

Research Article

# Who is Assisting Women to Deliver Babies within Health Facilities? An Analysis of Deliveries in Four Provinces in Zambia

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## Abstract

Skilled birth attendance (SBA) has been shown to reduce maternal mortality and improve birth outcomes. Because skilled professionals are supposed to be present in health facilities, increasing facility deliveries is expected to increase SBA. However, in a country with a critical shortage of skilled health personnel, is this always the case? We present data from three studies conducted in Zambia to understand SBA and delivery practices in health facilities.

In each of the studies, women were asked where and with whom they delivered their youngest child. We calculated the proportion of all deliveries that occurred at health facilities, and proportion of SBAs at health facilities.

Across all three studies, 62.5% of 39,419 were facility deliveries. Of 39,078 deliveries where data were available for the person assisting, SBA was 54.1%; non-SBA was 45.9%. TBAs assisted 18.5% of all deliveries, but of all non-SBAs, TBAs delivered 40.3%.

Among 24,254 health facility deliveries where data were available for person assisting, SBA was 86.3%; non-SBA was 13.7%; TBAs assisted 10% of all facility deliveries. Of all non-SBA deliveries within health facilities, 70.9% were assisted by TBAs.

Our studies revealed that unskilled personnel attended 14% of deliveries occurring within health facilities and TBAs assisted 71% of these. In a country with a critical shortage of skilled health personnel, facility deliveries may not directly translate into SBA. We recommend equipping TBAs with stronger skills to conduct deliveries and manage delivery-associated complications in addition to emphasizing the need to refer to health facilities.

**Keywords:** Skilled Birth Attendance; Facility delivery; Traditional Birth Attendants; TBA; Zambia

## Abbreviations and Selected Definitions

BEmONC: Basic Emergency Obstetrical and Neonatal Care; CHA: Community Health Assistant; CHW: Community Health Worker; CSO: Central Statistics Office; DHS: Demographic and Health Survey; EmOC: Emergency Obstetric Care; LINCHPIN: Lufwanyama Integrated Newborn and Child Health Project in Zambia; MDG: Millennium Development Goal; MOH: Ministry of Health; SBA: Skilled Birth Attendant or Attendance; TBAs: Traditional Birth Attendants; UN: United Nations; UNDP: United Nations Development Program; UNICEF: United Nations International Children's Fund; WHO: World Health Organization; ZDHS: Zambia Demographic and Health Survey; ZamCAT: Zambia Chlorhexidine Application Trial

## Traditional Birth Attendant

A person who assists the mother during childbirth and who initially acquired their skills by delivering babies themselves or through an apprenticeship to other TBAs<sup>1</sup>. Trained traditional birth attendants have received some level of biomedical training in

pregnancy and childbirth care. In these studies, we considered both trained and untrained TBAs recognized by the community as such but excluded relatives.

## Introduction

Globally, while maternal mortality has declined by 47% since 1990, from 400 maternal deaths per 100,000 live births in 1990 to 210 in 2010, this is still far short of the Millennium Development Goal (MDG) 5 target [1]. According to the UN MDG progress report [1], meeting MDG5 will require accelerated interventions, including improved access to emergency obstetric care and assistance from skilled health personnel at delivery. In Zambia, maternal mortality declined from 649 deaths/100,000 live births in 1996 to 483 deaths/100,000 live births in 2010. Despite this reduction, the chance of meeting the MDG5 target for this indicator in 2015 is unlikely. The current level of maternal mortality, with approximately one woman dying every day during pregnancy, labor and delivery, is unacceptably high. Neonatal mortality has declined from 43 deaths per 1,000 live births in 1990 to 27 deaths/1,000 in 2012 [2]. Infant mortality decreased from 107.2 deaths per 1,000 live births in 1992



poorly maintained roads that are frequently impassible during the rainy season, and a near complete absence of electricity except that produced locally by diesel generators, and no piped water or sewage.

From each of these studies, women were asked where they delivered and who delivered their youngest child. Figure 1 shows a map of Zambia with the districts and study sites for the three studies.

