abruption, placental previa, foetal mal-position, and foetal distress, will allow for rapid intervention through caesarean section to further reduce the rate of intra-partum foetal deaths.

Every death counts; a version of mortality audit in South Africa focuses on saving mothers, babies and children<sup>[33]</sup>. Replication of the exercise in all African countries, with the intention of putting to use lessons learnt from the exercise, will help stem the tide of the repugnant scourge.

Intermittent auscultation for monitoring foetal heart rate in labour is preferred and should be promoted in the low and medium income countries, rather than continuous foetal heart rate monitoring devices which might appeal to policy makers in such climes. This recommendation is based on the outcome of a Dublin based study, which concluded that there is no difference in intra-partum stillbirth rates, as well as long term outcome between the intermittent auscultation group and the continuous foetal heart rate monitored group<sup>[33]</sup>.

## CONCLUSION

The high rates of intra-partum foetal death in Sub-Saharan Africa should be a cause for concern for all stakeholders.

Urgent and effective steps are needed to promote equitable distribution of health facilities, providing maternal and newborn health care with optimal capacity for EMOC.

Initiatives that seek to increase rates of facility births in Sub-Saharan Africa must address the issues of quality of maternity care and socio-cultural determinants of access to health care.

It is important that health systems identify the causes of intra-partum foetal deaths peculiar to their location and endeavour to audit all stillbirths with a view to improving pregnancy outcomes for both mothers and new-borns.

Increased research attention focusing on this subject in the region is also advocated.



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