

PREVALENCE OF STILLBIRTH IN AYDER COMPREHENSIVE SPECIALIZED HOSPITAL, NORTH ETHIOPIA: A DESCRIPTIVE RETROSPECTIVE STUDY

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ABSTRACT

INTRODUCTION: Stillbirth continues to confound scientists and providers, claiming 18.4 per 1000 births globally in 2015. The rate is much higher in low and middle-income countries, including Ethiopia. Stillbirth is tied to maternal age, infection, non-communicable disease, nutrition and lifestyle factors, and inadequate antenatal care. Lack of quality data, including in Demographic and Health Surveys and national vital statistic registries, limits understanding of the causes and possible solutions of stillbirth.

OBJECTIVE: To assess the prevalence of stillbirth in Ayder Comprehensive Specialized Hospital.

METHODS: We conducted a retrospective chart review of births from January 2014 to May 2015 at Ayder Comprehensive Specialized Hospital, the largest referral hospital in northern Ethiopia. Stillbirth was defined as birth at, or after, 28 weeks' gestation or fetal weight >1000g without reliable dating with no observable sign of life. For the present study, the data are reported as descriptive statistics.

RESULT: A total of 4,582 live births and 315 stillbirths were recorded at Ayder Comprehensive Specialized Hospital over the study period. Removing lethal congenital anomalies, we observed a corrected stillbirth rate of 54.6 per 1000 deliveries. Nearly two-thirds of stillbirths occurred intrapartum. Among stillbirths arriving at Ayder Comprehensive Specialized Hospital with positive fetal heart tone, 36 (44.4%) occurred during the second stage of labor. Nineteen percent of all stillbirths also occurred in transit from a referral institution. Nearly 40% of stillbirths were classified as "unexplained".

CONCLUSION: A significant proportion of stillbirths occurred after arrival or while in transit. Improved identification of high-risk pregnancies with expedited transfer for emergency obstetric care and improved intrapartum care could help decrease the number of stillbirths.

KEYWORDS: Stillbirth, Ayder, Ethiopia, Africa

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INTRODUCTION

The World Health Organization (WHO) defines stillbirth as, “a baby born with no signs of life at or after 28 weeks’ gestation”¹. The estimated global stillbirth rate (SBR) was 18.4 per 1000 births in 2015, a decrease from 24.7 in 2000². Half of all stillbirths occur during labor when the baby would be expected to survive³. Seventy-seven percent of stillbirths occur in south Asia and sub-Saharan Africa and 98% occur in low and middle-income countries (LMICs). In Ethiopia, the SBR is 30 per 1000 births⁴. Other local studies report the SBR between 25.5 to 85 per 1000 births^{5,6}.

Globally, risk factors for stillbirth include maternal age > 35 years, maternal infection, non-communicable disease, nutrition, lifestyle factors³, and inadequate antenatal care (ANC). In Africa, and specifically in Ethiopia, studies have shown that maternal age ≤ 24 years, prolonged labor (> 12 hours), low blood pressure in late pregnancy, abruptio placentae, uterine rupture, gestational hypertension, pre-eclampsia and/or eclampsia, as well as lower education and wealth are all associated with higher rates of stillbirth^{5,7-10}. In contrast, a study in southern Ethiopia showed that referral from another facility, ANC attendance, and vaginal delivery were all associated with decreased risk of stillbirth¹¹.

Lack of quality data continues to inhibit scientists’ understanding of stillbirth. A review of 114 DHS (demographic health surveys) across 70 LMICs showed substantial variation in the measurement of stillbirth¹². These studies had limited documentation of risk factors. Another review showed that stillbirths remain uncounted in many national vital statistics systems¹³.

The present study aims to assess the prevalence of stillbirth in Ayder Comprehensive Specialized Hospital.

METHOD

This study was a retrospective chart review of stillbirths delivered between January 1, 2014 and May 31, 2015 (17 months) at Ayder Comprehensive Specialized Hospital (ACSH), a tertiary hospital in Mekelle, Tigray, northern Ethiopia, with a catchment population of over eight

million people. Mekelle is the capital of the Tigray Region and ACSH accepts referrals from Tigray as well as the neighboring regions of Afar and northern Amhara. All cases seen during the study period were reviewed.

