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Measurement of early initiation of breastfeeding: *a mixed
methods study exploring accuracy, challenges and implications
for tracking newborn health targets*

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Thesis submitted in accordance with the requirements for the degree of
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Department of Disease Control,
Faculty of Infectious and Tropical Diseases,
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I dedicate this to my beloved wife Mrs Fireweini K Fekadu and our daughters Eldana M Salasibew and Saron M Salasibew. Thank you Friye for your patience and continued motivation, which has been so instrumental in successfully completing my study. Kids, daddy achieved this big milestone and he is very happy. Thank you for your patience and I am so proud of you. We can now get on with the bed time stories.

Declaration

I, [Mihretab Melesse Salasibew], confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:



Date: 31/07/2015

Abstract

Background

Early initiation of breastfeeding within one hour after birth is one of the recommended interventions for saving newborn lives. Despite WHO standards, there are still inconsistencies between surveys in how the indicator is measured. This thesis identified challenges and accuracy issues in the measurement of early initiation indicator and proposed improvements to household survey tools.

Objectives

Individual studies included in this thesis assessed the following: the evidence-base for the 'one hour' time limit in defining the indicator; mothers' perception of the survey question; newborn care practices other than breastfeeding; and data collectors' experiences of asking mothers the early initiation question.

Methods

Mixed methods were used and data was collected using a critical review of the literature, cognitive interviews, semi-structured interviews, focus group discussions, key informant interviews and a self-administered questionnaire. All primary data was collected from Ethiopia.

Results

Nine out of 11 studies included in the review provided evidence supporting the 'one hour' time limit in the early initiation indicator. Primary data collection in Ethiopia revealed that some mothers did not understand the question as intended. Considerable probing was required and there were inter-personal variations among data collectors in how they asked the question. In the context of home births, other competing newborn care practices were given priority over breastfeeding initiation.

Conclusion

This thesis provided evidence supporting the 'one hour' time limit for the indicator and accordingly, consistent use of standard WHO definition is recommended. To avoid ambiguity, the early initiation question should be revised as "how long after birth did you first put [name] to the breast even if your breastmilk did not arrive yet?" Standard probes or follow on questions are required to avoid misinterpretation of the indicator by data collectors. Probes should be designed using other newborn care practices as reference points to improve maternal recall.

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List of abbreviations

BAT: Breastfeeding Assessment Tool

BFHI: Baby Friendly Hospital Initiative

BSES: Breastfeeding Self-efficacy Scale

CNS: California Newborn Screen

DHS: Demographic and Health Survey

EBF: Exclusive breastfeeding

EHS DP: Ethiopian Health Sector Development Programme

ENAP: Every Newborn Action Plan

HAZ: height-for-age z-score

IBFAT: Infant Breastfeeding Assessment Tool

ICC: Intra-class correlation coefficient

IDEAS: Informed Decisions for Actions to improve maternal and newborn health

IYCF: Infant and Young Child Feeding

MBA: Mother Baby Assessment

MDG: Millennium Development Goals

MICS: Multiple Indicator Cluster Survey

MNCH: Maternal, Newborn and Child Health

NIS: National Immunization Survey

PMNCH: Partnership on Maternal, Newborn and Child Health

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

SMS: Short Message Service

SNL: Saving Newborn Lives

SNNP: Southern Nations, Nationalities and Peoples' region

SSC: Skin-to-skin contact

TBA: Traditional birth attendants

TWG: Technical Working Group

UN IGME: UN Inter-agency Group for Child Mortality Estimation

WHO: World Health Organization

WHZ: weight-for-height z-score

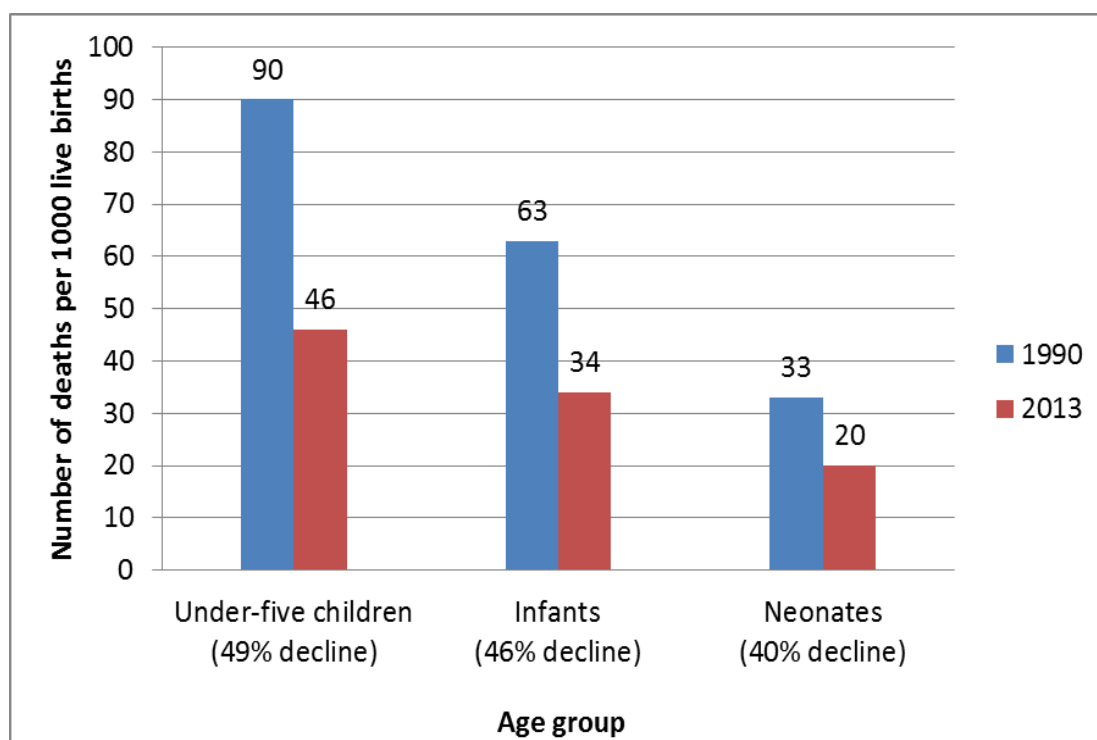
Chapter 1 : Introduction

This chapter introduces early initiation of breastfeeding in the context of newborn health policy initiatives and interventions, summarises measurement standards and presents background information about Ethiopia as a study setting for this PhD.

1.1 Newborn health policy initiatives and recommendations

Worldwide, the under-five mortality rate continues to decline with a substantial 49% reduction in child deaths between 1990 and 2013, from 90 to 46 deaths per 1,000 live births. The global neonatal mortality rate also declined 40 percent from 33 deaths per 1,000 live births in 1990 to 20 in 2013. However, the proportion of under-five deaths that occur within the first 28 days of life (the neonatal period) increased from 37 percent in 1990 to 44 percent in 2013 because declines in the neonatal mortality rate were slower than those in the mortality rate for older children. In 2013, global estimates showed that 2.8 million newborn babies die every year. This trend was even more pronounced in sub-Saharan Africa which carried a third of all global under-five deaths and 39 percent of all global neonatal deaths - with the region having the highest neonatal mortality rate (31 deaths per 1,000 live births) (1) (Fig 1.1).

Figure 1.1: Global trends in neonatal, infant and under-five mortality between 1990 & 2013



Source: UN Inter-agency Group for Child Mortality Estimation (UN IGME). Levels & Trends in Child Mortality: 2014 report. 2014.

1.1.1 Newborn health policy initiatives

Since the early 1990s, attention has increasingly focused on the importance of addressing newborn survival. In 1990, world leaders agreed on a set of eight Millennium Development Goals (MDGs) which range from reducing under-five mortality and halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 (2). In June 2000, Save the Children USA and its partners launched the Saving Newborn Lives (SNL) initiative which focused on advocacy to inform policy-makers and programme managers on the importance of improving newborn survival, what could be done affordably and in a sustainable manner, and how to integrate newborn care into existing health care programmes. The initiative demonstrated that low-cost, community-based interventions and strategies, backed up by targeted research on overcoming the key barriers, could significantly reduce newborn mortality (3).

The Lancet child and neonatal survival series, 2003 & 2005 respectively, highlighted the magnitude and causes of newborn deaths and provided evidence-based, cost-effective interventions that could save newborn lives as well as strategies for scale-up (4-7). The Partnership for Maternal, Newborn and Child Health (PMNCH), launched in 2005 in partnership with the World Health Organization, the Healthy Newborn Partnership (based at Save the Children USA) and the Child Survival Partnership (hosted by UNICEF), was designed to enable partners to share evidence on maternal and child health strategies, align objectives and resources, and agree on interventions to achieve more together (8).

The Every Woman Every Child movement, launched by UN Secretary-General Ban Ki-Moon during the United Nations MDGs Summit in September 2010, aimed to save the lives of 16 million women and children by 2015 (9). The movement put into action the global strategy for women's and children's health (10), which presented a roadmap on how to enhance financing, strengthen policy and improve service on the ground for the most vulnerable women and children.

In 2012, a modelling exercise presented at a high level forum (Child Survival Call to Action) demonstrated that countries could lower their national under-five mortality rates to 20 or fewer deaths per 1,000 live births by 2035 if action was taken to scale up efforts to accelerate declines in preventable maternal, newborn and child deaths. During the forum, 178 governments, as well as hundreds of civil society and faith-based organizations, signed a pledge, vowing to do everything possible to stop women and children from dying of causes that are easily avoidable. This call is now referred to as 'Committing to Child Survival: A Promise Renewed' (11). In May 2014, the Lancet Every Newborn Series (12) was launched and, following the neonatal survival series in 2005, presented evidence on the on-going slow progress in newborn survival and provided a new focus of newborn health beyond survival for the post 2015 agenda. Accordingly, the new series proposed national targets for 2035 of no more than 10 stillbirths per 1000 total births and no more than 10 neonatal deaths per 1000 live births, compatible with the under-5 mortality targets of no more than 20 per 1000 live births pledged in the 'Promise renewed' (11).

This Lancet Series (12) was closely aligned with the Every Newborn Action Plan (ENAP), launched on the 30th June 2014 and the result of extensive consultation with member states and multiple organizations and individuals. ENAP supports the target to reach an under-five mortality rate of 20 or fewer deaths per 1,000 live births in each country by 2035, calculating that nearly 3 million lives could be saved each year if the actions in the plan were implemented and its goals and targets achieved (13).

1.1.2 Recommended newborn health care interventions

Essential interventions for all newborns immediately after birth such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour after birth) as well as hygienic cord and skin care are recommended to save newborn lives (13-15). In 2013, WHO (16) assessed the strength of evidence supporting these and other newborn care recommendations and accordingly, the interventions strongly recommended immediately after birth include the following:

- Cord clamping: Late cord clamping (performed after one to three minutes after birth) is recommended for all births while initiating simultaneous essential newborn care. Early cord clamping (<1 minute after birth) is not recommended unless the neonate is asphyxiated and needs to be moved immediately for resuscitation.
- Skin to skin contact in the first hour of life: newborns without complications should be kept in skin-to-skin contact with their mothers during the first hour after birth to prevent hypothermia and promote breastfeeding.
- Initiation of breastfeeding: all newborns, including low-birth-weight (LBW) babies who are able to breastfeed, should be put to the breast as soon as possible after birth when they are clinically stable, and the mother and baby are ready.
- Cord care: daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) application to the umbilical cord stump during the first week of life is recommended for newborns who are

born at home in settings with high neonatal mortality (30 or more neonatal deaths per 1000 live births). Clean, dry cord care is recommended for newborns born in health facilities and at home in low neonatal mortality settings. Use of chlorhexidine in these situations may be considered only to replace application of a harmful traditional substance, such as cow dung, to the cord stump.

- Keeping the newborn warm: Bathing should be delayed until 24 hours after birth. If this is not possible due to cultural reasons, bathing should be delayed for at least six hours. Appropriate clothing of the baby for ambient temperature is recommended. This means one to two layers of clothes more than adults, and use of hats/caps. The mother and baby should not be separated and should stay in the same room 24 hours a day.

1.2 Breastfeeding policy initiatives and recommendations

Breastfeeding protects children from asthma and common childhood infections such as acute otitis-media, gastro-enteritis and severe lower respiratory infections because of the presence of antimicrobial, anti-inflammatory and immunomodulatory agents in human milk that contribute to optimal immune system function (17-25). More studies have also established benefits of breastfeeding in reducing neonatal and under-five mortality (4, 13-15). Consequently, a series of national and global policy initiatives, guidelines and legislations have been implemented over a number of years to promote and protect breastfeeding.

In May 1981, the World Health Assembly adopted the International Code on Marketing of Breastmilk Substitutes following the view that some infant food industries were undermining breastfeeding through aggressive and unethical marketing strategies (26). In 1989, WHO and UNICEF recommended the Ten Steps to successful breastfeeding (27) for facilities providing maternity services. One of the recommendations, step 4, was to initiate breastfeeding within at most one hour after birth. Other recommendations include having a written breastfeeding policy

(step 1), training of health workers (step 2) and informing pregnant women about the benefits and management of breastfeeding (step 3).

In July 1990, a global initiative called the “Innocenti Declaration on Protection, Promotion and Support of Breastfeeding” was adopted in an international meeting held in the Innocenti centre, Florence, Italy (28). In 1991, WHO and UNICEF launched the Baby Friendly Hospital Initiative (BFHI) following the Innocenti Declaration and the initiative, which was revised in 2009 (29), represented a global effort to implement practices that protect, promote and support breastfeeding. In 2003, WHO and UNICEF jointly developed the Global Strategy on Infant and Young Child Feeding building upon previous initiatives to further strengthen the protection and promotion of breastfeeding. Accordingly, exclusive breastfeeding is recommended for the first six months of age and thereafter appropriate complementary feeding with timely, nutritionally safe and adequate food is recommended while breastfeeding continues up to two years of the child’s life or beyond. This strategy addressed the needs of all children at different ages and those living in difficult circumstances, for example, low birth weight children, infants in emergency situations and infants born from HIV-positive mothers (30). In 2010, WHO published a further guidance with infant feeding recommendations in the context of HIV/AIDS supporting breastfeeding for all infants together with provision of anti-retroviral therapy (31).

1.3 Standards for the measurement of early initiation of breastfeeding

In order to generate accurate prevalence figures and inform policy makers about success or failure of a particular breastfeeding policy or program, a set of standard indicators were recommended. In 1991, WHO published standard questions and indicators recommended for the assessment of infant feeding practices (32). These standards were revised in 2008 following changes to infant feeding recommendations, and accordingly, eight core and seven optional indicators are currently recommended for population-based measurement of infant and young child feeding practices. Core indicators include the indicators for early initiation,

exclusive breastfeeding and continued breastfeeding at one year (Box 1). Optional indicators include children ever breastfed, continued breastfeeding at two years, age appropriate breastfeeding and predominant breastfeeding under 6 months of age (33).

Box 1: Core indicators recommended for assessing infant feeding practices

Early initiation

Proportion of children born in the last 24 months who were put to the breast within one hour after birth

Exclusive breastfeeding

Proportion of infants 0–5 months of age who were fed exclusively with breast milk

Continued breastfeeding at 1 year

Proportion of breastfed children at 12–15 months of age

Introduction of solid, semi-solid or soft foods

Proportion of infants 6–8 months of age who received solid, semi-solid or soft foods

Minimum dietary diversity

Proportion of children 6–23 months of age who received foods from 4 or more food groups

Minimum meal frequency

Proportion of breastfed and non-breastfed children 6–23 months of age who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

Minimum acceptable diet

Proportion of children 6–23 months of age who received a minimum acceptable diet (apart from breast milk)

Consumption of iron-rich or iron-fortified foods

Proportion of children 6–23 months of age who received an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the home

This PhD thesis will focus on one of the recommended core indicators i.e. early initiation of breastfeeding. WHO defines early initiation as initiation of breastfeeding within one hour after birth and the indicator is calculated as the number of children born in the last 24 months who were put to the breast within one hour of birth divided by the total number of children born alive in the last 24 months (table 1.1). The following key points were highlighted in the WHO guidance (33, 34) in order to facilitate accurate interpretation and measurement of early initiation:

- The numerator and denominator include children born alive who were either deceased or living at the time of survey.
- This indicator relies on historic recall i.e. recall by mothers about their feeding practices in early child life.
- The wording of the question recommended to ask mothers about their practice in early initiation is 'how long after birth did you first put [name] to the breast?'
- Eligible mothers to be asked the question assessing early initiation of breastfeeding are those between 15 to 49 years old who ever breastfed a child born two years preceding the survey.
- The indicator for early initiation was designed to measure the length of time after birth when the mother attempted to initiate breastfeeding regardless of whether breastmilk had arrived or not.

Table 1.1: Standards recommended for assessing early initiation of breastfeeding

WHO standard definition: breastfeeding initiation within one hour after birth	
Indicator: Number of children born in the last 24 months who were put to the breast within one hour after birth divided by all children born alive in the last 24 months	
Survey question: How long after birth did you first put (NAME) to the breast?	
Coding format:	
If mother reports she put the infant to the breast immediately after birth, circle '000'.	IMMEDIATELY.....000
If less than 1 hour, circle '1' for hours and record '00' hours.	HOURS.....1 _ _
If less than 24 hours, circle '1' and record number of completed hours, from 01 to 23.	HOURS.....1 _ _
Otherwise, circle '2' and record number of completed days.	DAYS.....2 _ _

1.4 PhD study setting: Ethiopia

Ethiopia was chosen as the study setting because it is the home country for the principal investigator which makes it convenient to facilitate selection of study sites, participants and research assistants as well as to liaise with local partners and authorities, not least by being able to communicate using local languages.

1.4.1 Background

Ethiopia, located in the horn of Africa, border Eritrea 1033 km in the North, Sudan 744 km and south Sudan 1299 km in the west, Kenya 867 km in the south, Somalia 1640 km and Djibouti 342 km in the east (Figure 1.2). Ethiopia has over 99 million population (2015 est.) with the majority (64%) of its population under 24 years of age and only 2.8% are over the age of 65 (35).

Figure 1.2: Map of Ethiopia



Source: Map of World (36)

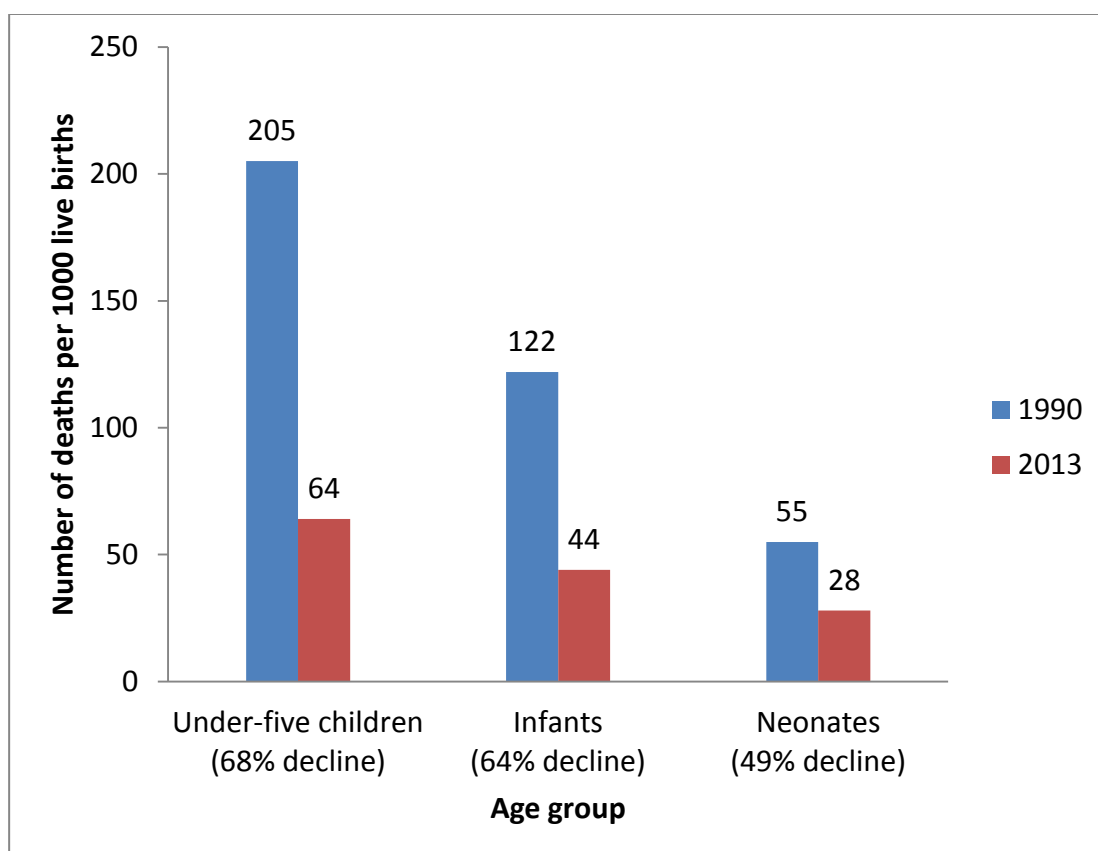
Ethiopia has a diverse population comprising Oromo 34.4%, Amhara 27%, Somali 6.2%, Tigray 6.1%, Sidama 4%, Gurage 2.5%, Welaita 2.3%, Hadiya 1.7%, Afar 1.7%, Gamo 1.5%, Gedeo 1.3%, Silte 1.3%, Kefficho 1.2% and others 10.5% (2007 est.). The national language is Amharic but each region also has its own official language with Oromigna in the Oromiya region and Tigrigna in the Tigray region. English is a major foreign language in the country which is also taught in schools. Ethiopian Orthodox 43.5% and Muslim 33.9% are the two major religions and other religions include Protestant 18.5%, traditional 2.7% and Catholic 0.7%. Ethiopia has an agriculture-led economy and coffee is a major export crop. It has a GDP per capita of \$1500 (2014 est.) which makes Ethiopia one of the poorest countries in the World (35). Politically, Ethiopia is a federal democratic republic with 9 regions and 2 administrative cities

i.e. Addis Ababa (the capital city) and Dire Dawa. Ethiopia has a constitution adopted in 1994 and national and regional elections are held every five years (37).