### Data management and statistical analysis

Data for both the CHA and ZamCAT studies were collected on TeleForms survey instruments. Data from the TeleForms were scanned and transferred into a Microsoft Access database. After data entry, weekly reports were then generated using SAS v9.1.3 (Cary, NC) in order to conduct basic logic, range, and missing data checks on the database. All data analyses were conducted using SAS 9.1.3. For the LINCHPIN study data entry and cleaning were undertaken using CS Pro through customized data entry screens with in-built range and consistency checks. All forms were entered twice by independent data entry clerks and completed data files compared. Errors were validated and reconciled. Analysis was done using STATA/SAS software. Data from the three individual studies related to the goal of this paper were then entered into an Excel spreadsheet and analyzed to assess: proportion of deliveries conducted at health facility, at home, and at TBA hut; proportion of all deliveries attended by SBA; proportion of all deliveries attended by unskilled birth attendant; and proportion of facility-based deliveries attended by non-skilled birth attendant.

### Definitions

For this paper, the following definitions were used:

**Facility based delivery:** Any delivery occurring in a hospital, health centre or health post, irrespective of the person assisting with the delivery.

**Supervised delivery or assisted delivery:** Refers to delivery conducted by a doctor, nurse, midwife, clinical officer or traditional birth attendant as inferred from the Zambia MDG report for 2013 [2]. The term “supervised delivery” has however, been used synonymously with SBA [8,9].

**Skilled birth attendance (SBA):** Any delivery assisted by a doctor, nurse, midwife or clinical officer [10].

**Non-SBA delivery:** Any delivery not conducted by a skilled person (doctor, nurse, mid-wife, clinical officer), including those assisted by a TBA, relative, or where nobody assisted.

**TBA hut:** Any delivery assisted by a TBA outside of a health facility.

## Results

### Sample characteristics

We analyzed data from 2,236 deliveries from the CHA study, 36,449 deliveries from the ZamCAT study and 735 deliveries from the LINCPIN study. The CHA study population consisted primarily of married young women, in the 20-35 year age group. Most of the respondents had educational background up to primary level and were farmers. The ZamCAT study population was younger than the CHA study, mainly in the age group 24 years and below. Like women in the CHA study, most of them had only a primary level of education

and 82% were married. The socio-demographic characteristics of the women in the LINCHPIN study were similar to that of the CHA study. Overall, the study population was mostly young, less than 24 years of age, of low educational background up to primary school level, mainly farmers and most of them married (Table 1).

### Place of delivery

Among the three studies only about two thirds of the women (24,621 out of 39,418) delivered at a health facility; with 36.5% of the deliveries (14,375 out of 39,418) occurring at home. There were fairly large variations among the three studies in terms of facility deliveries, with the LINCHPIN study recording the lowest percentage of facility deliveries at 31.0% (228 out of 735) and the ZamCAT study recording the highest at 63.8%; while the CHA study recorded 51.7% facility deliveries. Less than 1% of the deliveries occurred at a TBA hut overall. However, in the LINCHPIN study 7.2% delivered at a TBA hut. A TBA hut refers to any place where a TBA conducts delivery, including the TBA's house (Table 2).

### Person assisting with delivery (all deliveries; N=39,079)

Unskilled deliveries constituted 46% (n=17,923) of all the deliveries across the three studies. TBAs conducted 19% (n=7,218) and

**Table 1:** CHA study socio-demographic characteristics of respondents and household.

Respondents	CHA N=2,236 n (%)	ZAMCAT N=39,375 n (%)	LINCHPIN N=735 n (%)	All studies N=42,3446 n (%)
<i>Age</i>				
24 years and below	825 (36.9)	20,160 (51.2)	263(35.8%)	21,248(50.2)
25-35 years	981 (43.9)	14,985 (38.1)	346(47.1%)	16,312 (38.5)
36-45 years	383 (17.1)	4,133 (10.5)	118(16.0%)	4,634 (10.9)
46-65 years	29 (1.3)	72 (0.2)	8 (1.1%)	109 (0.3)
> 65 years	18 (0.8)	0 (0)	8 (1.1%)	26 (0.1)
<i>Level of Education</i>				
No education	176 (7.9)	3,894 (9.9)	86(11.7)	4,156 (9.8)
Primary	1,695 (75.8)	20,461 (51.9)	456(62.0)	22,612 (53.4)
Secondary	355 (15.9)	14,656 (37.2)	188(25.6)	15,199 (35.9)
Post-secondary	10 (0.5)	340 (0.9)	5(0.7)	355 (0.8)
<i>Marital status</i>				
Married	1,774 (79.4)	32,606 (82.8)	623 (84.8%)	35,003 (82.7)
Separated/divorced	131 (5.9)	311 (0.8)	34 (4.6%)	476 (1.1)
Single/Unmarried	277 (12.4)	6,154 (15.6)	67 (9.1%)	6,498 (15.2)
Widowed	54 (2.4)	100 (0.3)	11 (1.5%)	165 (0.4)
<i>Main occupation (N=2,970)</i>				
Business/self-employed	108 (4.8)	-	126(17.1)	234 (7.9)
Farmer	1,852 (82.9)	-	489(66.5)	2,341 (78.8)
Civil Servant	-	-	14(1.9)	-
Housewife	204 (9.1)	-	85(11.6)	289 (9.7)
Unemployed	52 (1.1)	-	-	-
Other Office work	-	-	2(0.3)	-
Other	19 (0.9)	-	19(2.6)	65 (2.2)