For the purposes of this study, stillbirth was defined as birth at, or after, 28 weeks’ gestation with no observable sign of life. Additionally, fetal deaths weighing > 1000 grams without reliable dating criteria were reviewed to ensure inclusion of all possible cases of stillbirth. Gestational age was determined based on last normal menstrual cycle or early ultrasound. Fresh stillbirth was defined as the presence intact skin and suspected death during labor. Macerated stillbirth (MSB) was defined as the presence of skin desquamation, discoloration of the umbilical cord, reduced soft tissue, collapsed cranial bone or, suspected death, before the onset of labor.

Data was collected retrospectively by reviewing delivering obstetricians’ documentation on a standardized WHO stillbirth recording form [14]. And by reviewing the documented physical examination of fetus and placenta. At referring institutions in Tigray, Pinard stethoscope is the sole method of auscultation of fetal heart rate. At ACSH, cardiotocography is used for constant fetal heart rate monitoring but it is only read in real-time on the LCD monitor. There is no fetal heart tracing pattern interpretation on paper or on computer monitors. Providers therefore rely on live fetal heart rate at any given time, similar to evaluation with a Pinard stethoscope, to assess fetal-wellbeing and consequently may make decisions regarding cesarean delivery.

Simple descriptive data analysis was completed using SPSS version 20 (IBM, Armonk, NY, USA). Data was presented as frequency, mean, SD and range.

The study was approved by the Ethics Committee of College of Health Sciences, Mekelle University (Institutional Review Board Number ERC 0836/201) and the Institutional Review Board of the University of Illinois at Chicago (Institutional Review Board Protocol Number 2016-0830). As this was a retrospective chart review with no greater than minimal risk to participants, waiver of consent was requested and granted by the Ethics Committee and Institutional Review Board listed above.

RESULTS

Over the 17-month study period, there were 4,582 live births and 315 stillbirths at ACSH, yielding a crude stillbirth rate of 64.3 per 1000 deliveries, including 193 fresh stillbirths (39.4 per 1000 deliveries) and 122 macerated stillbirths (24.9 per 1000 deliveries). There were 50 lethal congenital anomalies, making the corrected stillbirth rate 54.6 per 1000 deliveries.

Of the 315 women experiencing stillbirth, 104 (33.3%) were primiparous, 220 (69.9%) rural dwellers, 141

(44.8%) housewives, and 188 (59.6%) had less than secondary education. Just 13 (4.1%) women did not receive any antenatal care (ANC), while 221 (70.2%) received ANC at the health center level. Average maternal age was 27 years. Seventeen percent of women (n=53) were > 35 years of age and 6.4% (n=20) were < 20 years of age. Nearly one-fourth of women had one or more pre-existing medical problems, including pre-eclampsia (n=35, 11.1%), chronic hypertension (n=17, 5.4%) and history of malarial attack (n=22, 7%) (Table 1).

Table 1. Maternal Characteristics and Risk Factors of Stillbirth in ACSH, 2014-2015.

Variable name	Category	N (%)
Geographic distribution	Urban	95 (30.1)
	Rural	220 (69.9)
Regional distribution	Tigray	301 (95.6)
	Afar	12 (3.8)
	Amhara	2 (0.6)
Employment status	Employed	47 (14.9)
	Unemployed	141 (44.8)
	Unknown	127 (40.3)
Highest level of education	No education	93 (29.5)
	Elementary (<7th grade)	95 (30.2)
	High school (8-12th grade)	91 (28.9)
	Some college	16 (5.1)
	Completed college or higher	5 (1.6)
Marital/relationship status	Unknown	15 (4.8)
	Married/marriage-like relationship	258 (81.9)
	Separated	14 (4.4)
	Divorced	6 (1.9)
	Widowed	3 (1)
	Never married	9 (2.9)
HIV status	Unknown	25 (7.9)
	Positive	14 (4.4)
	Negative	282 (89.6)
Hemoglobin at admission	Unknown	19 (6)
	>7	301 (95.6)
	<7	12 (3.8)
Prenatal care provided at	Unknown	2 (0.6)
	Health center	221 (70.2)
	Hospital	61 (19.4)
	No prenatal care	13 (4.1)
Pre-existing condition	Unknown	20 (6.3)
	Chronic HTN	17 (5.4)
	Pre-eclampsia	35 (11.1)
	Eclampsia	4 (1.3)
	Diabetes	5 (1.6)
	Malaria	22 (7.0)
	Hydrops	12 (2.8)
	Syphilis	16 (5.1)
Multiple gestation	10 (3.2)	