In the health sector, the country adopted its existing national health policy in 1991 followed by four consecutive five-year health sector development plans (HSDP) with considerable achievements and success stories in recent years. There has been a decreasing trend in under-five mortality from 205 deaths per 1000 live births in 1990 to 146 and 64 deaths per 1000 live births in 2000 and 2013, respectively. Overall, under-five mortality rate dropped by 68% between 1990 and 2013, which meant that Ethiopia succeeded in meeting the fourth millennium development goal two years before the deadline in 2015 (38). Similarly, infant and neonatal mortality rates declined from 122 and 55 deaths per 1000 live births in 1990 to 44 and 28 deaths in 2013, respectively (1) (Fig 1.3). In 2014, four in every ten married women (42%) used contraception and the total fertility rate in Ethiopia dropped from 5.4 in 2005 to 4.1 children. Forty percent of women received antenatal care from a skilled provider for their most recent birth, an increase from 34% in 2011. One woman in every three (32%) made four or more antenatal visits during the course of her pregnancy, up from 19% in 2011 (39).

However, like many sub-Saharan Africa countries, Ethiopia has a long way to go to address the health needs of its population. According to 2013 estimates, Ethiopia was among the top ten countries with the highest absolute number of under-five deaths (196, 000 deaths) and neonatal deaths (84, 000 deaths) which accounts for 3% of both all global under-five deaths and all neonatal deaths. Twenty eight newborns per 1000 live births die within the first 28 days after birth (40). Although the percentage of facility births increased from 10% in 2011 to 15 % in 2014, 85% of women in Ethiopia still deliver at home and only 12% receive postnatal care within the first two days of delivery (39).

Figure 1.3: Neonatal, infant and under-five mortality trends in Ethiopia from 1990 to 2013



Source: Calculated based on data from UN Inter-agency Group for Child Mortality Estimation. Levels & Trends in Child Mortality: 2014 report. 2014

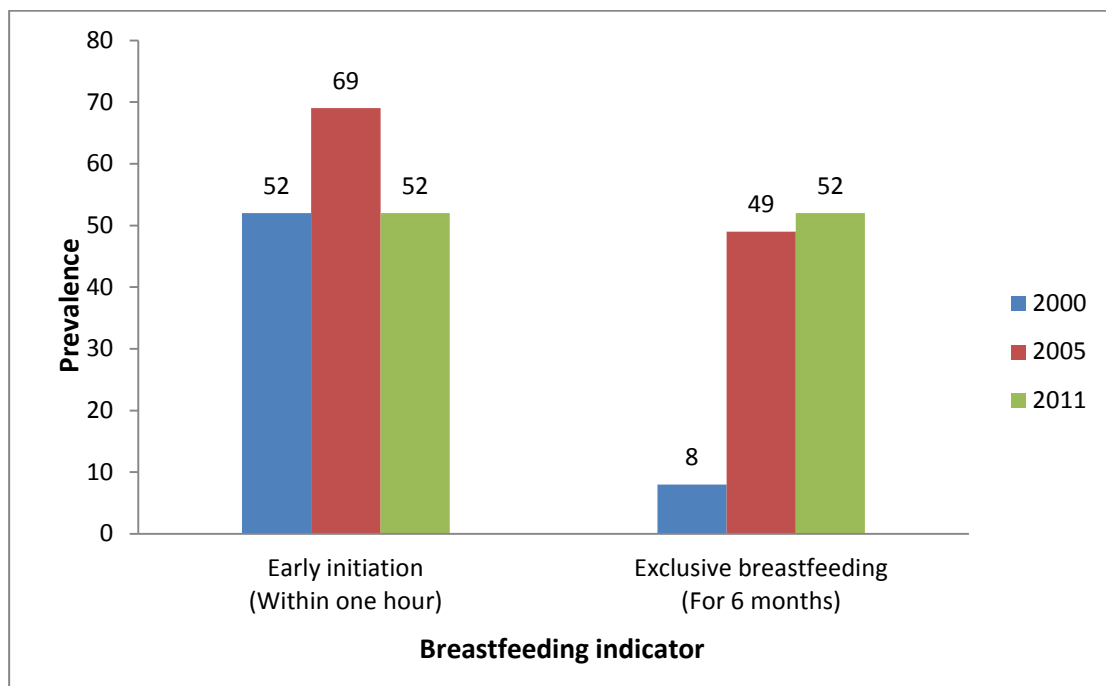
1.4.2 Household surveys assessing prevalence of early initiation of breastfeeding

In sub-Saharan Africa, the two most common large scale population-based sources of infant feeding data are Demographic and Healthy Survey (DHS) and UNICEF'S Multiple Indicator Clustered Survey (MICS). MEASURE DHS project, funded by USAID, collects and disseminates nationally representative data on fertility, family planning, maternal and child health, gender, HIV/AIDS, malaria, and nutrition. There are three core questionnaires in DHS surveys: Household questionnaire, Men's questionnaire and Women's questionnaire which includes questions assessing breastfeeding practices. Over 260 standard DHS surveys have been conducted in more than 90

countries worldwide since the start of the project in 1984. Except Angola, all 44 sub-Saharan African countries have had at least one standard DHS survey and a total of 126 surveys have been conducted in the region (41). On the other hand, UNICEF has been conducting MICS surveys since mid-1990s to provide data on the situation of women and children in the areas of health, education, child protection and HIV/AIDS. So far, over 240 MICS surveys have been conducted worldwide in approximately 100 countries. Of the 44 sub-Saharan African countries, 35 countries have had at least one MICS survey and over 64 surveys have been conducted in the region (42).

In Ethiopia, there are no MICS surveys conducted so far but three standard DHS surveys were conducted in 2000 (43), 2005 (44) and 2011 (45), respectively. In 2014, a mini DHS was conducted to collect the latest population-based data on key demographic indicators that support monitoring and evaluation needs for Phase IV of the Ethiopia Health Sector Development Program (HSDP IV) (39). According to the 2011 DHS report, over 98% of all children in Ethiopia are ever breastfed but only 52% of newborns initiated breastfeeding within one hour after birth, which is far from the government's own target of 92% (45). There was an increasing trend in rates of exclusive breastfeeding for the first six months of child's life from as low as 8% in 2000 to 49% in 2005 and 52% in 2011. Although more mothers initiated breastfeeding within one hour after birth in 2005 (69%) compared to 52% in 2000, this proportion dropped back to 52% in 2011 (46) (Fig 1.4).

Figure 1.4: Trends in breastfeeding practices in Ethiopia between 2000 and 2011



Source: Negera A, Abelti G, Bogale T, Gebreselassie T, and Roger P. An analysis of the trends, differentials and key proximate determinants of infant and under-five mortality in Ethiopia: further analysis of the 2000, 2005 and 2011 Demographic and Health Surveys data. Calverton, Maryland, USA: ICF International; August 2013.

1.5 Scope and composition of the thesis

Accurate measurement of prevalence in early initiation could help in tracking the progress made in reaching out to more newborn babies who could benefit from this life-saving intervention. This PhD thesis will explore accuracy in the measurement of early initiation of breastfeeding, identify the challenges and propose improvements to population level household surveys tools. Subsequent chapters in this thesis will address the following areas:

Chapter 2:

Critically reviews the evidence-base supporting early initiation of breastfeeding as one of the interventions saving newborn lives, examines the factors which could affect accuracy in measurement of breastfeeding practices, identifies the knowledge gaps in the literature and provides the rationale for this PhD thesis.

Chapter 3:

Summarises objectives and methods for individual studies within the thesis

Chapters 4-7:

Constitute results of individual studies published or submitted for publication.

Chapter 8:

Compiles all findings from individual studies and discusses these findings based on existing knowledge identified in the literature review and finally

Chapter 9:

Presents conclusions and implications for policy, practice and research

1.6 References

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Chapter 2 : Literature review

As discussed in the previous chapter, the World Health Organization recommends early initiation of breastfeeding within one hour after birth, exclusive breastfeeding for the first six months of age and appropriate complementary feeding with timely, nutritionally safe and adequate food thereafter while breastfeeding continues up to two years of the child's life or beyond (1). It also recommends standard indicators to estimate population-level prevalence of infant-feeding practices such as early initiation and exclusive breastfeeding (2-4).

This chapter presents (i) the evidence-base for the reported benefits of early initiation of breastfeeding in saving newborn lives, (ii) factors affecting accuracy in the measurement of infant-feeding practices and (iii) the rationale and research questions for this PhD.

2.1 Benefits of early initiation of breastfeeding in saving newborn lives

An estimated 2.8 million newborn babies die every year (5) and there is a global consensus in scaling up newborn life-saving interventions, such as early initiation of breastfeeding (6, 7). This review explored the evidence-base for the reported benefits of early initiation of breastfeeding in preventing newborn deaths.

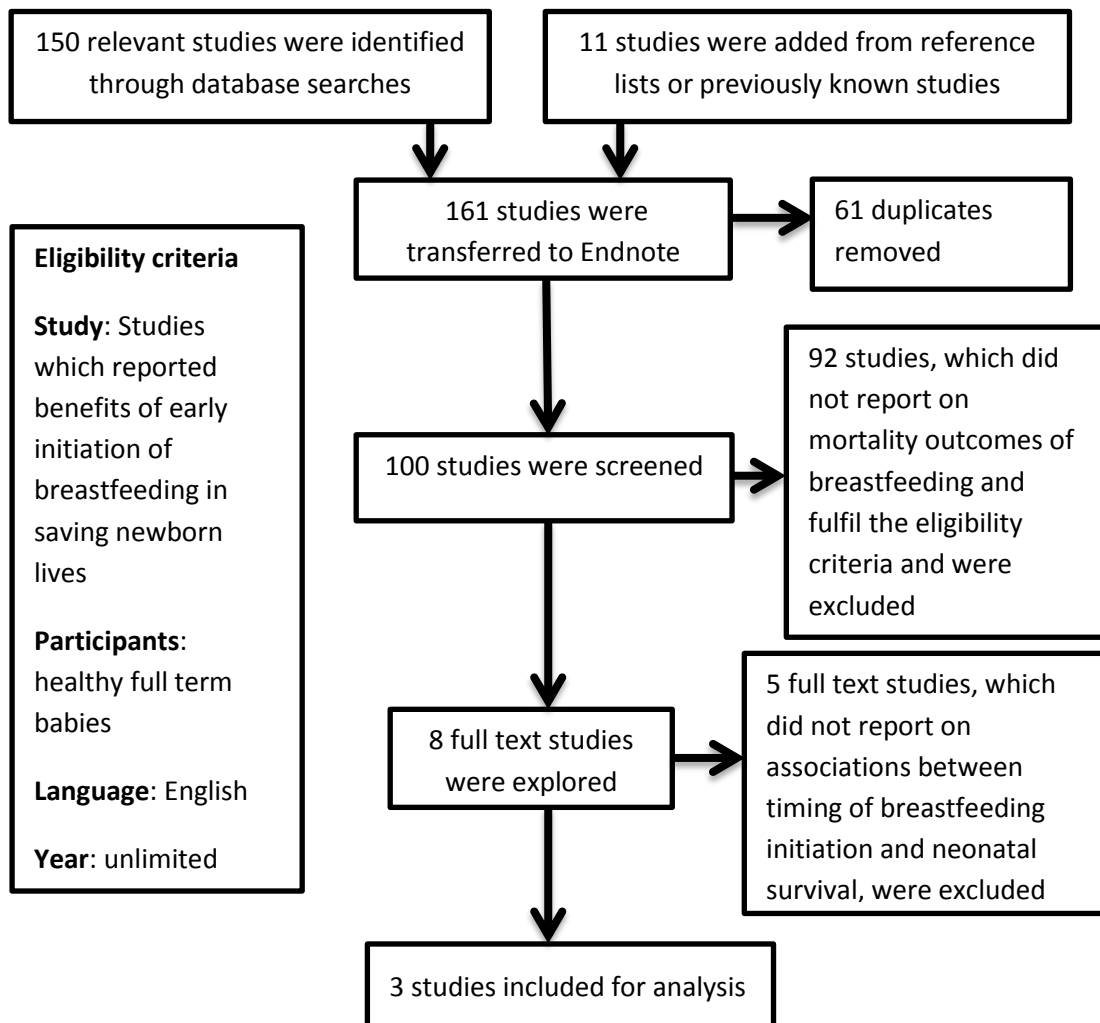
Review question: Does early initiation of breastfeeding prevent newborn deaths?

Studies in English language which reported associations between early initiation of breastfeeding and newborn survival among healthy and full-term newborn babies were included regardless of the year the study was published. Reviews and commentary articles were excluded. The search terms used were benefits, advantages, gains, early, immediate, within one hour, breastfeeding, breastmilk, human milk, lactation. Eligible studies were identified using searches from electronic databases Medline, Embase and CINAHL and from the reference list of identified studies. The search strategy [benefits OR advantages OR gains] AND [early OR

immediate OR within one hour] AND [breastfeeding OR breastfeeding initiation OR breastmilk OR human milk OR lactation] was developed for Medline and adopted for other databases (See appendix 3, for further details).

Following searches in Medline, Embase and CINAHL, 599, 786 and 168 studies were retrieved from each database, respectively. Titles and abstracts of these studies were screened and 150 studies were relevant for further review. Eleven studies were added from previously known studies or identified from reference lists of relevant studies. A total of 161 relevant studies were transferred to EndNote and 61 duplicates were removed. The remaining 100 studies were screened based on the eligibility criteria (Fig 2.1) and 92 studies, which did not report on mortality outcomes of breastfeeding and fulfil the eligibility criteria, were excluded. Full texts of the remaining eight studies which reported mortality outcomes were explored and only three studies remained eligible for further analysis.

Figure 2.1: Flow diagram showing identification of studies



Among the 92 excluded studies, some studies reported on associations between breastfeeding and child infections or allergic diseases (8-25), brain development in later life (26-34), child obesity, diabetes and blood pressure (35-40) and maternal cardio-vascular function and postnatal depression (41-44). Of the eight studies with mortality outcomes, five studies reported on associations between breastfeeding and neonatal or child mortality (45-49) but did not specifically evaluate the effect of timing of breastfeeding initiation on neonatal mortality. Only three studies (50-52) were identified which directly reported about the associations between newborn survival and timing of breastfeeding initiation.

Using critical appraisal tools for studies with cohort study design (53), these three studies are critically analysed in table 2.1 below.

Table 2.1: Critical appraisal of studies which reported newborn survival outcomes based on timing of breastfeeding initiation

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
1	Was it a randomized controlled trial?	<p>No</p> <p>This was a <u>prospective cohort</u> study conducted as part of the ObaapaVitA trial in Ghana - a community-based, cluster-randomized, double-blind, placebo-controlled trial, which ran between December 2000 and October 2008 and assessed the impact of weekly vitamin A supplementation on maternal mortality.</p>	<p>No</p> <p>This was a <u>prospective cohort</u> study conducted as part of a large community-based, placebo-controlled randomized trial in Nepal, which was conducted between August 2002 and January 2006 and assessed the effect of chlorhexidine antiseptics interventions (newborn skin and umbilical cord cleansing) on neonatal mortality and morbidity.</p>	<p>NO</p> <p>This was a <u>prospective cohort</u> study conducted as part of the VASIN study in India - a community-based, randomized, placebo-controlled trial, which was conducted between June 1998 and March 2001 and assessed the impact of newborn vitamin A supplementation on early infant mortality</p>
2	Did the study address a clearly focused issue?	<p>Yes</p> <p>The study had a clearly defined target population and focused on assessing the effect of timing of early initiation of breastfeeding on neonatal mortality.</p>	<p>Yes</p> <p>The study had a clearly defined target population and focused on assessing the effect of timing of early initiation of breastfeeding on neonatal mortality.</p>	<p>Yes</p> <p>The study had a clearly defined target population and assessed the effect of timing of early initiation of breastfeeding on neonatal mortality.</p>

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
3	Was the cohort recruited in an acceptable way?	<p>Yes</p> <p>The study recruited all singleton infants born during the trial between July 1, 2003 and June 30, 2004, who initiated breastfeeding, survived to day 2 and whose mothers were visited for data collection in the neonatal period.</p>	<p>Yes</p> <p>The study recruited all live-born infants of mothers participating in the trial, survived to 48 hrs of life, whose mothers reported breastfeeding and for whom a breastfeeding initiation time could be estimated.</p>	<p>Yes</p> <p>The study recruited all infants born alive within 20 km of the participating villages in the VASIN trial and who survived to 48 hrs of life.</p>
4	Was the exposure measured accurately to minimise bias?	<p>Yes</p> <p>Exposure to breastfeeding was measured using the 'birth' questionnaire. When a birth was reported, field workers visited the mother and asked about timing of breastfeeding initiation and other newborn behaviours. As part of the questionnaire, the mother was asked when she initiated breastfeeding and was prompted for the exact timing (within 1 hr, after 1 hour but first day, day 2, day 3, day 4–7, after day 7).</p>	<p>Yes</p> <p>Exposure was measured using the 'birth assessment' questionnaire. Upon notification of live-born infants, a local female staff asked mothers if their infant had been breastfed and, if so, they were asked how long after birth was breastfeeding initiated. The primary exposure variable was categorized as follows: within 1 hr of birth, ≥ 1 to < 24 hr, ≥ 24 to < 48 hr, ≥ 48 hr to < 72 hr, and ≥ 72 hr. A 2nd exposure variable was created and defined as early initiators (< 24 hrs) and late initiators (≥ 24 hr).</p>	<p>Yes</p> <p>Exposure was measured using a questionnaire. When a birth occurred, a supervisor visited the village and collected information on breastfeeding initiation time and newborn characteristics. The primary exposure variable (breastfeeding initiation time) was categorized both as a three category variable (12 hr of birth, 12 to 24 hr and > 24 hr) and as a binary variable (24 hr vs > 24 hr) for comparability with previous studies.</p>

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
5	Was the outcome accurately measured to minimise bias?	<p>Yes</p> <p>At the next 4-week visit, an 'infant' questionnaire was administered to obtain data on infant morbidity and mortality. Infants were followed up at subsequent visits every 4 weeks until they reached 12 months of age.</p>	<p>Yes</p> <p>The local female staff made 11 followed up visits during the neonatal period on a standard schedule (d 1-4, 6, 8, 10, 12, 14, 21, and 28) and asked mothers about feeding practices and signs of infections like omphalitis, other morbidities as well as any newborn deaths.</p>	<p>Yes</p> <p>Project staff visited infants every 2 weeks to record daily vital status and morbidity history. In the event of an infant death, cause of death was assigned through an independent review by two paediatricians based on the verbal autopsy data provided by family members.</p>
6	Was the follow up of subjects complete and long enough?	<p>Can't tell, because no follow up plan was reported</p>	<p>Yes</p> <p>A flow chart is presented, clearly showing which participants provided the exposure and outcome data for analysis.</p>	<p>Yes</p> <p>A flow chart is presented, clearly showing which participants provided the exposure and outcome data for analysis.</p>

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
7	Have they taken account of the confounding factors in the design and/or analysis?	<p>Yes</p> <p>To reduce problems with <u>reverse causality</u> (the possibility of breastfeeding pattern being affected by serious illnesses that lead to death) only infants who survived to day 2 and who were breastfed successfully were included in the primary analyses and analyses were repeated excluding infants at high risk of death and ill health (congenital anomalies, premature, unwell on the day of birth, and unwell at the time of interview) and early neonatal deaths. <u>Multiple births</u>, <u>non-initiators</u>, and those who were interviewed <u>outside the neonatal period</u> were also excluded. Potential confounders relating to the <u>mother</u> (health, parity, age, educational level, and cash income), <u>household</u> (water supply and place of defecation), <u>health system</u> (number of antenatal visits, place of birth, and birth attendant), and <u>the infant</u> (sex, birth size, gestational age, presence of a congenital anomaly, health on the day of birth, and health at the time of interview) were controlled for analysis.</p> <p>No details were given how the authors attempted to minimize recall bias</p>	<p>Yes</p> <p>Similar measures were taken to reduce problems with <u>reverse causality</u> as the previous study (Edmond <i>et al.</i>, 2006)</p> <p>To minimize <u>recall bias</u>, time in hours was estimated from 3 main sources (<u>birth assessment</u>, interviews during follow-up visits on <u>days 1-4</u> and <u>day 14</u>).</p> <p>Priority was given to responses made with minimal recall time i.e. birth assessment interview. If this visit occurred before breastfeeding had been initiated, timing was estimated using breastfeeding information from previous 24 hrs collected during the follow-up visits.</p>	<p>Yes</p> <p>Similar measures were taken to reduce problems with <u>reverse causality</u> as the previous study (Edmond <i>et al.</i>, 2006)</p> <p>Additionally, to reduce likelihood of <u>recall bias</u>, only infants for whom the first visit occurred within 7 days after birth were included in the analysis. If during the first visit, breastfeeding had not been initiated, the infant was excluded from the analysis because their time of initiation could not be determined.</p>

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
8	What are the results of this study?	<p>Data was analysed based on 10947 infants and among these, there were 145 neonatal deaths from days 2 to 28.</p> <p>Compared to breastfeeding initiation within one hour, there was 43% increased risk of dying among newborns who initiated breastfeeding between one to 24 hours after birth (1.43, 95% CI: 0.88 to 2.31) and this risk more than doubled when breastfeeding initiation was delayed to day 2 (2.52, 95% CI: 1.58 to 4.02).</p> <p>Overall, late initiation (after day 1) was associated with a 2.4-fold increase in the risk of neonatal mortality (2.40, 95% CI: 1.69 to 3.40).</p> <p>Assuming that early breastfeeding has no effect on deaths prior to 48 hr, 16% and 22% of all neonatal deaths could be prevented if all mothers initiated breastfeeding within 24 hrs and one hour after birth, respectively.</p>	<p>Data was analysed based on 22838 infants and among these, there were 297 neonatal deaths from days 2 to 28.</p> <p>Compared to breastfeeding initiation within one hour, there was 43% increased risk of dying among newborns who initiated breastfeeding between one to 24 hours after birth (1.43, 95% CI: 0.52 to 3.89) and this risk increased by 78% when breastfeeding initiation was delayed to day 2 (1.78, 95% CI: 0.64 to 5.00).</p> <p>Overall, late initiators (≥ 24 hr) were 1.41 (95% CI: 1.08 to 1.86) times more likely to die during the neonatal period than early initiators (<24 hr).</p> <p>Assuming that early breastfeeding has no effect on deaths prior to 48 hr, universal initiation within one hr and 24hrs might prevent 19.1% and 7.7% of neonatal deaths, respectively.</p>	<p>Data was analysed based on 10464 infants and among these, there were 202 neonatal deaths from days 2 to 28.</p> <p>Compared to breastfeeding initiation within 12 hours after birth, there was 93% increase in the risk of dying among newborns who initiated breastfeeding between 12 to 24 hours after birth (0.93, 95% CI: 0.59 to 1.46).</p> <p>Overall, late initiators (≥ 24 hr) were 78% more likely to die during the neonatal period compared to early initiators (1.78, 95% CI: 1.03 to 3.10).</p> <p>Assuming that early breastfeeding has no effect on deaths prior to 48 hr, 3% of all newborn deaths could be prevented if all mothers initiate breastfeeding within 24hrs of birth.</p>
9	How precise are the results?	There were statistically significant p-values comparing early versus late initiators with narrow confidence intervals.	There were statistically significant p-values comparing early versus late initiators with narrow confidence intervals.	There were statistically significant p-values comparing early versus late initiators with narrow confidence intervals.