**Table 2:** Delivery Location.

Indicator or characteristic	CHA (N=2234) n (%)	ZamCAT (N=36,449) n (%)	LINCHPIN (N=735) n (%)	All Studies (N=39,418) n (%)
Health facility	1156 (51.7)	23,237 (63.8)	228(31.0)	24,621(62.5)
Home	1019 (45.6)	12,906 (35.4)	450(61.2)	14,375(36.5)
TBA hut	50 (2.2)	-	53(7.2)	103(0.2)
Other	9(0.5)	306 (0.8)	4(0.6)	321(0.8)

3% (n=1,142) were unassisted. Among the non-skilled deliveries, 40% (7,218 out of 17,923) were delivered by TBAs. The greatest proportion of unskilled deliveries was observed in the LINCHPIN study (73.2%; n=538), followed by the CHA study (69.9%; n=1,563), and ZamCAT study with 43.8% (n=15,823) deliveries assisted by unskilled personnel (Table 3). In the LINCHPIN study, TBAs conducted 96%

(n=515) of the deliveries assisted by unskilled personnel. However, in the ZamCAT study Family members conducted half of the unskilled deliveries and TBAs conducted just over one third of the deliveries (Table 3).

### Person assisting with delivery at health facilities

Table 4 shows data on the person who delivered the woman within the health facility. Out of a total of 24,254 facility deliveries where data was available for this analysis, 86.3% were delivered by skilled birth attendants, mostly a nurse or midwife; and 14% by unskilled personnel. Ten percent (n=2,346) of all the facility deliveries across the three studies were conducted by TBAs and close to 1% (n=166) were delivered by family members.

Out of the total of 3,311 unskilled deliveries, TBAs conducted 71%, family members conducted 5%, and 1% was unassisted. 25%

**Table 3:** Person assisting with delivery (all deliveries).

Indicator or characteristic	CHA (N=2236) n (%)	ZamCAT (N=36,108) n (%)	LINCHPIN (N=735) n (%)	All Studies (N=39,079) n (%)
Doctor/clinical officer	75 (3.4)	-	20(2.7)	95(0.24)
Nurse/Midwife	598 (26.7)	20,285 (56.2)	177(24.1)	21,060(53.9)
Traditional birth attendant	859 (38.4)	5,844(16.2)	515(70)	7,21(18.5)
Community health worker	32(1.4)	-	1(0.1)	32(0.08)
Family member	380 (17.0)	8,295 (23.0%)	19(2.6)	8,314(21.3)
Nobody assisted	95 (4.3)	1,044 (2.9%)	3(0.4)	1,142(2.9)
Other	197 (8.8)	640 (1.8%)	-	1,217(3.1)
Total assisted by skilled birth attendant	673 (30.1)	20,285(56.2)	197(26.8)	21,155( 54.1)
Total assisted by non-skilled birth attendant	1,563 (69.9)	15,823(43.8)	538(73.2)	17,923(45.9)
Proportion of non-skilled deliveries assisted by TBA	859(55.0)	5,844(36.9)	515(95.7)	7,218(40.3)
Proportion of non-skilled deliveries assisted by family member	380(24.3)	8,295(52.4)	19(3.5)	8,314(46.49)
Proportion of non-skilled deliveries unassisted	95(6.1)	1,044(6.6)	3(0.6)	1,142(6.4)