One hundred and five (33.4%) stillbirths occurred before 37 weeks' gestation and 18 (5.7%) occurred post-term. One hundred (31.8%) were low birth weight and 47 (14.9%) were very low birth weight. Placental and cord abnormalities were present in 61 (19.3%) and 20 (6.3%) stillbirths, respectively (Table 2).

Table 2. Characteristics of stillbirths in ACSH, 2014-2015.

Variable name	Category	N (%)
Gestational age	Post-term ($\geq 42w$)	18 (5.7)
	Late-term (41 to $< 42w$)	28 (8.9)
	Full-term (39 to $< 41w$)	50 (15.9)
	Early-term (37 to $< 39w$)	42 (13.3)
	Late Pre-term (32 to $< 37w$)	66 (21.0)
	Very pre-term (28 to $< 32w$)	39 (12.4)
	Unknown	72 (22.8)
Fetal weight	$< 1000g$	6 (1.9)
	1000-1499g	47 (14.9)
	1500-2499g	100 (31.8)
	2500-3999g	132 (41.9)
	$> 4000g$	13 (4.1)
Delivered infant status	Unknown	17 (5.4)
	Macerated	122 (38.7)
Fetal sex	Fresh	193 (61.3)
	Male	191 (60.7)
	Female	105 (33.3)
Placental abnormalities (small, large, hematoma, clot, infarct)	Unknown	19 (6.0)
	Present	61 (19.3)
	Absent	228 (72.4)
Cord abnormalities (length, knot, prolapse)	Unknown	26 (8.3)
	Present	20 (6.3)
	Absent	269 (85.4)
	Unknown	26 (8.3)

Most (n=193, 61.3%) stillbirths occurred intrapartum. Ninety-two (29.2%) stillbirths occurred at referring institutions, 71 (22.7%) upon self-presentation to ACSH, and 60 (19.0%) during transfer to ACSH. For the demises occurring after arrival to ACSH (n=81), eight (9.9%) occurred before start of labor or induction, four (4.9%) during latent phase, three (3.8%) during active phase and 36 (44.4%) during the second stage of labor (Table 3).

Table 3: Timing of Detection of Fetal Death in ACSH, 2014-2015.

Variable name	Category	N (%)
Time of death	Antepartum	122 (38.7)
	Intrapartum	193 (61.3)
Location of death	At referring institution	92 (29.2)
	At presentation to Ayder (if not referred)	71 (22.5)
	During transfer to Ayder	60 (19.0)
	After arrival to Ayder	81 (25.8)
	Unknown	11 (3.5)
Timing of death after arrival to Ayder (n=81)	Before start of labor/induction	8 (9.9)
	Stage 1 latent phase	4 (4.9)
	Stage 1 active phase	3 (3.8)
	Stage 2	36 (44.4)
	After delivery	21 (25.9)
	Unknown	9 (11.1)

The top five identifiable causes of stillbirth were abruptio placenta (16.5%), fetal congenital anomalies (15.9%), birth asphyxia (10.8%), cord accidents (7.0%), and infection (4.8%). Additionally, 125 (39.6%) stillbirths were unexplained (Table 4).

Table 4. Causes of Stillbirth in ACSH, 2014-2015.

Category	N (%)
Unexplained	125 (39.6)
Abruptio placenta	52 (16.5)
Congenital anomalies	50 (15.9)
Birth asphyxia	34 (10.8)
Cord accidents	22 (7.0)
Infections	15 (4.8)
Bleeding accidents	10 (3.2)
IUGR	2 (0.6)
Birth trauma	1 (0.3)
Other	4 (1.3)

DISCUSSION

Our retrospective chart review demonstrated that the stillbirth rate is high among women delivering at ACSH (54.6 per 1000 deliveries) compared to global averages (15-25 per 1000 deliveries). This may be due to difference in quality of care.