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
10	Do you believe the results?	<p>Yes</p> <p>Because, the authors made great efforts to control for reverse causality and other factors related to household, mother, delivery, infant and study treatment.</p>	<p>Yes</p> <p>The authors applied the same measures to control reverse causality and other factors as the previous study, Edmond etal, 2006. They also tried to control recall bias about timing of initiation to improve accuracy in the exposure variable.</p>	<p>Yes</p> <p>The authors applied the same measures to control reverse causality and other factors as the previous two studies. They also tried to control recall bias about timing of initiation to improve accuracy in the exposure variable.</p>
11	Can the results be applied to the local population?	<p>Yes</p> <p>Because, the study recruited a representative sample of 10947 infants and results can apply to local population</p>	<p>Yes</p> <p>Because, the study recruited a representative sample of 22838 infants and results can apply to the local population</p>	<p>Yes</p> <p>Because, the study recruited a representative sample of 10464 infants and results can apply to local population</p>

S/N	Question	Edmond KM <i>et.al.</i> 2006 (Ghana)	Mullany LC <i>et.al.</i> 2008 (Nepal)	Garcia CR <i>et.al.</i> 2011 (India)
12	Do the results of this study fit with other available evidence?	<p>Yes</p> <p>It confirms the findings in the Lancet newborn survival series 2003 and 2005 which recommended breastfeeding as a life-saving intervention. But, this study is the 1st to provide evidence for the direct association between timing of breastfeeding initiation and risk for neonatal death.</p>	<p>Yes</p> <p>It confirms the findings in the Lancet newborn survival series 2003 and 2005 which recommended breastfeeding as a life-saving intervention. But, this study is the 2nd to provide evidence for the direct association between timing of breastfeeding initiation and risk for neonatal death.</p>	<p>Yes</p> <p>It confirms the findings in the Lancet newborn survival series 2003 and 2005 which recommended breastfeeding as a life-saving intervention. But, this study is the 3rd to provide evidence for the direct association between timing of breastfeeding initiation and risk for neonatal death.</p>
13	What are the implications of this study?	<p>The study has implications to newborn policies particularly in developing countries which aim at reducing newborn deaths.</p>	<p>The study has implications to newborn policies particularly in developing countries which aim at reducing newborn deaths.</p>	<p>The study has implications to newborn policies particularly in developing countries which aim at reducing newborn deaths.</p>

As outlined in table 2.1 above, the authors in the Ghanaian study controlled for reverse causality and other factors related to the mother, household, health system and the infant. However, the study could still be prone to bias in how it measured the exposure (whether mothers accurately recalled timing of breastfeeding initiation) and outcome variables (whether reported neonatal deaths accurately correspond to the exposure data collected about the newborn). There was no detail provided about follow-up of subjects, which makes it difficult to judge whether fewer or more mothers dropped out after the first visit.

In the Nepalese study, the authors controlled for reverse causality and other factors similar to the previous study in Ghana but they also tried to minimize recall bias about timing of breastfeeding initiation. Maternal responses of time (exposure variable) were collected from three different sources i.e. the birth assessment questionnaire, interviews held during follow-up visits on days 1 to 4 and another interview held on day 14. Priority was given to data collected using the birth assessment questionnaire because of the minimal recall period. However, it is not clear how much of the exposure variable was based on data from birth assessment interviews or interviews during subsequent visits. This study could also be prone to bias in how the outcome variable was measured i.e. whether reported neonatal deaths accurately correspond to the exposure data collected about the newborn.

In the Indian study, the authors controlled for reverse causality and other factors similar to the previous two studies. They also attempted to accurately measure exposure variable by minimizing recall bias. However, in this study, there were different categories in the exposure variable compared to the previous two studies and hence, the authors report was limited to the effect of breastfeeding initiation within 24hrs after birth on newborn survival and were not able to report such outcome for early initiation of breastfeeding within one hour after birth.

Summary

It is important to note about the difficulty in conducting randomized controlled trials to ascertain reported benefits of breastfeeding initiation as it will be unethical to randomly allocate newborn babies to either initiate breastfeeding or not. Despite the limitations in observational studies, all three studies in Ghana (50), Nepal (51) and India (52), which were nested within large randomized controlled trials with careful prospective data collection, consistently demonstrated that healthy newborns who initiated breastfeeding sooner after birth are more likely to survive than late initiators. Furthermore, all three studies recruited a very large number of infants and they were generally well-conducted and had consistent findings. The study in Ghana was a pioneer in demonstrating the link between timing of breastfeeding initiation and newborn survival and, it has been used as a basis for national and international newborn health policies and programmes aiming at reducing neonatal mortality. Subsequent studies in Nepal and India confirmed findings from the Ghanaian study. Two systematic reviews in 2013 & 2015 (54, 55), which included these three studies, also demonstrated significant reduction in neonatal deaths the sooner newborn babies initiate breastfeeding.

2.2 Factors affecting accuracy in assessing infant-feeding practices

Given the demonstrable benefit of early initiation of breastfeeding in saving newborn lives, as discussed in section 2.1 above, it is important to accurately measure its prevalence and monitor progress on national and global newborn health targets. WHO recommended a set of standards to assess infant-feeding practices (2-4) and this review explored factors which could affect accuracy in the measurement of infant-feeding practices. In the context of this thesis, accuracy was defined as the degree to which reported prevalence figures reflect actual infant-feeding practices of mothers.

Review question: what factors affect accuracy in surveys assessing prevalence of infant-feeding practices using the WHO standard indicators?

Studies published in English language over the last seven years (2008-2015) following the revised indicators recommended by WHO in 2008 and which identified accuracy issues in assessing infant-feeding practices among under-two children were included. The search terms used were accuracy, validity, reliability, specificity, sensitivity, breastfeeding survey(s), infant-feeding survey(s), infant food survey(s), infant nutrition survey(s), nutrition(al) assessment(s), nutrition(al) survey(s) and nutrition(al) status survey (s). Studies were identified from Electronic databases CINAHL Plus, BIOSIS Citation Index, Embase, Global health, Medline and Web of Science as well as from reference lists of included articles or previously known studies. The search strategy was developed for MEDLINE and adapted for other databases as [accuracy OR validity OR reliability OR specificity OR sensitivity] AND [breastfeeding survey* OR infant adj survey* OR nutrition* assessment* OR nutrition* adj survey*] (See appendix 4, for further details).

Using the search strategy, 1931 studies were retrieved from CINAHL, 3286 from Embase, 3005 from Medline, 567 from Global health, 226 from BIOSIS Citation Index and 321 from Web of Science databases. Titles and abstracts of these studies were screened and 550 studies were relevant for further review. Five studies were added from previously known studies or identified from reference lists of relevant studies. A total of 555 relevant studies were transferred to EndNote and 92 duplicates were removed. The remaining 463 studies were screened based on the eligibility criteria (Fig 2.2) and 451 studies, which were not about WHO standard infant-feeding indicators and did not fulfil the eligibility criteria, were excluded. Full texts of the remaining 12 studies were critically reviewed, two were excluded and 10 studies were identified for further analysis.

One of the two studies excluded from further analysis (56) assessed associations between WHO infant and young child feeding (IYCF) indicators and child growth monitoring indicators such as child stunting, wasting, height-for-age z-score (HAZ) and weight-for-height z-score (WHZ). It was reported that WHO indicators showed

mixed associations with child anthropometric indicators and in some cases, higher prevalence reported using IYCF indicators correspond to better scores in growth monitoring indicators. The study did not, however, directly investigate accuracy in the IYCF indicators and hence was excluded from analysis in this review. The second excluded study (57), examined the reliability of sociodemographic variables in predicting initiation of breastfeeding within one hour of birth using data from Kenyan DHS 1998, 2003 and 2008-2009. It reported that most of the demographic and socioeconomic variables were unreliable predictors of early initiation of breastfeeding. The study did not specifically investigate accuracy about early initiation indicator and hence was excluded from further analysis.

Five factors were identified (figure 2.3) based on the 10 eligible studies included for analysis and listed in table 2.2. These factors were: (i) maternal recall, (ii) maternal characteristics, (iii) choice of indicators, (iv) questions asked and (v) the way data were collected.

Figure 2.2: Flow diagram showing identification of studies

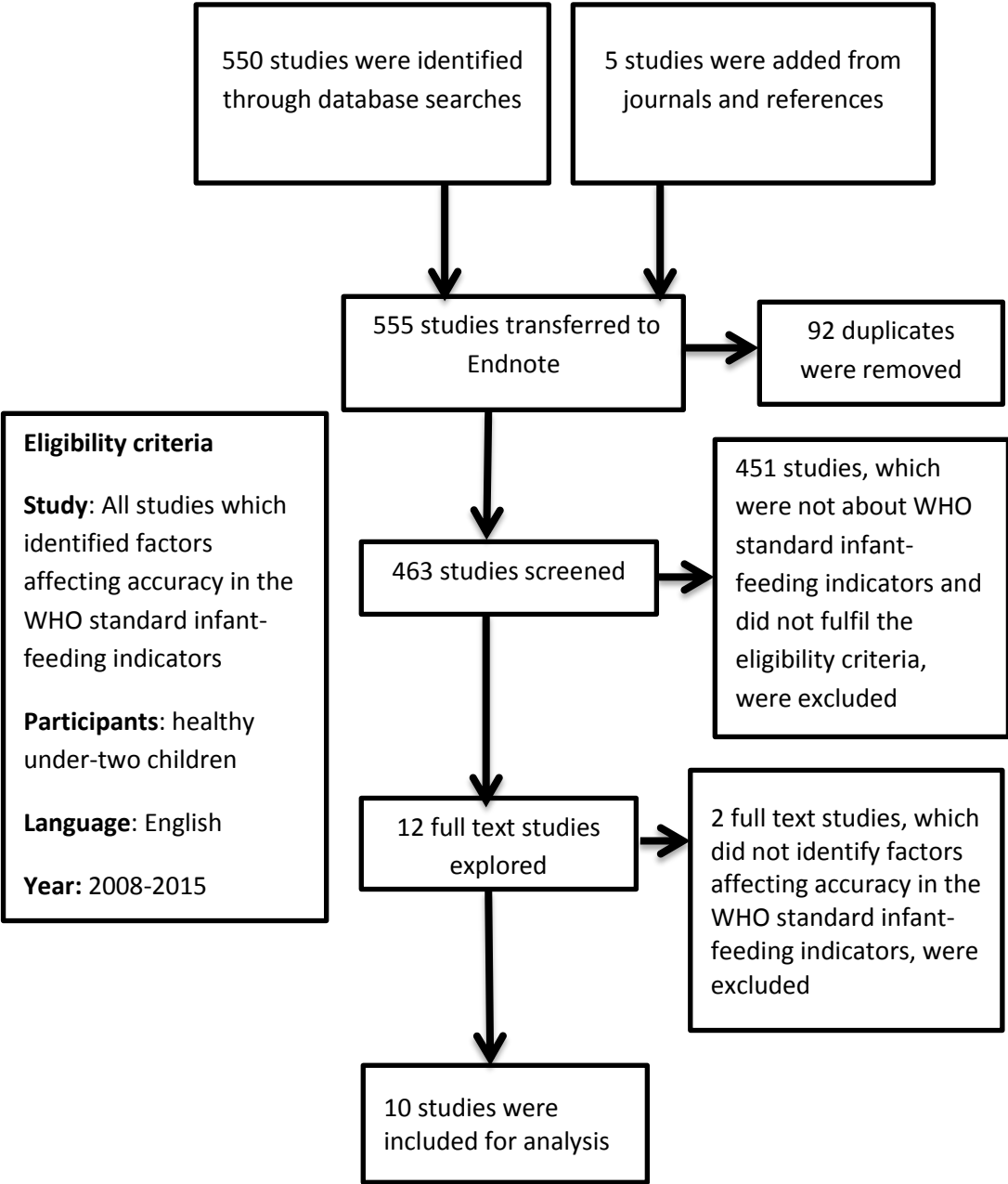


Figure 2.3: Factors affecting accuracy in surveys assessing prevalence of infant-feeding practices

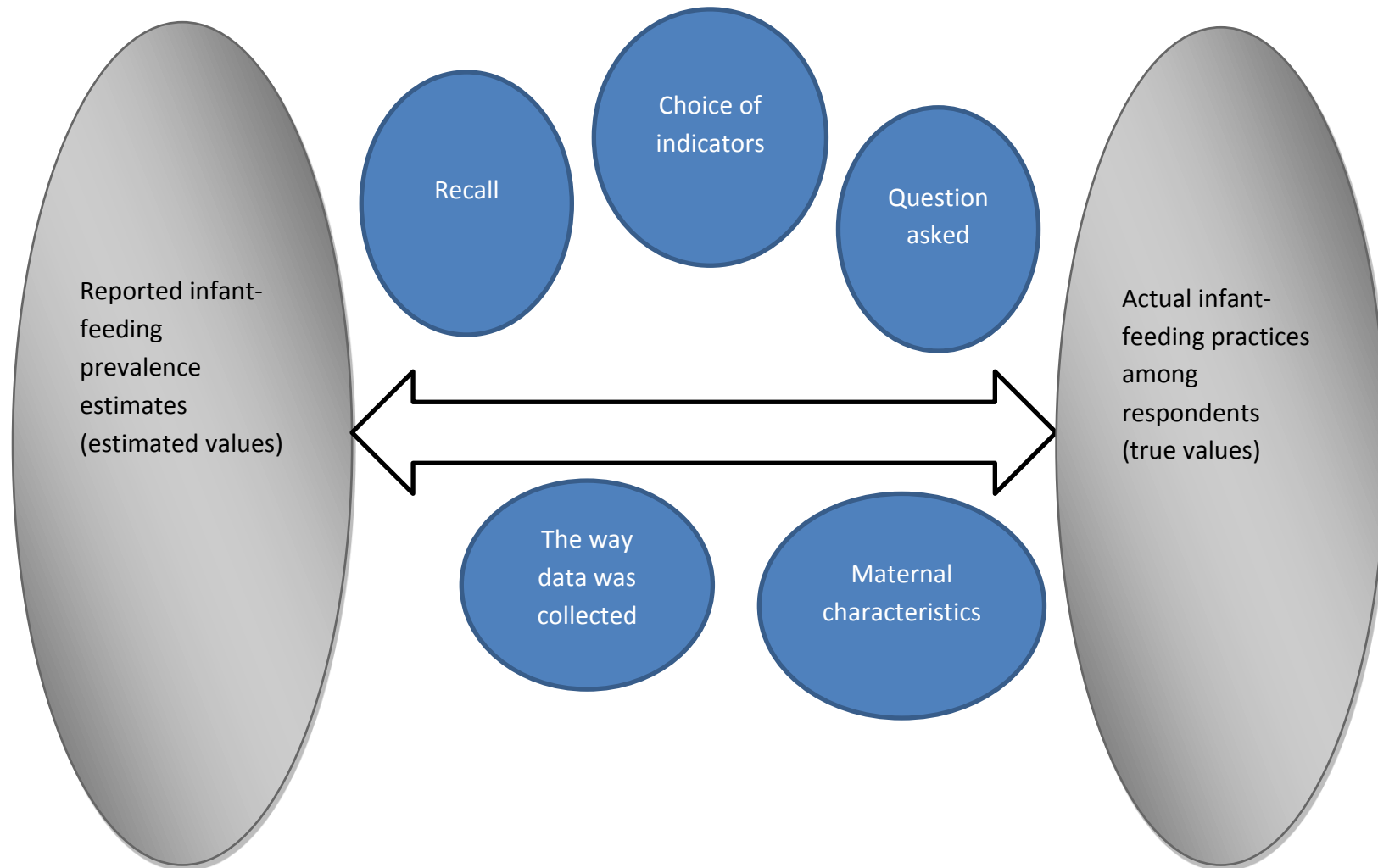


Table 2.2: Studies which identified factors affecting accuracy in surveys assessing prevalence of infant-feeding practices

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
1	Maternal recall The way data was collected	Agampodi <i>et.al.</i> 2009 (58)	To assess the validity of maternal recall of exclusive breastfeeding (EBF) duration. Duration of EBF was assessed among 114 mothers in three ways; based on prospective data since birth: retrospective databased on an event calendar: and mothers' reported EBF duration	Proportion of infants receiving EBF up to the completion of the sixth month by the three methods were; data since birth (actual EBF rate) - 23.9%; mothers' reported data - 77.7% and event calendar method - 41.3%. Retrospective evaluation methods systematically overestimate the duration of EBF. Maternal recall data provide highly unspecific data whereas use of an event calendar provided more valid data.
2	Maternal recall	Coit <i>et.al.</i> 2012 (59)	To evaluate accuracy of maternal report at 1 year postpartum regarding introduction of solid foods. One hundred fifty seven mothers were enrolled within 72 hours of giving birth and they were asked about timing of solid food introduction monthly for the first 6 months and then at 1 year.	At 1 year, only 14% (22/157) of reports matched data recorded monthly. Although 100% of women introduced solids before 6 months, at 1 year, 41.4% reported starting solids at 6 months. Most did not give an accurate response at 1 year and said they started giving solids later than they did. Maternal report may not be the best way to collect such data and health outcomes based on such data may be biased toward the null.

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
3	Maternal recall Maternal characteristics	Cupul-Uicab <i>et.al.</i> 2009 (60)	To evaluate the reliability of two reported breastfeeding durations. Five hundred sixty seven reproductive-aged women from Mexico were asked about breastfeeding duration using information obtained from nearly identical sets of questions applied at different times after weaning. Differences between maternal reports were compared and the intra-class correlation coefficient (ICC) was used to examine reports for any and exclusive breastfeeding (EBF).	The reliability of duration of any breastfeeding was high (ICC 0.94) but was lower for EBF duration (ICC 0.49). Overall, differences between reports of duration were usually <1 month and for 68% of mothers (385/567), the difference was <0.5 months. Predictors of poorer recall were having >4 children, and time between reports of >2 months. The only predictor of better recall was greater age of the baby at weaning. Age, education and previous breastfeeding were not important predictors of recall. However, parity and length of recall were associated with poorer recall of duration of any breastfeeding.
4	The way data was collected	Flaherman <i>et.al.</i> 2011 (61)	To compare two commonly used data sources for measuring breastfeeding rates and assess agreement. Compared reports for 'any breastfeeding' and 'EBF' among California infants between the National Immunization Survey (NIS) and the California Newborn Screen (CNS) using descriptive statistics	The two methods produced similar results for 'any' breastfeeding at <4 days (82.7%, 95% CI: 79.6 to 85.8) in the NIS and (86.1%, 95% CI: 86.0 to 86.2) in the CNS. However, the two methods produce very different results for 'exclusive' breastfeeding at <4 days (60.4%, 95% CI: 56.6 to 64.1) in the NIS and (41.6%, 95% CI: 41.5 to 41.7) in the CNS. The NIS, the CNS, or both are flawed measures of EBF. Validated methods for measuring EBF would allow improved monitoring of breastfeeding prevalence.