**Table 4:** Person assisting with delivery at health facilities.

Indicator or characteristic	CHA (N=1,156) n (%)	ZamCAT (N=22,870) n (%)	LINCHPIN (N=228) n (%)	All Study (N=24,254) n (%)
Doctor/clinical officer	70 (6.1)	-	20 (8.8)	90(0.37)
Nurse/Midwife	591(51.1)	20,086 (87.8)	176 (77.2)	20,853(86.0)
Traditional birth attendant	285(24.7)	2,029(8.9)	32(14.0)	2,346(10.0)
Community health worker	23 (2.0)	-	0	22(0.1)
Family member	4 (0.4)	162 (0.7%)	-	166(0.7)
Nobody assisted	1(0.1)	32 (0.1%)	0	33(0.1)
Other	182 (15.7)	561 (2.5%)	0	748(3.1)
Total assisted by skilled birth attendant	661 (57.2)	20,086(87.8)	196(86.0)	20,943(86.3)
Total assisted by non-skilled birth attendant	495(42.8)	2,784(12.2)	32(14.0)	3,311(13.7)
Proportion of non-skilled deliveries assisted by TBA	285(57.6)	2,029(72.9)	32(100)	2,346(70.9)
Proportion of non-skilled deliveries assisted by family member	4(0.8)	162(5.8)	0(0)	166(5.0)
Proportion of unassisted deliveries	1(0.2)	32(1.2)	0(0)	33(1.0)

(n=285) of the facility deliveries in the CHA study were assisted by TBAs. In the LINCHPIN and ZamCAT studies TBAs delivered 14% (n=32) and 9% (n=2,029) of the facility deliveries respectively.

## Discussion

Both the LINCHPIN and CHA study results reveal low to medium [3] levels of health facility deliveries in the respective study areas,

ranging from 31% to 52% respectively. This is within the Zambia national average of 48% [11]. It is also within the sub-Saharan region Figures [3]. ZamCAT data reveal high levels of facility deliveries. This is most likely due to the intense community sensitization and messages delivered to pregnant women encouraging them to deliver at health facilities. Health facility delivery has been used as a key maternal health indicator under the premise that it would facilitate

and increase the number of births attended to by qualified health professionals and create conditions for safe delivery. Fretheim A. and Hviding K. [12] report that the presence of a skilled birth attendant with the necessary remedies at hand is the main argument for promoting facility-based deliveries. The authors of this paper did not find a formal definition of “facility-based deliveries”, but according to them, the term implies having a permanent health facility where skilled attendance for deliveries is being provided. Despite the use of health facility deliveries as a proxy for SBA, there appears to be no clear definition in the literature of health facility delivery. The Zambia DHS for example, includes hospitals, health centres and health posts as facility deliveries irrespective of the staffing pattern at these facilities and irrespective of whether these facilities are designated delivery centers or not [11]. Our data shows that facility deliveries do not necessarily translate into 100% SBA. Part of this is due to the definition of facility deliveries. If we defined facility deliveries in the context of presence of skilled birth attendants, then facility deliveries should translate into 100% as SBAs. The fact that DHS, at least in Zambia, includes health posts as facilities is a problem if we are to promote facility deliveries in order to attain SBAs.

Overall, the proportion of unskilled deliveries of 46% observed in our data is lower than the national figure of 56% [2]. However, an examination of the individual studies reveals fairly high proportions of unskilled deliveries in the LINCHPIN and CHA studies, with 70-73% of the deliveries attended to by unskilled personnel respectively. This is not surprising, however, considering that there has been a general decline in the proportion of deliveries attended to by SBA in Zambia over the period 1992 to 2010 [2]. In the African region SBA is only 46.5%; hence unskilled delivery still stands at 55.5%. Overall, our data on unskilled deliveries is just lower than the Africa region average. Global literature shows that 34% of deliveries take place without SBAs [13]. The question is what should be done to help the large number of women currently delivering without skilled assistance? Is what Zambia calls “assisted delivery” using trained TBAs a workable interim measure? Would equipping the TBAs with greater delivery skills as well as skills to manage postpartum hemorrhage (PPH) be the interim solution? Recent evidence shows that TBAs could be trained to safely and correctly deliver misoprostol to control PPH and to correctly use blood collection delivery mat to measure PPH blood loss [14,15]. The related question is whether using TBAs to manage home deliveries better by equipping them with skills and supplying them with commodities to manage PPH would encourage home deliveries and reduce facility deliveries. We were not able to get any literature that indicates that this may be the case and it may be necessary to conduct rigorous implementation research to evaluate the effect of this approach.