In our study, a high proportion of stillbirths occurred intrapartum (61.3%), which is similar to many LMICs¹⁵, and was caused by abruptio placenta, congenital malformation, birth asphyxia and cord accident, which points to a lack of rapid intrapartum interventions and delayed referral to emergency obstetric care. An additional 60 (19.0%) stillbirths occurred during transit from referring institutions. One study showed that obstetric complications were the second leading cause of emergency transport in Africa¹⁶. And women and families may face financial hardship when considering emergency transport¹⁷.

Two other leading risk factors for stillbirth in LMICs are lack of ANC and low socioeconomic status¹⁵. In our study, only a few women (4.1%) had no ANC and ANC uptake continues to increase in Ethiopia^{18,19}, which will likely help decrease stillbirth rates. Of women who attended ANC, the majority did so at the health center

level, possibly pointing to an issue of quality of care, but not necessarily so. Most women experiencing stillbirth in our study had less than a secondary education (59.6%), lived in rural areas (69.9%), and had low parity, which is consistent with other studies^{20,21}.

Nearly 40% of stillbirths in our study were classified as unexplained (39.6%). This is similar to other studies in developing countries²², but different from developed countries, where cause of stillbirth is unexplained in only 5% of cases. Separating cause of stillbirth from the range of possible contributing factors can be challenging²³, but unexplained stillbirths resulting from poor inquiry inhibits efforts to understand the problem²⁴ and is an area where more thorough documentation and greater utilization of autopsy would likely result in significant improvement.

In our study, 5.1% of women were seropositive for syphilis similar with other studies in low resource countries which reported seropositivity rate of 5-9 %^{20,23}. Syphilis is a contributor to stillbirth, which could merit additional screening and treatment. Successful interventions with syphilis could therefore have an important impact on stillbirth.

Seven percent of women in our study had a history of malaria during pregnancy which is lower than a recent meta-analysis which showed that as many as 20% of the stillbirths in malaria-endemic sub-Saharan Africa are attributed to *P. falciparum* malaria in pregnancy²⁵. The discrepancy may be due to poor screening practice of stillbirths for malaria in our setup. Thus, pointing to the need for screening, prevention and treatment of malaria.

LIMITATIONS

There are two important limitations to consider when interpreting the results of this study. First, it is not possible to precisely determine whether stillbirth occurred before or during labor among patients that arrived in labor with negative fetal heartbeat. This is especially true for women experiencing prolonged labor. A second important limitation is that stillbirths observed in our study are not representative of obstetric care provided at ACSH given that most (70.7%) of women were admitted as stillbirth.

CONCLUSIONS

Stillbirth continues to be a significant problem in northern Ethiopia, with nearly two-thirds of stillbirths occurring intrapartum and 19.0% while in transit from referral institutions. Further prospective study should be done to assess the delay in referral and transfer of high-risk pregnant mothers. Moreover, the cause for significant proportion of stillbirths is unexplained and most stillbirths occurred intrapartum, underscoring the necessity of further prospective study.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of College of Health Sciences, Mekelle University (Institutional Review Board Number ERC 0836/201) and the Institutional Review Board of the University of Illinois at Chicago (Institutional Review Board Protocol Number 2016-0830). As this was a retrospective chart review with no greater than minimal risk to participants, waiver of consent was requested and granted by the Ethics Committee and Institutional Review Board listed above.

COMPETING INTERESTS

None

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AUTHORS' CONTRIBUTIONS

GG was the principal investigator; GG and AY designed the study, collected data, and wrote first and final drafts of the manuscript. YZ facilitated the initial discussion of the project concept, helped develop the protocol and identified key research personnel to be included. SM, EC, and AW assisted with data collection, analysis, and manuscript development. AR assisted with data analysis and manuscript review. KD assisted with manuscript development. MS guided data analysis and reviewed the final manuscript.

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