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
5	Maternal recall	Medoua <i>et.al.</i> 2012 (62)	<p>To compare the accuracy of the mothers' self-reported past infant-feeding events with the isotopic dilution technique.</p> <p>Breastfeeding practices were assessed in a sample of 44 Cameroonian mother-infant pairs using dietary recall since birth. Intakes of breast milk and non-breast milk water were measured in the same sample using the dose-to-the-mother deuterium-oxide turnover technique and compared with questionnaire.</p>	<p>Seventy-five per cent of the mothers who claimed to be exclusively breastfeeding were found to be predominantly or partially breastfeeding by the dose-to-the-mother deuterium-oxide turnover technique. Only 11% of the infants were exclusively breastfed and the breast milk output was not significantly affected ($P < 0.05$) by the mother's body composition.</p> <p>Mothers' self-reported behaviour overestimates the exclusive breastfeeding rate. The dose-to-the-mother deuterium-oxide turnover technique can be applied to validate the mother's reports of infant-feeding practices.</p>
6	Maternal recall	Natland <i>et.al.</i> 2012 (63)	<p>To assess the accuracy of long-term maternal recall of breastfeeding duration.</p> <p>Health facility records on breastfeeding initiation and duration were compared to recalled data obtained from mailed questionnaires to 374 mothers 20 years after giving birth in the health facility.</p>	<p>Recorded and recalled breastfeeding duration were strongly correlated ($ICC=0.82$, $p < 0.001$). Nearly two thirds of women recalled their breastfeeding to within one month. There were no apparent systematic discrepancies between the two sources of information, but recall error was predicted by the age when infants were introduced to another kind of milk. Breastfeeding duration was recalled quite accurately 20 years after mothers gave birth in a population where breastfeeding is common and its duration long.</p>

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
7	Questions asked	Navidi <i>et.al.</i> 2009 (64)	<p>In 2003, the question, 'Is the infant being breastfed at discharge?' was added to the US standard certificate of live births. In Massachusetts, this was adapted to, 'Are you breastfeeding or do you intend to?'</p> <p>In 2004-2005, a study was conducted in two hospitals (A & B) in Massachusetts and compared maternal responses to the birth certificate question with their infant-feeding records held in the hospitals.</p>	<p>There were differences in maternal responses depending on which question they were asked. At Hospital A, 94.8% (290/306) of birth certificate responses matched the record but only 79.8% (185/232) of responses matched in hospital B.</p>
8	Choice of indicator	Stanton CK <i>et.al.</i> 2013 (65)	<p>To validate the ability of women in Mozambique to report on facility-based care they and their newborns received during labour and one hour postpartum.</p> <p>Three hundred four mothers were interviewed and self-report about facility-based interventions delivered around the time of birth were compared against direct observation of the birth.</p>	<p>The study concluded that 13 of the 27 maternal, newborn and child health indicators assessed had better validity and were recommended for use in surveys.</p>

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
9	The way data was collected	Zakarija-Grkovic <i>et.al.</i> 2012 (66)	To assess the accuracy in EBF rates by comparing infant-feeding data collected from four sources. One hundred fifty seven healthy mother-infant pairs were enrolled. Data was collected from (1) Standard once-daily observations recorded by paediatricians; (2) new, every-feed observations recorded by nursing staff; (3) interview with the mother before discharge; and (4) Newborn Examination Form, completed on discharge by the paediatrician.	<p>Only 3% of infants were EBF throughout the hospital stay when calculated with the every-feed method, as opposed to 56% and 82%, with the once-daily and newborn examination methods, respectively ($P < .001$). Mothers reported that 97% of infants were supplemented with formula, indicating that most formula supplements are not recorded in the standard once-daily charts.</p> <p>Once-daily recordings of infant-feeding practices grossly underestimate the prevalence of formula supplementation in breastfed infants, resulting in significantly higher EBF rates</p>

S/N	Factor (s)	Study	Objective/Methods	Results/Conclusion
10	The way data was collected	Whitford et.al. 2012 (67)	<p>To test the reliability, validity, acceptability and practicality of short message service (SMS) messaging for collection of research data about current infant-feeding method and future feeding plans.</p> <p>Three hundred thirty five mothers participated and they were sent the following SMS message on two separate occasion one day apart: ‘The feeding your baby team asks, what infant-feeding method are you using at present? Please reply O, F, or B, where O=Only breast, F=Formula, and B=both. Mothers were sent the same message one day later to assess reliability. Validity was assessed by comparing their responses against other sources such as health visitors’ data and phone calls made within 24hr of their response.</p>	<p>Maternal responses were reliable based on the factual SMS messages sent to them at different time and highly valid compared to data collected by phone calls (0.92, 95% CI: 0.84 to 1.00) and health visitor during routine consultation (0.85, 95% CI: 0.73 to 0.97)).</p> <p>In this sample and for these questions, SMS was a reliable and valid method for capturing infant-feeding data.</p>

In this section, the five identified factors affecting accuracy in surveys assessing prevalence of infant-feeding practices will be discussed.

A. Maternal recall

This refers to maternal ability to recall an event and the time period a mother is expected to remember her infant-feeding practices. The previous 24 hour or current status method overestimates the proportion of children who were exclusively breastfeeding (58, 62) and longer term maternal recall can also be unreliable (59, 60). A study in Sri Lanka (58) reported that maternal recall data provided highly inaccurate data and the authors concluded retrospective evaluation methods systematically overestimate the duration of exclusive breastfeeding. To the contrary, a study in Norway (63) reported that breastfeeding duration was recalled quite accurately 20 years after mothers gave birth in a population where breastfeeding was common and its duration long. Standardized health care in Norway, where every mother receives similar level of maternity services, with higher socioeconomic status and a good concept of time assessments could be one explanation of the accurate longer term recall ability among these Norwegian mothers.

B. Maternal characteristics

Individual characteristics of mothers could also determine whether mothers provide accurate responses about infant-feeding practices. For example, it is possible that maternal age, cultural background, literacy level and whether the mother is from urban or rural area could influence mothers' ability to understand the meaning of the household survey questions. A study identified in this review (60) reported that increasing parity (having more children) and longer recall period (the time between when the mother practised breastfeeding and when the mother was asked about her practice during surveys) were associated with poorer recall of duration of any breastfeeding. However, the study found that maternal age, education and previous breastfeeding experience were not important predictors of recall.

C. The way data were collected

Although no study could be identified, in this review, which validated household survey tools such as DHS or MICS, five studies reported various levels of accuracy using different methods of data collection techniques. The study in Sri Lanka (58) compared the validity of various ways of data collection techniques including prospectively collected data since birth, retrospectively collected data based on an event calendar, or maternal reports of the duration of exclusive breastfeeding in response to the single question of 'at what age did you discontinue exclusive breastfeeding?' Other studies evaluated the validity of short message service (SMS) messaging for collection of research data about current infant-feeding method and future feeding plans (67).

A study in Croatia (66) compared early infant-feeding data obtained from four sources: (i) standard once-daily observations recorded by paediatricians; (ii) new, every-feed observations recorded by nursing staff; (iii) interview with the mother before discharge; and (iv) newborn examination form, completed on discharge by the paediatrician. Using the every-feed method, only 3% of infants were exclusively breastfeeding throughout their hospital stay, as opposed to 56% and 82% using the once-daily and newborn examination methods, respectively ($P < .001$). Another study highlighted differences in prevalence outcomes of two surveys conducted in the same target population using different methods. This study compared prevalence reports by the California Newborn Screen (CNS) and the National Immunization Survey (NIS) for "any breastfeeding" and "exclusive breastfeeding" among California infants. The two methods produced similar results for "any breastfeeding" but findings were very different for "exclusive breastfeeding" with 60.4% in the NIS and 41.6% in the CNS, respectively (61).

D. Questions asked

The wording of the question mothers are asked is also an important factor in determining whether mothers give accurate responses about their breastfeeding

practices. A study in the USA (64), included in this review, compared responses of mothers interviewed in two hospitals about their breastfeeding practices using questions with different wording. The first question was asked for birth certificate purposes and the wording was 'is the infant being breastfed at discharge?' whereas the second question was asked to collect infant-feeding data for hospital records and the wording was 'are you breastfeeding or do you intend to?' The authors reported that 94.9% of maternal responses to both questions were the same for one hospital but only 79.8% of maternal responses to both questions matched in the second hospital. This study demonstrated how changes in the wording of the question assessing breastfeeding practices could influence whether or not mothers provide accurate responses.

E. Choice of indicators

A study in Mozambique (65) tested validity of 34 mother, newborn and child health indicators by comparing maternal self-reports about the facility-based interventions they and their newborns received with direct observation of the birth 8-10 months ago. Women were able to report on some aspects of peripartum care and it was possible to validate 27 of the 34 indicators. Fourteen indicators had poor validity but the authors were able to identify 13 indicators to detect post-natal interventions in household surveys with better validity and these include (i) newborn placed skin to skin on mother covered with a cloth, (ii) newborn wrapped in a towel/cloth, (iii) breastfeeding of newborn initiated within one hour of birth and (iv) newborn bathed within one hour (i.e. bathing not delayed). Therefore, this study showed that various indicators could have different validity and it is important to choose the indicator which better captures actual practices of mothers.

2.3 PhD research questions and rationales

Three studies (50-52), identified in section 2.1 of this chapter, demonstrated a dose-response relationship between timing of breastfeeding initiation and newborn survival with the same direction of effect. There was increased risk of neonatal mortality associated with increasing time for breastfeeding initiation. In other words, newborn babies who initiated breastfeeding within one hour were more likely to survive than those who initiated breastfeeding within 24 hours after birth, who in turn were more likely to survive compared to those who initiated breastfeeding after 24 hours of birth. As such, existing national and international newborn health policies promote early initiation of breastfeeding within one hour after birth and there are coordinated efforts to increase its prevalence to improve newborn survival (6, 7).

In sub-Saharan Africa, population-level prevalence estimates in the essential interventions, including early initiation, are primarily derived from the DHS and MICS surveys. However, very few studies have evaluated the validity of the assessment tools included in these surveys (68) and it is not clear whether prevalence reports reflect actual practices. Five factors which could affect accuracy in measurement of infant-feeding practices were identified in section 2.2 of this chapter. Although these factors could also be relevant to measurement of early initiation, they were derived from studies related to exclusive breastfeeding and complementary feeding indicators. The indicator for early initiation was among indicators validated by a study which is included in this review (65). However, the study did not explore in detail about the challenges and accuracy issues related to measurement of early initiation as its focus was wider looking at 34 maternal, newborn and child health indicators.

This PhD study critically analysed the challenges related to measurement of early initiation of breastfeeding, which could potentially lead to inaccuracies in population-level prevalence estimates of the indicator, and made recommendations to improve accuracy by providing answers to the following list of research questions.

- i. How long does it take for a newborn baby to latch on to the breast following attempts to initiate breastfeeding immediately after birth?’
- ii. How do Ethiopian mothers perceive the question assessing early initiation of breastfeeding?’ and ‘how do they describe time in minutes, hours and days?’
- iii. What are the experiences of Ethiopian household data collectors in asking and coding maternal responses of time to breastfeeding initiation? and
- iv. What newborn care behaviours are practised immediately after birth during home births in Ethiopia, other than initiating breastfeeding?’

Chapter 4: provided answer to the first research question and the evidence-base for the ‘one hour’ time limit in defining the early initiation indicator.

Despite WHO standards, some studies defined early initiation as ‘breastfeeding initiation within the first 24 hours after birth?’ (54, 69) instead of the recommended definition ‘initiation of breastfeeding within one hour after birth’ (3). The Demographic and Health Survey (DHS) has two indicators for early initiation: one which measures breastfeeding within one hour after birth and a second for breastfeeding within 24 hours after birth (70). Because of such inconsistencies, it remains a challenge to understand the meaning and implications of prevalence estimates of early initiation and making comparisons within and between countries. This problem is even more pronounced when household surveys do not report on how the indicator was defined alongside reported prevalence estimates. Therefore, this study explored whether it is practically possible for a newborn baby to start suckling within one hour after birth and made recommendation on how the early initiation indicator should be defined.

Chapter 5: provided answer to the second research question i.e. Ethiopian mothers’ perception about the early initiation question and their description of time for breastfeeding initiation.

Because the indicator for early initiation is time dependent, the ‘one hour’ time limit is a crucial bench mark in defining which babies had early initiation. If the mother’s response is “immediately” or “less than one hour after birth”, this will be coded as early

initiation of breastfeeding. If, however, the response is for more than one hour after birth, then this will not be counted as early initiation of breastfeeding (4). For many mothers in developing countries, especially those from rural areas and illiterate, it is difficult to understand the meaning of time and come up with responses time in minutes, hours or days.

Furthermore, the question 'how long after birth did you first put [name] to the breast?' is not intended to measure the time when the newborn baby started getting mother's milk, but to measure practices or behaviour of mothers in trying to initiate breastfeeding by putting the baby to the breast regardless of whether or not the baby actually got mother's milk at the time of trying (4). It is unclear how mothers perceive this question and what their responses of time refer to. Therefore, accuracy in prevalence estimates for early initiation depends on whether mothers understood the meaning of the question as intended and whether they were able to describe time to breastfeeding initiation in minutes, hours or days as required for coding purposes. This study assessed Ethiopian mothers' perception of the early initiation question as well as their description of time and made recommendations.

Chapter 6: provided answer to the fourth research question i.e. newborn care behaviors practised immediately after birth during home births in Ethiopia, other than breastfeeding.

In order to assess prevalence, data about early initiation is collected based on historic recall (3) and there would be some recall bias due to the length of time elapsed since the event i.e. when the mother initiated breastfeeding. Breastfeeding doesn't happen in isolation and there are other newborn care behaviors which are practised immediately after birth. One assumes sequentially probing mothers using other newborn care practices might help in minimizing recall bias about maternal responses of time for breastfeeding initiation because of the possibility that mothers might easily recall other newborn care practices of more socio-cultural importance. This study established the

sequence of newborn care practices following the birth of a baby in a rural setting in Ethiopia.

Chapter 7: provided answer to the third research question i.e. experience of household data collectors in asking mothers the early initiation question and coding responses of time.

Currently, there are no standard probes recommended following the early initiation question (4). Although household surveys such as DHS (71) and MICS (72) provide guidance and training prior to data collection, enumerators still have to be able to accurately interpret what the early initiation question is intended to measure, explain to mothers as such and approximate maternal responses of time based on the exact time categories provided for coding purposes. Given the ambiguity in the definition and interpretation of the indicator as well as lack of any detailed guidance on how to ask the early initiation question, it is not clear how data collectors ask the question and approximate maternal responses of time. This study provided the evidence based on the experiences of Ethiopian household survey data collectors.

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Chapter 3 : Aim, objectives and methods

3.1 Aim

To identify challenges in the measurement of early initiation of breastfeeding, potential inaccuracies in prevalence estimates and propose improvements to survey tools.

3.2 Objectives

1. To synthesize evidence on whether the 'one hour' time limit used to define the early initiation indicator is practically possible by estimating the length of time after birth it takes for a newborn baby to start suckling.
2. To evaluate Ethiopian mothers' perception of the question assessing early initiation of breastfeeding and their description of time in minutes, hours or days.
3. To investigate other immediate newborn care behaviours (including thermal care, skin care, and cord care) in relation to the timing of early initiation of breastfeeding among Ethiopian mothers.
4. To evaluate experiences of Ethiopian household survey data collectors in asking questions assessing time-dependent indicators such as early initiation of breastfeeding.
5. To make recommendations on how to improve accuracy in the measurement of the early initiation indicator so that prevalence estimates can better reflect actual practices.

3.3 An overview of methods

This section summarises the overall methods applied to each objective (table 3.1). Further details about the methods are described within individual studies from chapters 4 to 7.

Table 3.1: Summary of methods for corresponding objectives

Objective	Study design/method
1	Critical literature review
2	Qualitative study design: cognitive interviewing technique
3	Qualitative study design: semi-structured interviews, Focus group discussions and Key informant interviews
4	Quantitative study design: self-administered structured questionnaire
5	Discussion and recommendations based on findings in previous four objectives

Objective 1: To synthesize evidence on whether the ‘one hour’ time limit used to define the early initiation indicator is practically possible by estimating the length of time after birth it takes for a newborn baby to start suckling

A critical literature review was conducted to analyse studies which reported the length of time it takes for a newborn baby to latch on to the breast following attempts to initiate breastfeeding immediately after birth. This review provided evidence on whether the ‘one hour’ time limit used to define the early initiation indicator is practically possible.

Objective 2: To evaluate Ethiopian mothers’ perception of the question assessing early initiation of breastfeeding and their description of time in minutes, hours or days.

A qualitative study was conducted in two woredas (districts) in Ethiopia namely; Basona (predominantly rural) and Debrebirhan (predominantly urban) woredas. Qualitative study design was chosen for an in-depth understanding about how mothers perceived the wording or text description of the question assessing early initiation of breastfeeding and their description of time.

Data was collected using cognitive interviews with eligible mothers. Cognitive interviewing technique, first proposed by a team of researchers in the interdisciplinary seminar on the Cognitive Aspects of Survey Methodology (CASM) and which has been widely used since the early 1980s (1), is uniquely successful to uncover the thought process of interviewees in answering questions and identifying if and why they experience difficulties (2). It is defined as:

“The administration of draft survey questions while collecting additional verbal information about the survey responses, which is used to evaluate the quality of the response or to help determine whether the question is generating the information that its author intends.” (3)

There are two sub-types or paradigms in cognitive interviewing; namely “Think aloud” and “Verbal probing” (2, 3) and these are described below.

Think-aloud

In ‘think-aloud’, participants are asked to speak out loud (think-aloud) the thought process they go through as they try to answer the question. The interviewer takes note of the thought process of participants beginning from when the question was asked until they give an answer. The session will be tape-recorded and the interviewer will have as little intervention as possible to allow flow of ideas of the interviewee. The main advantage of ‘think-aloud’ cognitive interviewing technique is that it can deliver unexpected information from participants about how difficult the question is. Its disadvantages include the need for training of participants as it is unusual for people to speak loudly about what they think while answering questions. Moreover, participants

can go off track and talk about something different as the interviewer is not recommended to intervene.

Verbal probing

In 'verbal probing', the interviewer explores more about how the participants reached their answers using probes. Probes can be either pre-scripted, which are prepared before the interviews, or spontaneous probes, which are not prepared in advance but created during the interview based on the answer from participants. The most commonly used standard probes in testing questionnaire include 'what does the term X mean to you?', 'can you repeat it in your own words?', 'how did you arrive at that answer?', and 'was it hard or easy to answer?'. Probes can be asked while the interview is in progress (concurrent probing) or at the end of the interviews (retrospective probing). The main advantage of 'verbal probing', which is the most common type of cognitive interviewing technique, is that it gives the interviewer more control in guiding participants. It is also possible to explore more as to why participants reached at a particular response. The main disadvantage of 'verbal probing' is that it can bias participants to a particular response. But, this can be tackled by using non-leading probes.

In this study, mothers were interviewed using 'verbal probing' cognitive interviewing technique as it was not possible to conduct 'think-aloud' cognitive interviews. Mothers felt that it is odd to be asked to talk loudly about what they were thinking while answering a question without having a conversation with the interviewer. The use of cognitive interviews, in this study, provided an in-depth understanding about how Ethiopian mothers perceived the wording or text description of the question assessing early initiation of breastfeeding and identified the difficulties mothers faced to describe time in minutes, hours or days.

Objective 3: To investigate other immediate newborn care behaviours (including thermal care, skin care, and cord care) in relation to the timing of early initiation of breastfeeding among Ethiopian mothers

This was conducted as part of the study in objective 2 above but data relevant to this objective were collected specifically from the village in Basona woreda. In order to determine the sequence of immediate newborn care practices, other than breastfeeding, a total of 26 semi-structured interviews and 2 focus group discussions were conducted with eligible mothers and a key informant interview was conducted with a local expert on traditional newborn care practices in the area.

Objective 4: To evaluate experiences of Ethiopian household survey data collectors in asking questions assessing time-dependent indicators such as early initiation of breastfeeding.

A cross-sectional descriptive survey was conducted and data was collected by inviting a large team of household survey interviewers, who were still in the field, to complete a self-administered semi-structured questionnaire. These data collectors were participating in a population-based newborn health survey conducted between October-November 2013 in four major regions of Ethiopia: Amhara, Oromiya, Tigray and Southern Nations, Nationalities and Peoples' region (SNNP). Data collectors were asked about their experiences in asking mothers about two time-dependent indicators i.e. delayed bathing and early initiation of breastfeeding.

Objective 5: To make recommendations on how to improve accuracy in the measurement of the early initiation indicator so that prevalence estimates can better reflect actual practices.

Chapter 8 (discussion) and chapter 9 (conclusion) discuss findings and provide recommendations on how to improve accuracy in measuring early initiation of breastfeeding.

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Chapter 4 : Measurement of early initiation of breastfeeding: how long after birth does it take for newborn babies to latch on to the breast?

This chapter synthesizes evidence from studies that reported the time it takes for a newborn baby to start suckling following attempts to initiate breastfeeding immediately after birth. Time to first suckling is used as a basis for defining the early initiation indicator, which is currently defined as initiation of breastfeeding within one hour after birth. However, there are documented variations in how different surveys define the indicator as discussed in chapter 2. This chapter provides the evidence on whether the 'one hour' time limit used to define the early initiation indicator is practically possible by estimating the length of time after birth it takes for a newborn baby to start suckling. Findings from this evidence review are presented below within a manuscript prepared for publication in Midwifery journal.

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Mihretab Melesse Salasibew
Principal Supervisor	Tanya Marchant
Thesis Title	Measurement of early initiation of breastfeeding: a mixed methods study exploring accuracy, challenges and implications for tracking newborn health targets

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
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Where is the work intended to be published?	Midwifery Journal
Please list the paper's authors in the intended authorship order:	Mihretab Melesse Salasibew, Suzanne Filteau, Tanya Marchant
Stage of publication	Not yet submitted

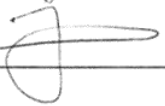
SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceived the idea, planned and conducted the systematic review including defining the search terms, search strategy, looking through electronic databases and journals, analysed and interpreted data and prepared the manuscript for publication. Suzanne Filteau and Tanya Marchant assisted in refining the
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	research question and critically commented on the draft manuscript.
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Student Signature:  _____

Date: 17/7/15

Supervisor Signature:  _____

Date: 17/7/15

Measurement of early initiation of breastfeeding: how long after birth does it take for newborn babies to latch on to the breast?

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4.1 Abstract

Background

The evidence supporting early initiation of breastfeeding as one of the newborn life-saving interventions is well-established. The World Health Organization recommends attempting to initiate breastfeeding within an arbitrary but practical time of at most one hour after birth and such practice is assessed using the early initiation indicator. Given variations between surveys, it is worth reviewing the evidence on whether the 'one hour' time limit used to define the early initiation indicator is practically possible by estimating the length of time it takes for a newborn baby to start suckling.

Methods

A critical literature review was conducted. All studies in English language which reported the length of time it takes for a newborn baby to latch on to the breast were included regardless of the year when the study was conducted. Eligible studies were identified from electronic databases Medline, Embase, CINAHL Plus and Web of Science and reference lists of included articles. The search terms used were skin to skin contact, kangaroo method, kangaroo care method, kangaroo mother care method,

breastfeeding, breastmilk, human milk, lactation, initiate, initiated, initiation, initiating, latch, latching, suckle and suckling.

Results

A total of 125 studies were identified. Thirty studies reported about breastfeeding outcomes and, of these, 11 reported timing for first suckling. Nine of 11 studies reported that it takes less than one hour for the newborn baby to start suckling following attempts to initiate breastfeeding immediately after birth. The remaining 2 studies reported timing of more than one hour with average times of 79 and 62 minutes, respectively.

Conclusion

In addition to documented benefits of early initiation of breastfeeding in saving newborn lives, there is also adequate evidence showing it is practically possible for healthy newborn babies to start suckling within one hour after birth and this supports the definition for early initiation as 'initiation of breastfeeding within one hour after birth'. Consistent use of this standard definition is recommend to all household surveys reporting prevalence in early initiation.