Some of our data on facility deliveries reveal a fairly large number of unskilled deliveries occurring within the health facilities themselves. Data from the CHA study show that, while approximately half of the deliveries occurred at a health facility, a SBA attended less than two thirds of these (57%). This means that unskilled personnel conducted 43% or 495 deliveries within the health facilities. Even for the ZamCAT study where SBA at health facilities was 88%, in absolute terms there were 2,784 unskilled deliveries within health facilities during the study period. A large proportion of these unskilled deliveries in health facilities were conducted by TBAs, both trained

and untrained. In the CHA study, 285 of the 495 unskilled deliveries within health facilities were conducted by TBAs. The ZamCAT study data revealed that 2,029 of the 2,784 unskilled deliveries (73%) within health facilities were conducted by TBAs. These data pose a number of challenges to the goal of achieving the millennium development goal number 5. First, in a country like Zambia with a critical shortage of staff for BEmONC, increasing facility deliveries may not necessarily reduce the number of unskilled birth attendance [16]. Secondly, the low proportions of facility deliveries, as shown by two of the three studies in Zambia, and considering that there are large numbers of unskilled deliveries occurring within health facility deliveries, poses great challenges to reducing maternal and neonatal mortality through SBA. Thirdly, the fact that most of the unskilled deliveries occurring in health facilities were attended to by TBAs adds to the debate on the role of TBAs in the delivery of babies and the skills TBAs should be equipped with. According to Prata et al. [17], in 2011 there were 28 countries from four major regions in which SBAs attended fewer than half of all births. And 69% of maternal deaths in those 4 regions could be attributed to the 28 countries, despite the fact that those countries only constituted 34% of the total population in those regions [18]. Prata and colleagues argue that while strengthening health systems makes excellent strategic sense, it does not address the immediate safe-delivery needs of the estimated 45 million women who are likely to deliver at home, without a skilled birth attendant. 46% of the women in the CHA study, 35% in the ZamCAT study, and 61% of the women in the LINCHPIN study respectively delivered at home. This constitutes 14,374 women who delivered at home during the study period of these three studies [19]. The question is who delivered these babies and more importantly, what was the outcome of these deliveries? An even more important question is, while efforts are being made to improve health systems and attain universal access to BEmONC, what should be done to assist these women who currently deliver at home? Prata and others recommend training of community-based birth attendants in primary and secondary prevention technologies (e.g. misoprostol, family planning, measurement of blood loss, and postpartum care) [20]. As stated above, equipping TBAs with more skills and resources may be an answer.

Lastly, we note that 3-4% of all deliveries were unassisted. For the CHA study, this translates to only 95 deliveries. However, for a large sample such as the one for ZamCAT, 3% of the deliveries translate into 1,000 unassisted deliveries. This scenario is not uncommon in sub-Saharan Africa, and thus requires urgent attention. For example, Fapohunda BM et al. [21] notes that not only are Nigerian women predominantly using unskilled attendants, but one in five births are delivered with No One Present (NOP).

## Limitations

Although the studies on which this paper is based are fairly large and had representative samples to detect change in their original outcome measures, the sub-analysis presented here may not be representative of the Zambian population as a whole. Another limitation is the unequal sample sizes among the studies included in this paper. For example, ZamCAT with its large sample size may have skewed the results.

## Conclusions and Recommendations

Results from the studies in this paper show that there is a fairly

large proportion unskilled deliveries occurring within health facilities and TBAs are delivering babies both outside and within health facilities. Hence facility deliveries within the current definition in Zambia and elsewhere in Africa and globally may not translate into SBA and are therefore unlikely to lead to the desired maternal outcomes expected from skilled assistance at birth. We recommend a redefinition of facility delivery as “the proportion of births occurring in a health facility with skilled birth attendants.” We also recommend a review of the role of TBAs and their training curriculum to ensure that the TBAs have stronger skills to conduct deliveries and control obstetric complications such as postpartum hemorrhage with misoprostol in addition to emphasizing the need to refer to health facilities. We make this recommendation in the light of the data that shows that in a country like Zambia, with a critical shortage of skilled health personnel for BEmONC, there are a large number of women assisted by TBAs, not just outside of health facilities but even within health facilities.

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