Key words

Skin-to-skin contact; kangaroo mother care; early initiation of breastfeeding; first suckling; first breastfeeding

4.2 Introduction

Early initiation of breastfeeding within one hour after birth is one of the recommended interventions for saving newborn lives (1-3) and there exists global consensus to reach out to more communities that could benefit from this intervention (4). Studies have demonstrated dose-response relationship between timing of initiation of breastfeeding and newborn survival suggesting increased risk in neonatal mortality as a result of

delaying breastfeeding initiation (5-9). The World Health Organization (WHO) published guidance on how breastfeeding prevalence should be assessed and this included details on the text description of survey questions, sampling strategy, choice and interpretation of indicators. The indicator for early initiation is recommended to measure the proportion of newborn babies who initiated breastfeeding 'within one hour' after birth (10-12).

However, there remain complexities in breastfeeding measurement and problems were identified related to the definition and interpretation of breastfeeding indicators (13). For example, two recent reviews (8, 14) defined early initiation as initiation of breastfeeding 'within 24 hours' after birth. The Demographic and Health Survey has two indicators for early initiation: one which measures breastfeeding 'within one hour' after birth and a second for breastfeeding 'within 24 hours' after birth (15). Given variations between surveys, it is worth reviewing the evidence on whether the 'one hour' time limit used to define the early initiation indicator is practically possible by estimating the length of time it takes for a newborn baby to start suckling.

In 1998, WHO conducted a review (16) to establish the evidence-base for the ten steps to successful breastfeeding and two studies (17, 18) reported that newborn babies are likely to start suckling 'within one hour' after birth if attempts to initiate breastfeeding were made immediately after birth. Accordingly, an arbitrary but practical recommendation was made for newborn babies to initiate breastfeeding within at most 'one hour' after birth. However, studies included in this review were of poor methodological quality, with small sample sizes and timing to breastfeeding initiation varied widely (16).

Given the arbitrary nature of the 'one hour' time recommendation, poor quality of the studies included in the WHO review and existing variations between surveys in how they define early initiation, this critical review of the literature was conducted to update the evidence about the length of time it takes for a newborn baby to start suckling and discuss the implications to the definition for early initiation of breastfeeding.

4.3 Methods

Research question

How long does it take for a newborn baby to latch on to the breast following attempts to initiate breastfeeding immediately after birth?

Search terms

A critical literature review was conducted using the search terms skin to skin contact, kangaroo method, kangaroo care method, kangaroo mother care method, breastfeeding, breastmilk, human milk, lactation, initiate, initiated, initiation, initiating, latch, latching, suckle and suckling.

Identification of studies

Studies were identified from electronic databases CINAHL Plus, Embase, Medline and Web of Science and reference lists of included articles. The search strategy was developed for CINAHL Plus as [Skin to skin contact OR kangaroo method OR kangaroo adj method] AND [initiat* OR latch* OR suckl*OR breastfeeding OR breastmilk OR human milk OR lactation] and adapted for use with other databases (See appendix 5, for further details).

Inclusion and exclusion criteria

Eligible studies were selected based on the following inclusion criteria,

- Studies of any design including observational studies and randomized controlled trials or quasi-experimental studies
- Studies assessing the length of time it takes for healthy, full term newborn babies to start suckling or latch on to the breast following attempts to initiate breastfeeding immediately after birth. These attempts can be demonstrated by

placing the baby on mother's chest with skin-to-skin contact (SSC) immediately after birth or directly putting the baby to the breast.

- Studies with breastfeeding outcomes i.e. early initiation or exclusive breastfeeding and
- Studies in English language

All studies fulfilling the inclusion criteria were included regardless of the year when the study was conducted. Studies on caesarean section deliveries were excluded.

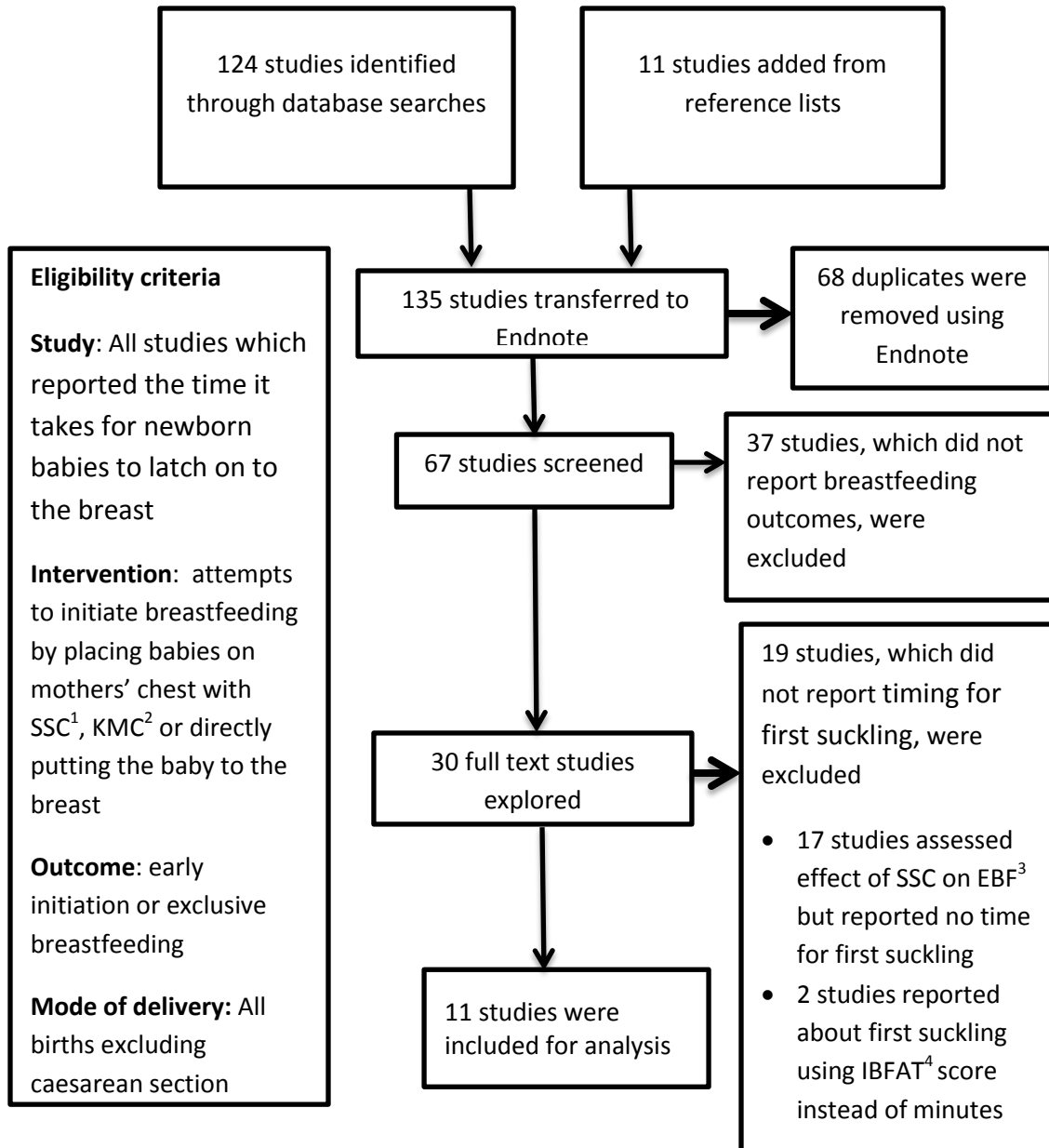
Data extraction and synthesis

All studies retrieved from electronic databases were screened for relevance by reading through their titles and abstracts. More studies were identified from the reference lists of relevant studies. All relevant studies were transferred to EndNote, where duplicates were removed, and assessed for inclusion based on the eligibility criteria. Data from eligible articles, including characteristics of individual studies, were extracted to a table and findings were analysed. Article selection process is shown in a figure using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline.

4.4 Results

A total of 567 studies were retrieved using the search terms from electronic databases. Titles and abstracts of these studies were screened and 124 relevant studies were identified for further review. Additional 11 studies were identified from reference lists of relevant studies. A total of 135 relevant studies were transferred to Endnote and 68 duplicates were removed. The remaining 67 studies were assessed based on the eligibility criteria and 37 studies which did not report on breastfeeding outcomes and fulfil the eligibility criteria were excluded. Full texts of 30 eligible studies were critically reviewed and 19 studies were excluded because they did not report on timing for first suckling. The remaining 11 studies were included for further analysis (Fig 4.1).

Figure 4.1: Flow diagram showing identification of studies



¹SSC=Skin-to-skin contact

²Kangaroo Mother Care (KMC) is a method of care for preterm babies where baby is placed on mother's chest with SSC

³EBF= Exclusive breastfeeding

⁴IBFAT= Infant Breastfeeding Assessment Tool

Of the 19 excluded studies which did not report timing of first suckling, 17 assessed the effect of skin-to-skin contact (SSC) on rates of exclusive breastfeeding or any breastfeeding at different points of time or age of the child (19-35). Two studies (36, 37) assessed outcomes for success in first suckling but findings were reported using Infant Breastfeeding Assessment Tool (IBFAT) scores instead of time in minutes or hours. IBFAT is a breastfeeding measurement tool developed to assess and measure breastfeeding competency by the newborn baby and it consists of four components (readiness to feed, rooting, fixing and sucking) and numerical values 0-3 are assigned to each component giving a total score range of 0 to 12, 12 being the score for a vigorous, effective feeding (38).

Of the 11 eligible studies which reported timing in minutes, nine studies (17, 18, 39-45) reported that it takes less than one hour for a newborn baby to start suckling or latch on to the breast if attempts to initiate breastfeeding were made immediately after birth. However, there was one outlier and this study reported an average time of 2 minutes for first suckling which suggests that the authors were measuring slightly different activity or had a different starting point (43). Two studies (46, 47), which reported timing of more than one hour, showed average times of 79 and 62 minutes, respectively (table 4.1).

Table 4.1: List of included studies which reported average time for first suckling

S/N	Study (Country)	Methods	Average time to first suckling
1	Windstorm, 1987 (Sweden)	21 healthy newborn children (11 intervention group, 10 controls) Those in the intervention group had some procedures such as gastric suction. All 21 newborns were placed skin-to-skin immediately after birth.	55 minutes Among newborns in the control group who only had SSC with their mother and no other intervention/procedure
2	Righard L 1990 (Sweden)	72 healthy full term mother-infant pair (38 allocated to skin-to-skin contact and 34 to control group) In the contact group, skin to skin contact between mother and infant was uninterrupted for at least 1 hour. In the control group, the infant was placed on the mother's abdomen immediately after birth but removed after about 20 min for measuring and dressing.	50 minutes Among the skin to skin contact
3	Ransjo-Arvidson AB, 2001 (Sweden)	28 healthy full term mother-infant pair were placed between their mother's breasts with skin to skin contact. A video camera recorded the baby's behaviour for the first 2 hrs of life or as long as the baby was awake. In the analysis, infants were grouped in to 3 depending on whether the mother had received analgesia or not	79 minutes Among mothers with no analgesia

S/N	Study (Country)	Methods	Average time to first suckling
4	Carfoot (2005) (England)	204 healthy full term mother-infant pair (102 allocated to skin-to-skin contact and 102 to control group) In the skin-to-skin care group, naked babies were placed between mother's breasts with skin to skin contact as soon as possible after birth and this continued up to 45 minutes. In the control group, babies were given routine hospital care.	46 minutes Among babies with skin to skin contact
5	Jonas W (2007) (Sweden)	47 healthy full term babies were placed between their mother's breasts with skin to skin contact. Mother-infant pair were grouped in to 3 groups during analysis depending on type of treatments the mother received during labour	2 minutes (1-9) Among mothers with no treatment
6	Gabriel M.A.M 2010 (Spain)	17 healthy full term babies were placed SSC immediately after birth and time in minutes between delivery and spontaneous breastfeeding was measured	48 minutes (16-150).
7	Widström, A. M 2011 (Sweden)	28 healthy full term babies were placed SSC immediately after birth. Infants were videotaped immediately after birth to understand the baby's behavioural sequence from birth until first breastfeeding.	62 minutes (44-90)

S/N	Study (Country)	Methods	Average time to first suckling
8	Mahmood 2011 (Pakistan)	183 healthy full term mother-infant pair (92 allocated to skin-to-skin contact and 91 to control group) In the skin-to-skin care group, naked babies were placed between mother's breasts with skin to skin contact as soon as possible after birth and this continued for up to 45 minutes after first breastfeed. In the control group, babies were given routine care	41 minutes (SD=11) among the SSC group
9	Gizzo S 2012 (Italy)	128 healthy full term mother-infant pair (64 in the intervention and 64 in the control group) All newborns received SSC. The intervention group received epidural analgesia during labour, whereas the control received no analgesia	30 minutes among the controls who only had SSC
10	Cantrill 2014 (Australia)	78 healthy full term naked babies were placed between mother's breasts with skin to skin contact as soon as possible after birth for at least 30 minutes before first breastfeed. The following events were then observed and recorded 1) Birthing events and placement of babies immediately following birth; 2) Newborn feeding behaviours; 3) Maternal behaviour to initiate breastfeeding; and 4) Assistance mothers received to position and attach their baby to the breast	38 minutes (SD=15)
11	Aghdas, (2014) (Iran)	92 healthy full term mother-infant pair (47 allocated to skin-to-skin contact and 45 to control group) In the skin-to-skin care group, naked babies were placed between mother's breasts with skin to skin contact as soon as possible after birth and this continued up to 2 hours. In the control group, babies were given routine hospital care.	22 ± 10 minutes Among babies with skin to skin contact

4.5 Discussion

Evidence synthesized in this review supports the WHO definition for the early initiation indicator and re-emphasizes the recommendation for mothers to initiate breastfeeding within at most 'one hour' after birth. If a mother attempts to initiate breastfeeding immediately after birth, this evidence suggests that it takes less than one hour on average for a healthy newborn baby to latch on to the breast.

Different studies report effective suckling in various ways and comparisons were made to determine which tool better predicts success in first suckling (48). Two studies in this review (36, 37) reported success in first suckling using the Infant Breastfeeding Assessment Tool (IBFAT). Some studies (46) added 'latching on' component to the tool and referred it as BAT (Breastfeeding Assessment Tool) whereas others used a modified version of IBFAT (37). Additional tools used to assessing success in first suckling include LATCH, MBA (Mother Baby Assessment) and BSES (Breastfeeding Self-efficacy Scale).

In this review, 11 studies reported the time in minutes between mothers' attempt to initiate breastfeeding immediately after birth and the first time the newborn baby started suckling or latched on to the breast. Of the 11 studies, nine reported an average time of less than one hour and therefore, the definition for early initiation indicator i.e. initiation within one hour after birth is justified and should be followed consistently. In addition to the evidence on the health benefits of early initiation in saving newborn lives, this review provided practical evidence supporting the 'one hour' time limit recommended for early initiation of breastfeeding. Furthermore, the number of studies available to contribute to this evidence-base has increased from two studies (17, 18), which were identified in the 1998 WHO evidence review (16), to nine studies identified in this review in 2015.

4.6 Conclusion

There is also adequate evidence showing it is practically possible for healthy newborn babies to start suckling within one hour after birth and this supports the definition for early initiation as 'initiation of breastfeeding within one hour after birth'. The narrative that the 'one hour' time limit is arbitrary should be avoided. It is recommended that all surveys reporting prevalence estimates on early initiation should consistently use this standard definition so that comparisons can be made within and between countries about the progress made in promoting early initiation of breastfeeding and achieving other newborn health targets.

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Chapter 5 : Measurement of breastfeeding initiation: a qualitative study exploring Ethiopian mothers' perception about survey questions assessing early initiation of breastfeeding

As previously discussed in chapter 2, section 2.3, the indicator for early initiation is not intended to measure and report the time when newborn babies actually started getting mother's milk. But, it is unclear whether mothers interpret the question as intended and also whether mothers are able to describe time in minutes, hours or days as recommended in the WHO coding format. This chapter presents findings, which are already published in the International Breastfeeding Journal, about how mothers in Ethiopia perceived the question assessing early initiation of breastfeeding and their description of time to breastfeeding initiation. The published version of this paper is available in Appendix 6.

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Student	Mihretab Melesse Salasibew
Principal Supervisor	Tanya Marchant
Thesis Title	Measurement of early initiation of breastfeeding: a mixed methods study exploring accuracy, challenges and implications for tracking newborn health targets

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	International breastfeeding Journal		
When was the work published?	25 August 2014		
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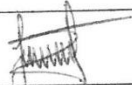
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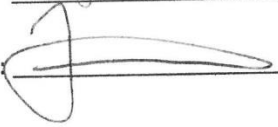
SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceived the research idea, designed the study, collected and analysed data and developed the draft manuscript. Suzanne Filteau and Tanya Marchant advised in the design of the study, data collection, analysis and interpretation of findings as well as critically commenting on the draft
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Measurement of breastfeeding initiation: a qualitative study exploring Ethiopian mothers' perception about survey questions assessing early initiation of breastfeeding

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5.1 Abstract

Background

Although breastfeeding is almost universal in Ethiopia, only 52% newborns benefited from early initiation of breastfeeding in 2011. Early initiation is one of the recommended interventions saving newborn lives but its potential has not yet been realized for Ethiopian newborns and there is a need for continued efforts to increase prevalence. To do so, it is also relevant to focus on consistent and accurate reporting of prevalence in early initiation.

WHO recommends the question “how long after birth did you first put [name] to the breast?” in order to assess prevalence in early initiation during household surveys. It is designed to measure the time after birth when the mother attempted to initiate breastfeeding regardless of whether breastmilk had arrived or not. However, it is unclear how mothers perceive this question and what their responses of time refer to. In this study, we assessed Ethiopian mothers' perception about the question assessing early initiation.

Methods

Cognitive interviews were conducted between April and May 2013 with eligible mothers in Basona and Debrebirhan woredas (districts), 120 km away from Addis Ababa, Ethiopia.

Results

A total of 49 mothers, most from Basona (n=36) and the rest from Debrebirhan woredas (n=13) were interviewed. No probes or follow on questions were required for mothers to understand what the WHO recommended question was about. However, further probing was needed to ascertain what maternal responses of time refer to. Accordingly, mothers' response about the timing of early initiation was related to the first time the newborn received breastmilk rather than their first attempt to initiate breastfeeding. In addition, considerable probing was required to approximate and code responses of time based on the WHO coding format because some mothers were unable to express time in minutes or hours.

Conclusion

Existing question assessing early initiation is not adequate to identify intended attempts of mothers to initiate breastfeeding. We recommend the question to be revised as "how long after birth did you first put [name] to the breast even if your breastmilk did not arrive yet?" Standard probes or follow on questions are required to avoid subjective interpretation of the indicator.

KEYWORDS:

Early initiation, breastfeeding, infant feeding, breastmilk, essential interventions, saving newborn lives

5.2 Background

Globally, a marked 41% reduction has been recorded in under-five mortality: from 87 deaths per 1,000 live births in 1990 to 51 in 2011. Sub-Saharan Africa, still with the

highest mortality rates in the world, achieved double reduction from 1.5 per cent a year in 1990–2000 to 3.1 per cent a year in 2000–2011. However, most of the reduction has been in deaths of older infants and toddlers so the proportion of all under-five deaths that occurred in the neonatal period (first 28 days of life) worldwide increased from about 36 per cent in 1990 to 43 per cent in 2011 (1). Ethiopia is among seven high-mortality countries (Bangladesh, Ethiopia, Liberia, Malawi, Nepal, United Republic of Tanzania and Timor-Leste) which have already achieved the fourth millennium development goal with 67% reduction in under-five mortality between 1990 and 2012 although the proportion of neonatal deaths still remains high (2).

Interventions immediately after birth such as breastfeeding, thermal care to prevent hypothermia (through immediate drying, warming, skin-to-skin contact and delayed bathing) and hygienic cord and skin care have been recommended to save newborn lives (3). It was estimated that if prevalence was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively (4). Further, studies have estimated that up to 16% of all neonatal deaths could be saved if all infants were breastfed within the first day of life, and 22% if breastfed within the first hour after birth (also referred to as ‘early initiation’)(5).

Although breastfeeding is almost universal in Ethiopia, with over 98% of all children ever breastfed, the 2011 Demographic and Health Survey (DHS) estimated that only 52% of Ethiopian newborns benefited from early initiation of breastfeeding which is far from the government’s own target of 92% (6). As such, the potential of early initiation of breastfeeding to save newborn Ethiopian lives has not yet been realized and there is a need for continued efforts to increase prevalence.

To do so, it is also relevant to focus on consistent and accurate reporting about prevalence in early initiation since these are needed to inform policy makers and programme managers about successes and failures of actions, and to make comparison of results across time and place. In 1991, the World Health Organization (WHO) recommended standard questions and indicators for the assessment of early initiation

of breastfeeding in household surveys (Chapter 1, table 1.1). The main purpose of setting standards was to have a common set of measurement tools in order to assess practices and evaluate promotional programs (7). These standards were revised in 2007 following changes in infant feeding recommendations (8). In 2010, WHO published a further guideline on how breastfeeding indicators should be measured. These include detailed guidance on the text description of survey questions, sampling strategy, choice and interpretation of indicators (9).

Eligible mothers to be asked the question assessing early initiation of breastfeeding are those between 15 to 49 years old and ever breastfed a child born two years preceding the survey. WHO also provides the following guidance about the questions assessing 'ever breastfeeding' and 'initiation of breastfeeding'.

"Child ever breastfed

For this question it does not matter how long the respondent breastfed the child, only whether or not she ever gave the child the breast (even if the baby died very young). It does not matter whether or not the mother's milk had arrived at the time she gave the child the breast.

Initiation of breastfeeding

This question asks about when the child was first put to the breast. For this question, it also does not matter whether or not the mother's milk had arrived at the time of first putting the child to the breast. ((9), p.18)

Accordingly, the indicator for early initiation is designed to measure the length of time after birth when the mother attempted to initiate breastfeeding regardless of whether breastmilk had arrived or not. A mother putting her baby directly to her breast and trying to get the baby's mouth to latch to the nipple is an attempt to initiate breastfeeding. Similarly, having the newborn baby placed on mother's chest with skin-to-skin contact could also be regarded as attempting to initiate breastfeeding. Because, studies have shown that newborn babies placed on mothers' chest with skin-to-skin contact would naturally make predictable movements or crawl towards the breast and are likely to initiate and successfully continue breastfeeding afterwards (10-14). Such evidence formed the basis for the WHO recommendation of an arbitrary but practical

minimum timing for mother-baby skin-to-skin contact to start within at most half one hour of birth and to continue for at least 30 minutes (15).

However, it is not clear how mothers participating in breastfeeding surveys perceive the early initiation question and what their responses of time refer to. Such understanding is necessary in order to ensure accuracy in reported prevalence figures about early initiation. In this study, we investigated how Ethiopian mothers perceive the early initiation question and whether their responses of time refer to their first attempt to initiate breastfeeding either by putting the baby to the breast or placing baby on mother's chest with skin-to-skin contact even if baby didn't manage to get breastmilk.

5.3 Methods

Study design

We used a qualitative study design for in-depth understanding about how mothers perceive the wording or text description of the question assessing early initiation of breastfeeding.

Study setting

The study was conducted in two woredas (districts) namely; Basona (predominantly rural) and Debrebirhan (predominantly urban) woredas. These woredas are located in Amhara regional state and 120 km away from Addis Ababa, the capital city of Ethiopia.

Study participants

Women residents either in Basona and Debrebirhan woredas, aged 15-49 years, who had at least one live birth in the last two years and with the most recent child ever breastfed were participants of the study as per WHO criteria for the kind of mothers eligible to be asked the question assessing early initiation of breastfeeding (9). Health extension workers, who provide integrated preventative care services within communities in Ethiopia, assisted in the identification and selection process. These

workers have a list of all 15-49 years old mothers in their catchment area, which we used to select study participants based on the eligibility criteria.

Data collection

We used cognitive interviewing technique with verbal probing to interview eligible mothers over a 6 weeks period between April and May 2013. The principal investigator conducted all interviews using the local language Amharic. The number of interviews conducted was determined by reaching the saturation point i.e. when there are no more new emerging views coming from mothers. In Basona woreda, interviews were held in a room provided by the local government administrative unit whereas in Debrebirhan they were held in residential homes of eligible mothers. A total of 49 mothers, most from Basona (n=36) and the rest from Debrebirhan woredas (n=13), were interviewed in the study. All interviews were tape-recorded after receiving informed written consent or thumb prints in order to do so. Prior to each interview, we completed a form to collect demographic characteristics of eligible mothers including their woreda (Basona or Debrebirhan), level of education (illiterate or \geq primary level education), place of delivery (home or hospital), time since last birth (<6 or 6-24 months) and parity (first time mother or with more than one child).

To identify attempts of breastfeeding initiation either by putting the baby directly to the breast or placing the baby on mother's chest with skin-to-skin contact, we asked mothers either of the following two questions and assessed their perception.

Q1: "how long after birth did you first put [name] to the breast?" (Standard WHO question)

Of the total 49, we interviewed 11 eligible mothers using this question when saturation point was reached.

Q2: "how long after birth did you first put [name] in contact with you on your chest?" (Revised WHO question in order to detect attempts to initiate breastfeeding through skin-to-skin contact)

Of the total 49, we interviewed 38 mothers using this question; 6 in Debrebirhan and 32 in Basona woreda. More mothers were interviewed using this question (Q 2) to get to saturation point especially in the rural woreda Basona.

During the cognitive interview process, we first read the questions either Q1 or Q2 and asked mothers the first thing they thought up-on hearing the questions before they responded with a time for breastfeeding initiation. We then used further probes to determine whether or not their responses of time refer to the time between birth and the mother attempting to initiate breastfeeding even if baby actually didn't start getting mothers' milk. (See appendix 1: Topic guide for cognitive interviews).

Data analysis

All interviews were transcribed verbatim directly from Amharic audios into English transcripts initially by an academic from Debrebirhan University and then by the principal investigator. Data was analysed deductively using the frame work analysis approach. Using qualitative data analysis software package NVIVO version 10, each transcript was carefully screened and coded. These codes were in turn grouped in to major themes representing similar views or perception about the questions.

Ethics

The study received ethical approval from research ethics committee at the London School of Hygiene and Tropical Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in April 2013. Further support letters were also obtained from Ethiopian Ministry of Health, Debrebirhan University and the health bureaus in Basona and Debrebirhan woredas. All eligible mothers gave written informed consent or thumb print prior to interviews.

5.4 Results

A total of 49 mothers, most from Basona (n=36) and the rest from Debrebirhan woredas (n=13), were interviewed in the study (Table 5.1). Of those interviewed in Basona woreda, 16 and 20 were from rural villages called Ametsegna and Kachamba respectively whereas in Debrebirhan, all mothers interviewed were from Kebele 09 (sub-district).

Table 5.1: Characteristics of mothers interviewed

Characteristic	N (%)
Woreda	
Basona	36 (74)
Debrebirhan	13 (26)
Educational level	
Illiterate	19 (39)
≥ primary level education	30 (61)
Place of delivery	
Home	27 (55)
Hospital	22 (45)
Parity	
Primiparous	10 (20)
Multiparous	39 (80)
Time since last delivery	
< 6 months	12 (24)
6-24 months	37 (76)

1. Immediate perception up-on hearing the questions

1.1 Q1: “how long after birth did you first put [name] to the breast?”

We asked 11 mothers this question and the first thing these mothers thought up-on hearing the question was about their practice in breastfeeding initiation and tried to recall the time it took them to do so immediately after birth.

“Your question is about what I fed my baby immediately after birth? ...you asked if she breastfed immediately or waited for a while. I don’t think it took 2 hrs, because she is my first daughter [other children are boys] and I was eager to have her with me soon after birth. When I asked them [traditional birth attendants] to give me my daughter, they told me to wait a bit until they give her bath and do other things. When they gave me about 2 hrs later, I gave her my breast and she got milk soon” [Mother of 3, illiterate, home delivery, Basona woreda]

“...well, you asked me about breastfeeding and it is one and half hour later that I started breastfeeding and she got milk soon” [First time mother, literate, with 2 weeks old baby born in hospital, Debrebirhan woreda]

No probes or follow on questions were required for these mothers to understand what the question was about. However, probes were needed to ascertain whether or not their responses of time referred to the time after birth when they attempted to initiate breastfeeding even if baby didn’t actually get their breastmilk yet.

1.2 Q2: “how long after birth did you first put [name] in contact with you on your chest?”

Thirty eight mothers were asked this question. The majority thought the question was about breastfeeding and didn’t need further probes or follow on questions to understand what the question was about. However, 5 mothers asked for further clarification and needed probing before they were able to give their responses of time as illustrated below;

“What do you mean when you say on my chest?” [Mother of 3, literate, hospital delivery, Basona woreda]

“...do you mean hugging her while I was at the hospital?” [Mother of 2, literate, hospital delivery, Basona woreda]

Others (n=7) perceived the question differently and the first thing they thought up-on hearing the question was about the time when they started hugging or holding the baby on their chest.

“After 6 months ... I mean she becomes stronger after 6 months and even she tries to stand when I hold her in my chest” [illiterate, 2 children, Basona woreda]

“After 5 months... you asked me how long after birth did I put my baby in to my chest and that is after 5 months” [Literate, 3 children, Basona woreda].

Even after repeating the question and further probes, a mother [Mother of 3, illiterate, home delivery and Basona woreda] still did not understand the question asked was about breastfeeding initiation as shown in the extract below;

MS: how long after birth did you first put [name] in contact with you on your chest?

Mother: it is after 3 days or so that the baby becomes slightly stronger for me to hug and hold her in upright position in my chest. We can't hug the baby soon after her birth and sit down...rather you wrap the baby soon after birth and get her to sleep or rest...

MS: Ok thanks, can I ask if you understood my question please?

Mother: you asked me about the circumstances around [name's] birth...

MS: Ok, may be let me repeat the question... how long after birth did you first put [name] in contact with you on your chest?

Mother: I said it is not possible to hug the baby soon after birth, which means it would be on the 3rd or 4th day after birth that I hug my baby.

This particular mother was able to give relevant responses of time for breastfeeding initiation once the phrase “start breastfeeding” was included in the question.

MS: Ok, how long after birth did you start breastfeeding [name] then?

Mother= we don't give breastmilk soon after birth. We give the baby slightly warm water with some sugar using a spoon. This continues until the breastmilk bursts and the mother gets ready to feed. We don't give butter these days either..., she was born at 2am and she started breastfeeding around 12 pm noon [10 hrs after birth].

Therefore, revising the early initiation question as Q2 (how long after birth did you first put [name] in contact with you on your chest?) confused some mothers resulting in unintended responses of time for breastfeeding initiation and considerable probing was required. Although we revised the standard WHO question to detect attempts of breastfeeding initiation by placing baby on mother's chest with skin-to-skin contact, none of the mothers we interviewed reported having skin-to-skin contact with their babies immediately after birth. Instead during home deliveries, babies were given bath immediately after birth, dried and wrapped up in a towel before attempting to initiate breastfeeding.

"When the baby came out, she (traditional birth attendant) cut the cord using clean blade and tied it. After that, she wrapped the baby in a towel and gave me to breastfeed..." [First time mother, literate, Basona woreda]

Therefore, maternal responses of time to both questions Q1 & Q2 refer to the first time the newborn received breastmilk rather than their first attempt to initiate breastfeeding. In fact, some mothers did not even consider colostrum as part of breastmilk and they reported the time after birth when their milk 'bursts' or 'came in': in other words, when full lactation was established. For example, a first time mother, illiterate and from Basona woreda reported that it took her up to 3 days to initiate breastfeeding although colostrum was available to the baby during her earlier attempts to initiate breastfeeding.

MS: how long after birth did you first put [name] in contact with you on your chest?

Mother: ...I started feeding 3 days later because the milk was not coming until 3 days.

MS= ok, have you actually tried to breastfeed your baby soon after birth even if the milk was not coming?

Mother: yes, I tried but no success. The milk came 3 days later. I gave her cow milk for the first 3 days until the breastmilk came in...

2. Mothers' understanding of time

The indicator for early initiation is time-dependent and the WHO coding format (Fig 5.1) (9) is designed to capture responses of time in minutes, hours or days. However, some mothers we interviewed found it difficult to express the time as such.

“I don’t know time...? It is difficult to say...” [Mother of 2, illiterate, home delivery, Basona woreda]

When mothers were able to give responses of time, it was not as specific as required by the WHO coding format. For example, two mothers we interviewed gave responses of time for breastfeeding initiation as follows;

“After a while...” [Mother of 4, illiterate, home delivery, Basona woreda]

“I gave birth in the morning and breastfed him in the afternoon...” [Mother of 2, illiterate, home delivery, Basona woreda]

We also asked mothers if they can tell the difference between minutes and hours in order to understand how accurate their responses of time were and the following extracts show how some mothers found it difficult to differentiate between minutes and hours.

MS: I am sure you heard people talk about minutes or hours, what do you understand with that and which one do you think is bigger?

“Well, when described in hours it means something has taken too much time...I don’t know which is bigger ... I am illiterate. I can’t say what is what...minutes, hours etc....no...[Mother laughs]” [Mother of 4, illiterate, Basona woreda]

“I don’t know that. I only know to say 12 o’clock when it is lunch time after asking people. I don’t understand time myself” [mother of 5, illiterate, Basona woreda]

“well, it is the husbands who say minutes, hours etc., not me...and their mobile also tells time...[Mother laughs]...the mobile may not tell about minutes but it shows the hour...[Mother laughs]” [Mother of 3, literate, Basona woreda]

Mothers interviewed in this study, especially those in the rural woreda Basona, describe time in their day to day life using one or more of the following methods including by looking at sun shine shadows, cattle coming home (6pm), asking others about the time, sun set (6pm), husbands coming home from farming (lunch time-noon), listening to the

radio to know the time, children coming from school (lunch time-noon), hearing chicken make noise (3am) and own watch or mobile. For example, a mother of 2, illiterate and who gave birth at home in Basona woreda described how she uses the shadow from sun shine to tell the time of the day;

“We have sunshine during the day almost always. There is associated shadow that is seen in my house compound i.e. you see in the ground an area with and without shadow (sun). The shadow moves according to the intensity of the sun shine. For example, earlier in the morning, you get more shadow than the sun. As the day progress, the area covered by the sun becomes bigger and there will be less shadow. Later in the evening, the shadow increases and the sun decreases as it is getting to sun set. I have marked certain places in my house compound that correspond to the actual time of the day by monitoring the movement of the shadow and that’s how I know what time it is”.

5.5 Discussion

Three challenges in the measurement of breastfeeding initiation have been identified in this study. Mothers’ response about the timing of early initiation of breastfeeding was related to the newborn receiving breast milk rather than their first attempt to initiate breastfeeding. In addition, we reported on how revising phrases or the wording in the early initiation question affects mother’s perception of the question. Finally, we identified difficulties among mothers in expressing time with minutes or hours which needed considerable probing.

The small sample size in this study is a limitation and the findings may not be applicable to other Ethiopian population or elsewhere in developing countries. However, it still provided an in-depth insight in to how mothers could perceive the question and potential implications to accuracy in prevalence reports about early initiation of breastfeeding.

Despite existing guidance, breastfeeding measurement remains a complex process and there are still variations among different breastfeeding surveys even in how they define breastfeeding indicators (16). For example, a recent study on breastfeeding defined

early initiation as “breastfeeding initiation within the first 24 hours after birth” (17) instead of the WHO standard definition “breastfeeding within one hour after birth”(8). DHS has two indicators for early initiation; one which measures breastfeeding within one hour after birth and a second for breastfeeding within 24 hrs after birth (18). Breastfeeding surveys heavily rely on self-reporting by mothers and in any population-based epidemiological survey self-reporting is subject to bias affecting accuracy in reported outcomes. A number of studies about dietary or energy intakes (19-22) and sexual health behaviour reports (23-26) have demonstrated problems associated with self-reporting. The extent to which outcomes could be accurately reported depends on a number of factors including the length of recall period (27-30), demographic characteristics of respondents (31), inter- or intra- observer variations between data collectors (32, 33), social desirability i.e. reporting about own practice based on socially acceptable norms [34-36] and approaches in data collections (34, 37).

In this study, we provided evidence on how maternal responses could be influenced by how the question was asked including the wording or text description of the question i.e. approaches in data collection. WHO recommends the question (Q1 in our study) “how long after birth did you first put [name] to the breast?” in order to assess early initiation of breastfeeding (9). However, we found out that mothers reported the time when their baby actually started receiving breastmilk rather than the time when they first put the baby to the breast. Such perceptions remained the same after we revised the question as (Q2 in our study) “how long after birth did you first put [name] in contact with you on your chest?” The revised question (Q2), however, was misinterpreted by some mothers due to changes in the text or wording of the question. None of the mothers we interviewed reported having ‘skin-to-skin contact’ with their babies immediately after birth and there is evidence that local traditional birth attendants did not practice as such during home deliveries. Furthermore, some mothers were not even considering colostrum as part of breastmilk and instead reported the time when their ‘milk came in’ or ‘burst’. This phenomenon in the process of breastmilk production is technically described as lactogenesis II and some mothers do not feel

increased breast fullness or the sense of ‘milk coming in’ until 72 hours after birth (38, 39). Other studies in Ethiopia also reported that even some health professionals did not consider colostrum as part of breastmilk (40).

This study also identified problems related to coding maternal responses using the WHO recommended format because some mothers were unable to express time in minutes or hours. These mothers needed considerable probing in order to approximate and code their responses of time. To our knowledge, no studies have previously highlighted this concern about difficulties in expressing time by mothers. Understanding time and being able to express it in minutes, hours or days is crucial for accurate reporting about early initiation of breastfeeding. If the mother’s response is “immediately” or “less than one hour after birth”, this will be coded as early initiation of breastfeeding. If, however, her response is more than one hour after birth, then this will not be counted as early initiation of breastfeeding (9).

5.6 Conclusion

Existing question assessing early initiation is not adequate to identify intended attempts of mothers to initiate breastfeeding. We recommend the question to be revised as “how long after birth did you first put [name] to the breast even if your breastmilk did not arrive yet?” Standard probes or follow on questions are required to avoid subjective interpretation and these should specify what early initiation is intended to measure. More guidance will also help data collectors on how to identify local socio-cultural beliefs related to breastfeeding such as colostrum avoidance and how to approximate responses of time reported by mothers who are unable to express in minutes or hours.

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Chapter 6 : A qualitative study exploring newborn care behaviours after home births in rural Ethiopia: implications for adoption of essential interventions for saving newborn lives

Breastfeeding doesn't happen in isolation and there are other newborn care behaviours practised immediately after birth. Understanding these newborn behaviours could be useful in developing context-specific and culturally-sensitive probes for household surveys assessing early initiation, which could lead mothers to recall better when they initiated breastfeeding immediately after birth. This chapter presents findings, which are already published in BMC Pregnancy and Child Birth Journal, about newborn care behaviours practiced in a rural village in Ethiopia. The published version of this paper is available in Appendix 7.

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SECTION A – Student Details

Student	Mihretab Melesse Salasibew
Principal Supervisor	Tanya Marchant
Thesis Title	Measurement of early initiation of breastfeeding: a mixed methods study exploring accuracy, challenges and implications for tracking newborn health targets

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	BMC Pregnancy and Child Birth		
When was the work published?	12 December 2014		
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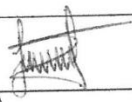
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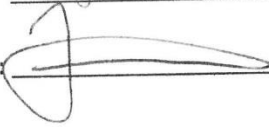
SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceived the research idea, designed the study, collected and analysed data and developed the draft manuscript. Suzanne Filteau and Tanya Marchant advised in the design of the study, data collection, analysis and interpretation of findings as well as critically commenting on the draft
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Student Signature:  _____

Date: 17/7/15

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Date: 17/7/15

A qualitative study exploring newborn care behaviours after home births in rural Ethiopia: implications for adoption of essential interventions for saving newborn lives

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6.1 Abstract

Background

Ethiopia is among seven high-mortality countries which have achieved the fourth millennium development goal with over two-thirds reduction in under-five mortality rate. However, the proportion of neonatal deaths continues to rise and recent studies reported low prevalence of the essential interventions saving newborn lives. In the context of low uptake of health facility delivery, it is relevant to explore routine practices during home deliveries and, in this study, we explored the sequence of immediate newborn care practices and associated beliefs following home deliveries in rural communities in Ethiopia.

Methods

Between April-May 2013, we conducted 26 semi-structured interviews and 2 focus group discussions with eligible mothers, as well as a key informant interview with a local expert in traditional newborn care practices in rural Basona woreda (district) near the urban town of Debrebirhan, 120 km from Addis Ababa, Ethiopia.

Results

The most frequently cited sequence of newborn care practices reported by mothers with home deliveries in the rural Basona woreda was to tie the cord, immediately bathe then dry the newborn, practise 'Lanka mansat' (local traditional practice on newborns), give pre-lacteal feeding and then initiate breastfeeding. For 'Lanka mansat', the traditional birth attendant applies mild pressure inside the baby's mouth on the soft palate using her index finger. This is performed believing that the baby will have 'better voice' and 'speak clearly' later in life.

Conclusion

Prevalence figures fail to tell the whole story as to why some essential interventions are not practiced and, in this study, we identified established norms or routines within the rural communities that determine the sequence of newborn care practices following home births. This might explain why some mothers delay initiation of breastfeeding and implementation of other recommended essential interventions saving newborn lives. An in-depth understanding of established routines is necessary, and community health extension workers require further training and negotiation skills in order to change the behaviour of mothers in practicing essential interventions while respecting local values and norms within the communities.

KEY WORDS:

Newborn care, newborn behaviours, newborn practices, essential interventions, delayed bathing, cord tying, thermal care, breastfeeding

6.2 Background

Globally, a marked 41% reduction has been recorded in under-five mortality: from 87 deaths per 1,000 live births in 1990 to 51 per 1,000 in 2011. Although sub-Saharan Africa still has the highest mortality rates in the world, the region doubled its annual rate of mortality reduction from 1.5 per cent a year between 1990 to 2000 to 3.1 per cent a year between 2000 to 2011. However, similar improvements in newborn survival

(first 28 days of life) have not been observed, and therefore the percent of all under-five deaths that occur in the newborn period increased from 36 percent in 1990 to 43 percent in 2011 (1). Essential interventions immediately after birth such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care are recommended to save newborn lives (2). It has been estimated that if prevalence was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively (3).

Between 1990 and 2010, seven high-mortality countries (Bangladesh, Ethiopia, Liberia, Malawi, Nepal, United Republic of Tanzania and Timor-Leste) had reduced their under-five mortality by two-thirds or more. Ethiopia recoded a 67% reduction in under-five mortality; hence it already achieved the fourth millennium development goal (4). However, in 2012 a large population-based survey in Ethiopia (5) reported that only 50% of newborns had early initiation of breastfeeding, 41% had clean cord care, 43% immediate drying and 47% delayed bathing. These sub-optimal prevalence estimates were consistent with other surveys from Ethiopia (6) and elsewhere in Africa (7-9) and Asia (10-14).

The potential of essential interventions to save newborn Ethiopian lives, therefore, has not yet been realized and there is a need for continued efforts to increase prevalence especially in rural areas where access to health services and information about newborn care is limited. Nine of every ten mothers in Ethiopia deliver at home (15) and, in the context of low uptake of health facility delivery, it is relevant to explore routine immediate newborn care practices that follow the birth of a baby at home within rural communities in Ethiopia. Therefore, in this study, we report on the sequence of newborn care practices and associated beliefs following home births in rural Ethiopia.

6.3 Methods

We used qualitative methods to gain an in-depth understanding about newborn care practices and associated beliefs in rural Ethiopia.

Setting

A breastfeeding measurement study (16) was conducted between April and May 2013 in Basona (rural) and Debrebirhan (urban) woredas (districts) in Ethiopia which are located in Semen Shewa Zone (sub-region) in Amhara regional state and 120 km away from Addis Ababa, the capital city of Ethiopia. These districts were chosen for convenience, being close to Debrebirhan University where a research assistant facilitated the data collection process. Basona woreda has a total population of 120,930, is predominantly rural and women aged 15-49 years old constitute one fifth of its total population (17). As part of the breastfeeding measurement study, we explored the sequence of immediate newborn care practices and associated beliefs following home deliveries in the rural Basona woreda.

Study participants

Mothers aged 15-49 years who had at least one live home birth in the last two years, and who had ever breastfed that child, and who were resident in the rural Basona woreda, were participants of the study. Health extension workers, who keep a list of women aged 15-49 years old in their catchment area, assisted during recruitment by identifying and contacting eligible mothers in their homes. Mothers who agreed to participate in the study were then invited for interview in a venue within their community in a room provided by the local government administrative unit.

Data collection

Data was collected using 26 semi-structured interviews, 2 focus group discussions (9 participants in each group) and a key informant interview with a local expert on traditional newborn care practices.

During the semi-structured interviews, we asked mothers an open-ended question about the context within which they initiated breastfeeding and all events and newborn care practices they remember taking place during that home delivery. Stories of mothers covered a range of topics including who assisted them, which family member was around, whether they had difficulty with labour, whether the baby was given a bath, dried, breastfed etc. At the end of their story, we probed mothers to establish the sequence of newborn care practices or the order in which those events happened (Table 6.1).

Table 6.1: Topic guides for semi-structured interviews and focus group discussions

Semi-structured interviews	Focus group discussions
<p>Question:</p> <p>I try not to interrupt you; so please feel free to tell me everything you remember about this birth and the context when it happened starting from when you went to labour, newborn care your baby received and other events that followed immediately after the birth of [name].</p>	<p>Question:</p> <p>During the interviews, you told me about the context within which you initiated breastfeeding and all events and newborn care practices you remember taking place following the birth of your child [name]. In this focus group discussion, I would like to discuss some of these practices further in order to understand how common these practices are within your community and more details about how each newborn care behaviour is practiced and underlying beliefs, if any.</p>
<p>Probes</p> <p>Who attended the birth?</p> <p>Cord care= what was used to cut and tie the cord? Did you apply anything on it?</p> <p>Thermal care= was the baby given immediate bath and dried?</p> <p>Breastfeeding initiation= when did you start breastfeeding your baby, did you give baby anything other than breastmilk after birth?</p> <p>Any other newborn care practice you would like to mention please?</p>	<p>Discussion points</p> <p>Cord care</p> <p>Immediate bathing & drying</p> <p>Lanka mansat</p> <p>Pre-lacteal feeding and early initiation of breastfeeding</p>

In order to gather views of mothers from diverse backgrounds, we categorized eligible mothers based on two key characteristics: level of education (illiterate or \geq primary level education) and parity (first time mother or with more than one child). We continued to interview mothers in one category until saturation was reached and before we moved on to the second category.

On days when a sufficient number of women attended, mothers interviewed were then invited to stay to attend the focus group discussions. This way, we managed to do 2 focus group discussions on 2 separate days with 18 mothers (9 in each focus group discussion). In these discussions we further explored whether the sequence of newborn care practices reported during semi-structured interviews were regarded as a norm within the community at large.

All interviews and facilitated focus group discussions were conducted in the Amharic language. The number of interviews conducted was determined by reaching the saturation point, i.e. when there were no more new emerging views. Interviews and focus group discussions were conducted with only mothers and the interviewer present and were recorded using a digital-audio recorder.

Data analysis

All interviews and focus group discussions were transcribed verbatim directly from Amharic audios into English transcripts initially by a lecturer from Debrebirhan University and then by the principal investigator. Data were analysed deductively using the framework analysis approach (18). Using qualitative data analysis software package NVIVO version 10, each transcript was carefully screened and coded. These codes were in turn grouped into major themes representing reported newborn care practices such as bathing, cord care or breastfeeding initiation. For each mother, identified themes were outlined in a chronological order starting from the first newborn care practice immediately after birth to the time when breastfeeding was initiated. Finally, the most frequently cited sequence of newborn care practices was identified among all mothers interviewed in the study.

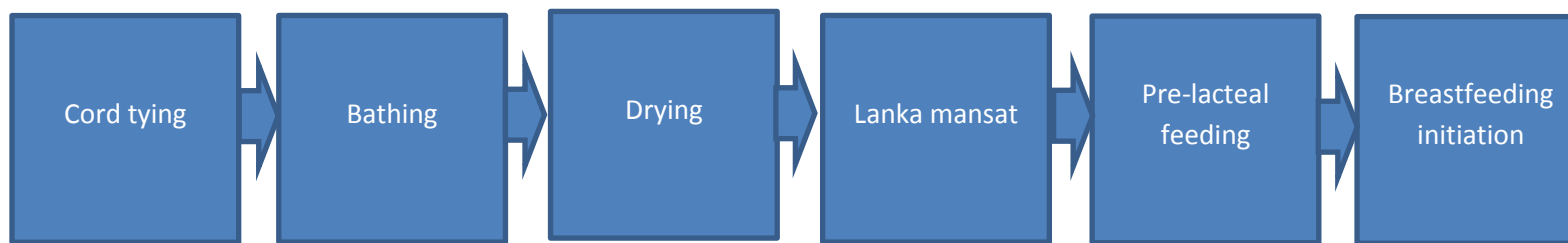
Ethics

The study received ethical approval from research ethics committee at the London School of Hygiene and Tropical Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in April 2013. Further support letters were also obtained from Ethiopian Ministry of Health, Debrebirhan University and Basona woreda health bureau. All eligible mothers gave written informed consent or thumb print prior to interviews.

6.4 Results

Although there were some differences between maternal reports about which newborn care behaviours they practiced, if at all, the most frequently cited sequence of newborn care practices among mothers with home deliveries in the rural Basona woreda was to tie the cord, immediately bath then dry the newborn, practise 'Lanka mansat' (local traditional practice on newborns and described below), give pre-lacteal feeding and then initiate breastfeeding (Figure 6.1: Sequence of newborn care practices for home deliveries in rural Basona woreda).

Figure 6.1: Sequence of newborn care practices for home deliveries in rural Basona woreda



A. Cord care

Almost all mothers interviewed said they used clean blades for cutting the cord, tied the cord using a string or thread and did not apply anything on the cord during the process of drying.

“They [Traditional birth attendants (TBAs)] cut the placenta using clean blades and tied the cord there and then with a thread ...we don’t apply anything on the cord” [First time mother, literate]

B. Bathing and drying

Immediate bathing was a common practice and mothers reported that either the TBA or families who attended the birth give the baby a bath immediately after birth, dried and wrapped the baby in a clean towel before passing it to another family member or a friend to hug the baby for a while.

“Soon after birth, she gave the baby a bath, wrapped her with a towel; she hugged her a bit and then gave me back to breastfeed” [Mother of two, literate]

“...I gave birth on the street on my way to hospital, we returned back home and my family gave a bath to the baby while I sat down waiting for the placenta to come...” [First time mother, literate]

However, some mothers claimed that they had had health education from health professionals and community health extension workers about delaying bath. As a result, they no longer bathed newborns immediately after birth.

“She only dried and wrapped the baby in a clean towel soon after birth, that’s the first thing she did. She said we don’t bath babies any more. I also heard this in trainings from the health professionals before” [Mother of 5, illiterate]

In the focus group discussions, all mothers agreed that immediate bathing of newborn babies was the norm when a mother gives birth at home. A few mothers, who argued for changing this behaviour, made reference to the information they heard from

community health extension workers or recent health education sessions they attended about delaying bathing. However, there were discrepancies as to how long these mothers thought bathing should be delayed for, with responses ranging from 2 hours to 24 hours after birth. Therefore, despite their awareness about delaying bathing, mothers were not clear about for how long bathing babies should be delayed.

C. Lanka Mansat

This is not part of the essential interventions (2) and is not a recommended practice to save newborn lives. However, it was reported that while the mother waits for the placenta to be delivered, the TBAs or family members who attended the birth perform a traditional practice on the newborn baby which they refer to as 'Lanka Mansat'. 'Lanka mansat' is a local traditional practice whereby the TBA applies mild pressure inside the baby's mouth on the soft palate using her index finger which is made wet using a mixture of warm water and a local herb called 'ersho' or honey. Some mothers preferred to do 'Lanka mansat' just after tying the cord and before immediate bathing.

"After birth, she picked the baby up and applied Ersho [local herb] to his Lanka [soft palate]. She then gave the baby a mixture of water and sugar using a spoon [pre-lacteal feeding] before letting him sleep a bit. The placenta came out and after they gave me some food to eat, I got my baby to breastfeed" [Mother of 2, literate]

"...no one eats meal in the house until 'Lanka Mansat' is done and the baby is given bath, dried and wrapped up in a towel" [Mother of 2, illiterate]

"...the way they [TBAs] do it is, first they put some honey in to a small cup and then immerse their index finger in to the cup and apply mild pressure in the baby's mouth [soft palate] using their index finger lifting it [soft palate] upwards ..." [Mother of 4, illiterate]

Mothers believed this helps the baby to have a 'better voice' and 'be able to speak clearly' when he or she gets older.

“I don’t know how it works but in our tradition people believe children will have better voice when they grow up and can be listened to from distance if they had ‘Lanka mansat’ done” [Mother of 2, literate]

“...because, if ‘Lanka mansat’ is not done, babies cannot talk properly when they grow up” [Mother of 3, literate]

A total of 16 out of 26 mothers confirmed that their last child had Lanka mansat performed, but all multiparous mothers said this was a practice performed with their older children. In the focus group discussions, there was a broad consensus among mothers in practising ‘Lanka mansat’ as part of their culture or tradition in their community. A few mothers argued they no longer practise it because of advice from health professionals and community health extension workers about not giving anything to the newborn baby other than breastmilk. However, there was no mention of health workers advising them against practising ‘Lanka Mansat’ specifically. We also noted during these discussions that some mothers strongly believed in the tradition and, despite hearing the advice from the professionals, they were keen to continue practising it.

Findings from the key informant interview with a local expert on traditional newborn care practices revealed that ‘Lanka mansat’ was not listed as one of the traditional practices they identified in the rural Basona woreda.

“...I am not aware of this; we run a number of projects to raise awareness in harmful traditional newborn care practices common in this area which are female genital mutilation, uvula cutting, milk teeth extraction, marriage before 15 years and marriage by abductionwe also try to enforce the law on some individuals as some of the harmful traditional practices I mentioned are now illegal...”

D. Initiation of breastfeeding

Pre-lacteal feeding i.e. feeding babies anything other than breastmilk before the initiation of breastfeeding (19) is common among most mothers who gave birth at home in the rural woreda Basona. Immediately after birth, newborn babies were usually

given a mixture of warm water and sugar until the mother was ready to breastfeed regardless of whether that baby had Lanka Mansat done or not.

“My mother gave the baby warm water with sugar using a spoon [pre-lacteal feeding]. She then gave me the baby after I become stronger and ready to breastfeed” [Mother of 2, literate]

Timing for initiation of breastfeeding varied from 30 minutes to 7 or 8 hours after birth. However, accuracy in all reports about timing for breastfeeding initiation needs to be interpreted with caution as most mothers, especially those in rural settings, found it difficult to describe time in minutes or hours.

“I don’t know the time...? It is difficult to say...” [Mother of 2, illiterate]

“I gave birth in the morning and breastfed him in the afternoon...” [Mother of 2, illiterate]

6.5 Discussion

Beyond reported prevalence figures about interventions saving newborn lives, in this study, we provided an in-depth insight into reported behaviours and sequences of immediate newborn care practices during home deliveries in rural Ethiopia. Reported practices in clean cord care appeared to be in line with those recommended as life-saving interventions. However, maternal reports about thermal care and immediate breastfeeding do not currently align with recommended practices, although there was some evidence that health education messages were beginning to change maternal practices.

There are established norms or routines within communities (20-23) and, in this study, we identified the most commonly cited sequence of newborn care practices following home births in the rural Barona woreda in Ethiopia. Almost all mothers in our study reported that they did not apply anything on the cord in the drying process. However, we found that immediate bathing followed by drying of the newborn was the norm,

similar to findings in other studies in Ethiopia (6). Pre-lacteal feeding was reported by almost all mothers we interviewed. All respondents reported breastfeeding their newborn, consistent with evidence that breastfeeding is almost universal in Ethiopia with over 98% of children ever breastfed at some point (15), but we found that initiation of breastfeeding within one hour after birth was problematic for some women. This may be because of challenges when reporting time for breastfeeding initiation (16) but can also be partly explained by competing newborn care practices that families prioritise over immediate breastfeeding.

We also identified a local traditional newborn care practice referred to as ‘Lanka mansat’ which was performed by TBAs or family members during home births. A study in Ethiopia (24) did not list ‘Lanka mansat’ as one of the traditional practices in the area and this was confirmed in the interview with a local expert. To our knowledge, no studies have been conducted to explore and understand more about such traditional newborn care practices. The soft palate is anatomically located at the back of the roof of the mouth and consists of mainly muscle tissues with no bone structure. One of its functions is to assist in making speech sounds and any abnormalities in the soft palate can cause inability to articulate certain sounds (25). It is this structure on which the TBAs apply mild pressure while performing ‘Lanka mansat’.

In generating this evidence we experienced three important limitations. First, the findings were limited to home births and don’t apply to mothers who gave birth in health facilities. Second, the results represent one rural community in Ethiopia and may not be indicative of practices beyond this study area. Finally, participants of the focus group discussions were the same mothers who attended individual semi-structured interviews and this meant a more limited number of perspectives were included in the study. However, we believe inviting the same mothers who attended individual interviews to also participate in focus group discussions was useful in order to establish (i) whether practices they described individually were also accepted as a norm

or a culture within the community at large and (ii) how strongly these mothers believe and argue about newborn care practices they mentioned during one-to-one interviews.

6.6 Conclusion

Prevalence figures fail to tell the whole story as to why some essential interventions are not practiced – or have low prevalence - and, in this study we identified established norms or routines within the rural communities that determine the sequence of newborn care practices following home births. These findings help to explain why some mothers delay initiation of breastfeeding or choose to bath their baby immediately after birth, for example.

The findings have implications to the adoption and implementation of the essential interventions saving newborn lives such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care. Therefore, we recommend an in-depth understanding about established routines in immediate newborn care practices within communities prior to designing programs and implementation strategies which aim to promote and increase prevalence in the essential interventions. Community health extension workers also require further training and negotiation skills in order to attempt to change the behaviour of mothers, while respecting local values and norms within the communities.

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Chapter 7 : Measurement of delayed bathing and early initiation of breastfeeding: a cross-sectional survey exploring experiences of data collectors in Ethiopia

Existing household survey tools do not have standard probes or follow on questions following the question assessing early initiation of breastfeeding. Given the ambiguity surrounding the meaning of the early initiation question and difficulty for mothers in understanding the intention in the question and providing responses of time in minutes, hours or days, it is unclear how data collectors interpret the question and approximate maternal responses of time while coding responses. This chapter presents findings, already published in BMC Paediatrics Journal, about experiences of household data collectors in Ethiopia and discusses implications to accuracy in the measurement of early initiation of breastfeeding. The published version of this paper is available in Appendix 8.

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Mihretab Melesse Salasibew
Principal Supervisor	Tanya Marchant
Thesis Title	Measurement of early initiation of breastfeeding: a mixed methods study exploring accuracy, challenges and implications for tracking newborn health targets

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	BMC Pediatrics Journal		
When was the work published?	6 April 2015		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Yes	Was the work subject to academic peer review?	Yes

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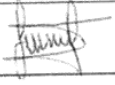
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Stage of publication	Choose an item.

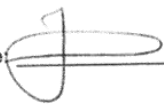
SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceived the research idea and designed the study, developed data collection tools, analysed data and drafted the manuscript. Della Berhanu and Girmaye Dinsa collected data and commented on the draft manuscript. Suzanne Filteau and Tanya Marchant advised in the design of the study, data collection,
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	analysis and interpretation of findings as well as critically commenting on the draft manuscript.
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Student Signature: 

Date: 17/7/15

Supervisor Signature: 

Date: 17/7/15

Measurement of delayed bathing and early initiation of breastfeeding: a cross-sectional survey exploring experiences of data collectors in Ethiopia

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7.1 Abstract

Background

Delayed bathing and early initiation of breastfeeding are among the essential interventions recommended to save newborn lives. Although survey prevalence reports are key to monitoring these interventions, few studies investigated whether such reports accurately reflect the proportion of mothers and children who received these interventions. In order to gather accurate data, guidance on how to interview and probe mothers is provided. In this study, we investigated experiences of data collectors when asking mothers survey questions that assessed delayed bathing and early initiation of breastfeeding.

Methods

In November 2013, using a self-administered semi-structured questionnaire, we interviewed data collectors who had taken part in a population-based newborn health

household survey in Ethiopia during October-November 2013. A total of 130 out of 160 invited data collectors completed and returned the self-administered questionnaire. Descriptive statistics were used to analyse quantitative data using SPSS software version 19. Qualitative data showing the variety of probes used by data collectors was analysed by listing, screening to identify common themes, and grouping by category.

Results

Most data collectors reported that, in their opinion, mothers were able to understand the meaning of the question about newborn bathing (n=102, 79%) and breastfeeding initiation (n=106, 82%) without the need for probes. However, fewer mothers were able to recall the event for either newborn behaviours and describe it in minutes, hours or days without the need for probes. Overall, only 26% (n=34) and 34 % (n=44) of all data collectors reported that they did not need any probing for the questions related to newborn bathing and breastfeeding initiation questions, respectively. We identified a variety of probes used by data collectors and present examples.

Conclusion

Considerable probing was necessary to facilitate maternal recall of the events and approximate their responses of time regardless of mothers' age, level of education and parity. This could potentially lead to inaccurate prevalence reports due to subjective and inconsistent interpretation of the indicators. Therefore, we recommend inclusion of standard probes or follow-on questions to the existing survey tools assessing the two indicators. Data collectors also require further guidance in using appropriate probes to gather accurate maternal responses.

KEY WORDS:

Newborn care, newborn behaviours, newborn practices, essential interventions, delayed bathing, breastfeeding initiation, household survey, data collectors, interviewers, probes

7.2 Background

Essential interventions immediately after birth such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care are recommended to save newborn lives (1-3) and there is global consensus in reaching out to more newborn babies (4). It has been estimated that if prevalence was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively (5). Furthermore, up to 16% of all neonatal deaths could be prevented if all infants were breastfed from day one and 22% if breastfed within the first hour after birth (6).

Accurate measurement of essential interventions, including delayed bathing and early initiation, could inform policy makers in tracking progress made in saving newborn lives and permit comparison of prevalence figures within and between countries. In many high mortality settings, tracking the extent to which every newborn benefits from these care components is limited by the lack of well-established routine health information systems. Population-based household surveys such as the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) remain the main source of prevalence reports based on which national and regional newborn health policies and strategic decisions are made. However, few studies have evaluated validity and reliability of such household surveys and it is unclear whether survey reports accurately reflect the proportion of mothers and children who accessed and received life-saving interventions (7).

A recent review (8) identified some challenges related to measurement of immediate care behaviours and practices for newborns, including: (i) lack of routine collection of data about immediate newborn behaviours (other than breastfeeding) during national household surveys, (ii) variations in the questions asked, and (iii) maternal recall and timing of specific newborn care interventions. In response to these challenges, the authors of the review recommended standardised indicators for thermal care (drying,

skin-to-skin care, and delayed bathing) and hygienic skin and cord care (clean cord cutting and dry cord care; hand washing prior to delivery) be included in national household surveys, suggested that questions about immediate newborn behaviours and practices be asked of all mothers irrespective of place of birth, and also simplification of questions about timing of events.

We propose another challenge related to measurement of immediate newborn care behaviours and practices is the experience of the data collectors themselves. In order to gather accurate data, guidance on how to interview and probe mothers is provided to enumerators prior to data collection (9, 10). In this study, we investigated experiences of data collectors in how they asked and coded the questions assessing delayed bathing and early initiation of breastfeeding - both of which require maternal responses of time. Specifically, we report on (i) whether data collectors needed to use probes to facilitate mothers' understanding of the questions and (ii) examples of the probes used by data collectors to assist mothers' understanding of the wording of the question, and recall of newborn events (bathing, breastfeeding initiation), including timing.

7.3 Methods

Data was collected by inviting a large team of household survey interviewers, who were still in the field, to complete a self-administered semi-structured questionnaire and provide answers based on the most recent interview they had conducted with a mother of a newborn child.

Setting

A population-based newborn health survey was conducted between October-November 2013 in four major regions of Ethiopia: Amhara, Oromiya, Tigray and Southern Nations, Nationalities and Peoples' region (SNNP). The household survey, implemented as part of a measurement, learning and evaluation grant to the IDEAS project (Informed Decisions for Actions in maternal and newborn health), at London School of Hygiene and Tropical

Medicine, was designed to measure population level prevalence of newborn behaviours and practices, including immediate breastfeeding and delayed bathing. The survey tools were modular, consistent with the DHS structure, and included a module for women aged 13-49 years who had a recent live birth. DHS tools include a coded response ‘immediately’ but this response was not included in this survey and the wording of the question assessing early initiation was translated to local languages as shown in table 7.1. As part of the survey, eligible mothers were specifically asked about timing of breastfeeding initiation and bathing their newborn babies.

In order to minimize language and cultural barriers, data collectors were recruited from the same region where the interviews took place and all of them had college-level or above education in health and social sciences. In addition to participating an intensive training on the data collection tool and field guide, data collectors also participated in one-day pilot testing of the tool before they started actual interviews. A total of 160 data collectors were employed for the survey and all were invited to participate in this study sharing their experiences of interviewing eligible mothers.

Table 7.1: Questions assessing delayed bathing and early initiation of breastfeeding in the newborn health household survey in Ethiopia

Question	Coding options
Delayed bathing: “How long after birth did you first bath [name]?”	<input type="checkbox"/> Within one hour, write minutes <input type="checkbox"/> After one hour, write hours <input type="checkbox"/> After the first day, write days
Early initiation: “How long after birth did you start breastfeeding [name]?”	<input type="checkbox"/> Within one hour, write minutes <input type="checkbox"/> After one hour, write hours <input type="checkbox"/> After the first day, write days

Data collection

We developed a self-administered, semi-structured, paper-based questionnaire. An additional pdf file shows this in more detail (see appendix 2: Self-administered questionnaire). We specifically explored data collectors' views of whether mothers understood the questions upon hearing them for the first time, and were able to recall the event and describe the timing of bathing and breastfeeding initiation in minutes, hours or days without probing or further explanation. To minimise recall bias, we asked data collectors to complete the questionnaire during the field work period and to base their responses on their experience of interviewing the most recent eligible mother. The questionnaire was translated to local languages depending on the region each data collector worked in: Amharic (Amhara and SNNP region), Tigrigna (Tigray region) and Oromifa (Oromiya region).

Data management and analysis

Completed questionnaires were returned to the central office in Addis Ababa, Ethiopia where they were double data entered using SPSS software version 19 and differences reconciled. Quantitative data was analysed using this software where mean values were calculated for continuous variables and percentages were described for categorical variables. Evidence of statistical association between maternal characteristics (age, education level, place of last birth, and parity) and reported frequency of probing by data collectors was sought using the chi square test. Qualitative data showing examples of probes reported to have been used by data collectors were analysed by listing all reported probes in a table, screening them to identify common themes and finally grouping each probe under a specific category.

Ethics

The study received ethical approval from the research ethics committee at the London School of Hygiene and Tropical Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in

April 2013. Participants of the study received an information sheet and a written consent form together with the questionnaire. They were asked to read these and, if they agreed, sign the consent form before completing the questionnaire. Each questionnaire was pre-assigned a number and data was analysed anonymously.

7.4 Results

A total of 130 out of 160 invited data collectors completed and returned the questionnaire: 53 out of 72 in Oromiya, 15 of 16 in Tigray, 26 out of 36 in SNNP and all 36 in Amhara region. The average age of the last mother the data collectors interviewed was 29 years (SD= \pm 7) and most were reported to have been multiparous (n=103, 79%), had no education (n=89, 69%) and gave birth at home (n=96, 74%).

Delayed bathing:

Question: How long after birth did you bath [name]?"

Most data collectors (n=102, 79%) reported that, in their opinion, mothers were able to understand the meaning of the question upon hearing it for the first time without the need for probes. However with regards to responses about timing of when the newborn was bathed, only 39% (n=51) and 46% (n=60) of data collectors reported that mothers were able to recall the event and describe it in minutes, hours or days without probing, respectively. There was evidence that a higher percentage of mothers who gave birth at home were able to give responses without requiring any probing compared to mothers with a health facility delivery (31% compared to 12%, p 0.03). Overall, just over a quarter of all data collectors 26% (n=34) reported that they did not need any probing to help mothers understand the meaning of the question, recall the event of newborn bathing, or describe it in minutes, hours or days (Table 7.2).

Table 7.2: Data collector reports of mothers who understood the question, recalled and described timing for bathing babies with no probing at all

Maternal characteristics	N	Understood question without probes N (%)	Recalled timing without probes N (%)	Described timing without probes N (%)	No probing at all	
					N (%)	P-value*
Total	130	102 (79)	51 (39)	60 (46)	34 (26)	
Age						
15-24	36	29 (80)	18 (50)	18 (50)	12 (33)	0.29
25-34	59	47 (80)	23 (39)	28 (48)	16 (27)	
35+	35	26 (74)	10 (29)	14 (40)	6 (17)	
Education						
No education	89	66 (74)	31 (35)	37 (42)	19 (21)	0.07
Primary level or above	41	36 (88)	20 (49)	23 (56)	15 (37)	
Place of birth						
Home	96	76 (79)	42 (44)	45 (47)	30 (31)	0.03
Health institution	34	26 (77)	9 (27)	15 (44)	4 (12)	
Parity						
Primiparous	27	22 (82)	14 (52)	16 (59)	10 (37)	0.15
Multiparous	103	80 (78)	37 (36)	44 (43)	24 (23)	

* P values were obtained from chi-square tests

Early initiation of breastfeeding

Question: How long after birth did [name] start breastfeeding?"

Most data collectors (n=106, 82%) reported that, in their opinion, mothers understood the question about breastfeeding initiation upon hearing it for the first time without the need for probes. However, only 48% (n=62) reported that they didn't need to probe mothers both to help them recall the event of breastfeeding initiation or describe the time in minutes, hours or days. Overall, only a third of all data collectors 34% (n=44) reported that they did not need any probing to help mothers understand the meaning of the question, recall the event of breastfeeding initiation or describe it in minutes, hours or days (Table 7.3).

Probes

Data collectors reported using a variety of probes to help mothers understand the questions about newborn bathing and breastfeeding initiation, recall the event, and describe timing in minutes, hours or days. We identified three groups of probes used by data collectors: (i) probes which simply re-phrased the wording of the question, (ii) probes that used some reference points during birth such as delivery of placenta, and (iii) probes that sequentially listed all events surrounding birth in order to facilitate maternal recall.

Examples of probes which simply re-phrased the wording or text description of the questions include the following.

"From the time you gave birth, when was the first time the baby come in contact with water?" (Male data collector, degree level qualified, Amhara region)

"As per the advice from health extension workers, did you delay bathing your baby to prevent baby getting cold and by how long?" (Male data collector, degree level qualified, Oromiya region)

"How many minutes or hours after (name) was born did you get her to breastfeed?" (Male data collector, diploma level qualified, SNNP region)

Table 7.3: Data collector reports of mothers who understood the question, recalled and described timing for breastfeeding initiation with no probing at all

Maternal characteristics	N	Understood question without probes N (%)	Recalled timing without probes N (%)	Described timing without probes N (%)	No probing at all	
					N (%)	P-value*
Total	130	106 (82)	62 (48)	62 (48)	44 (34)	
Age						
15-24	36	31 (86)	22 (61)	20 (56)	16 (44)	
25-34	59	49 (83)	27 (46)	27 (46)	19 (32)	0.23
35+	35	26 (74)	13 (37)	15 (43)	9 (26)	
Education						
No education	89	69 (78)	37 (42)	35 (39)	26 (29)	0.10
Primary level or above	41	37 (90)	25 (61)	27 (66)	18 (44)	
Place of birth						
Home	96	78 (81)	50 (52)	48 (50)	36 (38)	0.14
Health institution	34	28 (82)	12 (35)	14 (41)	8 (24)	
Parity						
Primiparous	27	23 (85)	17 (63)	14 (52)	12 (44)	0.19
Multiparous	103	83 (81)	45 (44)	48 (47)	32 (31)	

* P values were obtained from chi-square tests

“Did he breastfeed as soon as you gave birth? Or did the baby breastfeed on the same day of his birth, or the second day, or the following consecutive days?” (Female data collector, degree level qualified, SNNP region)

Probes which used reference points of an event around birth in order to help mothers recall the event and describe the time include the following.

“How long after the placenta was delivered did you bath your baby?” (Female data collector, Nurse, SNNP region)

“When you bath your baby for the first time after birth, was it breakfast time, lunch, dinner or time when the cattle came back home?” (Female data collector, diploma level qualified, SNNP region)

“When did you start breastfeeding your baby? Was it before the placenta came out or after? If it is, how long after delivery of the placenta did you start breastfeeding?” (Female data collector, diploma level qualified, SNNP region)

“Did you start breastfeeding after the placenta came out and you were given kacha (traditional meal given to mothers soon after birth)? How long after birth was that?” (Female data collector, degree level qualified, SNNP region)

Finally, probes which were used to ask mothers sequentially going through all events following birth in order to estimate approximate time for bathing the baby include the following.

“What happened after the baby was born and placenta delivered? Did they dry the baby and wrap him in a cloth? What time did they bath him?” (Male data collector, degree level qualified, Amhara region)

“Who attended the birth? Did they bath your baby? Where was the baby kept after that and when did they give you your baby to start breastfeeding?” (Male data collector, degree level qualified, Amhara region)

“Did they bath your baby at the health center or was it after you went back home? How long did you stay in the health center after giving birth? Did you start breastfeeding in the health center or once you got back home? How long after birth could this be?” (Male data collector, degree level qualified, Tigray region)

7.5 Discussions

Although most data collectors reported that the majority of mothers they interviewed understood the meaning of the essential newborn care questions, considerable probing was still needed to facilitate recall and approximate responses of time regardless of maternal age, educational level, parity and place of delivery. We also identified variation in the types of probes that the data collectors used.

A limitation of this study was whether data collectors accurately recalled and reported their experience of interviewing mothers using the self-administered questionnaires provided. Attempts were made to minimize recall bias, for example by asking them to base their answers on the most recent interviews, and by providing them information sheet and orientation in order to help them accurately complete the questionnaire. Nonetheless, data collectors might have chosen to share their experiences based on the “best or worst” interviewee they had and therefore, their perception of how mothers understood the questions could still be inaccurate.

Despite this limitation, some consistent results emerged. According to data collector reports, although most mothers were clear about the wording or text descriptions of both questions, considerable probing was necessary to facilitate maternal recall of the event and approximate their responses of time as per the recommended coding format. Consistent with a study in South Africa (11), we found no statistical evidence of association between mothers’ characteristics (age, education or parity) and their ability to understand the questions, recall the event and describe timing without any probing.

However, we did observe that mothers who gave birth at home could answer questions without probing more frequently than mothers who gave birth in a health facility. This could partly be explained by limited involvement of mothers with immediate newborn care practices due to hospital protocols even when they had non-emergency deliveries, and therefore mothers may need more prompting to remember the sequence of

events. We also identified different examples of probes used as follow-on questions for mothers who needed clarification about the questions. Currently, there are no standard probes or follow-on questions recommended in household surveys such as DHS (9, 12) and MICS (10, 13) to avoid leading questions or subjective and possibly inaccurate interpretations of questions assessing the two time-dependant newborn indicators i.e. delayed bathing and early initiation of breastfeeding.

Accuracy in self-reports of mothers who participated in population-based household surveys have been assessed (14, 15) and recommendations made to improve measurement and reporting of prevalence estimates (8). Accuracy of survey data can depend on a number of factors including the length of recall period (16-18), demographic characteristics of respondents (11) inter- or intra-observer variations (19,20), social desirability i.e. reporting about own practice based on socially acceptable norms (21-23) and approaches to data collection (21-24) In this study, we have revealed variations in how data collectors interviewed and probed mothers to explain time-dependant questions about newborn bathing and breastfeeding initiation.

7.6 Conclusion

Data collectors reported that considerable probing was necessary to facilitate maternal recall of the event and approximate their responses of time regardless of mothers' age, level of education and parity. This could potentially lead to inaccurate prevalence reports due to subjective and inconsistent interpretation of the indicators, which makes it difficult to track progress in the implementation of newborn life-saving interventions. Therefore, we recommend inclusion of standard probes or follow-on questions to the existing survey tools assessing the two newborn indicators. Data collectors also require further guidance about the purpose and interpretation of the indicators as well using appropriate probes to gather accurate maternal responses.

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Chapter 8 : Discussion

8.1 Main findings

This PhD thesis provided an in-depth insight to challenges in the measurement of early initiation of breastfeeding and made recommendations to estimate prevalence with better accuracy. Accordingly, consistent use of the standard definition ‘initiation of breastfeeding within one hour’ is recommended as there is now adequate evidence showing it is practically possible for healthy newborn babies to start suckling within one hour after birth. In order to avoid ambiguity, the household survey question assessing early initiation should be revised as “how long after birth did you first put [name] to the breast even if your breastmilk did not arrive yet?” Standard probes or follow on questions are needed to avoid inconsistencies and misinterpretation of the indicator by data collectors. Probes should be designed using other immediate newborn care practices as reference points so that mothers could accurately recall when breastfeeding was initiated.

8.2 Summary of thesis chapters and findings

Design and implementation of household surveys need careful thought in order to produce the best, accurate and most relevant information that is needed by public health decision makers (1). Accuracy can be influenced by a number of factors, especially when surveys rely on respondents’ self-report (2-7) . Understanding these factors is a key step in developing strategies to improve accuracy in prevalence estimates about newborn-live saving interventions such as early initiation. The Literature review in **Chapter 2** identified five factors which could affect accuracy in measurement of breastfeeding practices but these were based on studies about exclusive breastfeeding and complementary feeding indicators. Therefore, subsequent chapters in this thesis explored the challenges related to measurement of early

initiation of breastfeeding and made recommendations to avoid potential inaccuracies in population-level prevalence estimates of the indicator.

Accordingly, **chapter 4** looked at the issues related to inconsistencies in defining the indicator among surveys and explored whether the 'one hour' time limit used to define the early initiation indicator is practically possible by estimating the length of time after birth it takes for a newborn baby to start suckling; **chapter 5** identified potential misinterpretations of the early initiation question and provided evidence about Ethiopian mothers' perception of the question; **chapter 6** explored other newborn care behaviours practiced immediately after birth and highlighted whether setting the context when breastfeeding was initiated can potentially assist mothers to recall timing of early initiation with better accuracy; and **chapter 7** investigated the challenges faced by household data collectors to accurately ask and code maternal responses.

8.3 Existing initiatives to improve newborn health indicators

Given the slower rate of decline in neonatal mortality than under-five mortality (8), there is now a great focus on scaling up essential interventions saving newborn lives, including early initiation of breastfeeding (9-12). Despite newborn health data being increasingly available in recent times, there is still a need for more and better programmatically relevant data for decision-makers. To address this need, the Newborn Technical Working Group (TWG) was officially established in April 2008 with representatives from Save the Children's Saving Newborn Lives program (SNL), USAID, Macro, and UNICEF. The working group aims to ensure consistent use of existing and expanded newborn health indicators by revising and/or developing questions on newborn health for potential inclusion in nationally representative surveys such as DHS and MICS. So far, the group conducted several studies and identified key challenges related to measurement of indicators for postnatal care. There is now consensus on implementing three additional newborn indicators pertaining to immediate drying, delayed bathing, and cutting the cord with a clean instrument and on testing three

additional indicators proposed to measure immediate skin-to-skin care, applications to the umbilical cord, and content of postnatal care (13).

In 2013, PLOS Medicine published a collection entitled “Measuring Prevalence in Maternal Newborn and Child Health” (14) which included original research articles and reviews conducted by diverse group of experts in the field including the technical directors of DHS and MICS. This collection demonstrated that while some indicators can be measured accurately, others may not provide valid results and therefore need further investigation. One of the studies in the collection (1) suggested six strategies for improving prevalence measurements through household surveys. These were (i) using additional tools or aids alongside the DHS/MICS questions, (ii) refining the survey questionnaire and/or procedures, (iii) linking household surveys to other sources of information about service provision, (iv) incorporating information technology, (v) delivering an intervention in a pronounced or more visible way so that one can recall the intervention and (vi) using measures that do not rely on respondents' reports.

Another study (15) identified measurement issues related to postnatal indicators including ‘recall about the event’, ‘timing’, ‘content’ and ‘misunderstanding of survey questions’. ‘Timing’ referred to the lack of clarity to distinguish between intrapartum and postnatal care i.e. whether all contacts from birth should count or whether postnatal care should only include contacts made with a health worker after the intrapartum period (the cut-off point) and ‘Content’ referred to specific actions related to newborn care practices which the mother is likely to recall such as use of equipment, undressing baby and giving advice during postnatal care period.

8.4 Thesis contributions

This thesis provided a further input to the measurement of early initiation of breastfeeding by providing an in-depth insight into the key challenges and potential accuracy issues in the prevalence estimates about early initiation. It made recommendations about refining the early initiation question; consistency in using the

standard definition 'within one hour after birth'; the need for the development of standard probes or follow on questions to avoid inconsistencies among data collectors; and the use of other immediate newborn care practices as reference points so that mothers could accurately recall when breastfeeding was initiated.

A review (15), published as part of the PLoS collection on measurement of maternal, newborn and child health indicators, identified some challenges related to measurement of immediate care behaviours and practices for newborns. Findings from this review and additional contributions of this PhD thesis are presented in table 8.1 below. It is worth pointing out that measurement issues identified in the PLoS collection were about all postnatal care indicators whereas this PhD thesis had a particular focus on issues related to measurement of early initiation of breastfeeding.

Table 8.1: Measurement issues identified in the PLoS collection and contributions of this PhD thesis

Measurement issues identified in PLoS collection			Measurement issues identified in this PhD thesis	
Topic	Issue (s)	Already accomplished	Issue (s)	Recommendations made
Recall	<p>Uncertainty about mother’s knowledge about what happened to baby after birth, especially for facility births</p> <p>Lack of recall of past births up to five years prior to survey</p>	<p>Studies have been conducted and showed that mothers have a good knowledge about what happens to their baby regardless of place of delivery</p> <p>MICS uses previous two years recall period and DHS also changed the recall period from five to two years. Others are now using even lesser recall period such as one year recall period</p>	<p>The literature review in chapter 2 identified ‘recall’ as one of the factors which could affect accuracy in breastfeeding measurements.</p>	<p>Chapter 6 provided evidence on the sequence of newborn care practices that occur immediately after birth among rural mothers in Ethiopia and recommended the following.</p> <p>To improve accuracy in maternal recall and approximate responses of time to breastfeeding initiation, household surveys should use local newborn care practices to design probes or follow on questions. For example, if we know ‘bathing’ is commonly practised immediately after birth, this can be used as a reference point to estimate timing of breastfeeding initiation by probing mothers as ‘how long after or before you bathed the baby did you first put [name] to the breast?’</p>

Measurement issues identified in PLoS collection			Measurement issues identified in this PhD thesis	
Topic	Issue (s)	Already accomplished	Issue (s)	Recommendations made
Timing	Lack of criteria to distinguish between intrapartum and postnatal care e.g. should all contacts from birth count or is postnatal care valid only for contacts made after the intrapartum period (the cut-off point)	Detailed postnatal module developed and tested for MICS Distinct measurement of the first pre-discharge and post-discharge contacts included in MICS	WHO coding format applied during household surveys is designed to code maternal responses as 'immediately', 'within one hour' and after '24 hours'. Chapter 2 , section 2.3 in the literature review discussed the difficulty for mothers in expressing time in minutes, hours or days and chapter 5 in the results section provided the evidence	Chapter 7 recommended the need for standard probes or follow on questions to enable data collectors approximate maternal responses of time and avoid inconsistencies in how they probe mothers about time
Question	Potential misunderstanding of survey questions on postnatal care	DHS and MICS questions on postnatal care revised	The early initiation question 'how long after birth did you first put [name] to the breast?' is intended to measure the length of time after birth it took the mother to attempt to initiate breastfeeding regardless of whether or not the baby got mother's milk at the time of her first attempt. But, it is unclear how mothers perceive this during household surveys and what their responses of time refer to	Chapter 5 in this thesis provided evidence on how mothers perceived the early initiation question and to avoid ambiguity, it recommended revising the question as 'how long after birth did you first put [name] to the breast, even if your baby did not receive your breastmilk yet?'

Measurement issues identified in PLoS collection			Measurement issues identified in this PhD thesis	
Topic	Issue (s)	Already accomplished	Issue (s)	Recommendations made
Indicator	No comment was made about consistency in defining indicators and the implications to making comparisons between prevalence estimates		Inconsistencies in defining the early initiation indicators which makes it difficult to compare prevalence estimates within and between countries.	<p>Chapter 2, section 2.1 in the literature review provided evidence that early initiation of breastfeeding within one hour after birth prevents newborn deaths.</p> <p>Chapter 4 in the results section provided the evidence demonstrating that it is biologically and practically possible for a newborn baby to latch on to the breast 'within one hour after birth' if attempts to initiate breastfeeding are made starting from immediately after birth. Therefore, to ensure consistency and comparison between prevalence estimates, it is recommended that all household surveys use the standard WHO definition 'initiation of breastfeeding within one hour after birth'.</p>

8.5 Strengths

The main strength of this thesis is that it used a wide range of data collection tools (mixed-methods) to explore challenges and accuracy in the measurement of the indicator for early initiation of breastfeeding. Using quantitative methods (simple descriptive statistics), it was possible to quantify the proportion of data collectors who found it difficult to gather maternal responses without having to use further probes or follow on questions. Similarly, a range of qualitative method tools were also applied. Cognitive interviews helped to understand how mothers perceived the existing early initiation question and made it possible to make recommendations in how to refine the question assessing early initiation. Semi-structured interviews, focus group discussions and the key informant interview were instrumental for in-depth understanding newborn care practices immediately after birth, other than early initiation of breastfeeding. Furthermore, a critical literature review was conducted in order to synthesis the evidence supporting the 'one hour' time limit in the early initiation indicator. The recommendations arising from the thesis are practical in their application and have potential for public health impact by strengthening measurement approaches for newborn interventions.

8.6 Limitations

Limitations were present in this thesis, including those described below.

1. Cognitive interviews

Conducting cognitive interviews involves recruiting participants who can openly verbalize their perception, feelings and first impressions about the survey questions and are willing to help in improving the questionnaire that the interviewer is testing. Cognitive interviews should be conducted in up to three rounds i.e. asking participants about their thought process on the survey questions, revising questions based on participants' comments, conducting a second round of cognitive interviews, and making

revisions again. Interviews should not be more than one hour long and within a round, 8-12 interviews are usually sufficient to gather feedback on the survey questions (16).

In **chapter 5**, cognitive interviews were conducted to evaluate Ethiopian mothers' perception of the question assessing early initiation of breastfeeding and their description of time. However, participants in these cognitive interviews were selected as per WHO criteria for the kind of mothers eligible to be asked the question assessing early initiation of breastfeeding i.e. mothers aged 15-49 years, who had at least one live birth in the last two years and with the most recent child ever breastfed. Therefore, recruitment of participants was not based on their ability to openly verbalize their feelings about the survey question.

Furthermore, only one round of cognitive interviews was conducted during the only field visit the principal investigator had as part of this PhD study because of time and limited funding available. Therefore, the revised question for assessing early initiation, recommended in this thesis, has not yet been tested for its validity in capturing accurate and intended maternal responses about breastfeeding initiation. More than the recommended 8-12 interviews were conducted in one round by interviewing 49 eligible mothers.

2. Self-administered questionnaires

As part of the study in **chapter 7**, data collectors were interviewed about their experiences of interviewing mothers using a self-administered questionnaire. Although appropriate orientation was given to data collectors prior to completing the questionnaires, it is still possible that data collectors inaccurately described their experiences which could have influenced the conclusions made in the chapter.

3. Relevance to other settings

Findings in this thesis are based on data collected from a largely rural setting in Ethiopia where home births are more common: findings may not be applicable to urban settings and health facility births in Ethiopia. For example, this thesis did not explore newborn

care practices in a health institution nor whether early initiation of breastfeeding was the priority immediately after facility birth, unlike findings in **chapter 6** of this thesis.

Despite the limitations above, this thesis highlighted key challenges and provided relevant recommendations to accurately measure prevalence in early initiation and track progress in achieving national and global newborn health targets.

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Chapter 9 : Conclusion

Evidence supporting the essential interventions saving newborn lives such as early initiation of breastfeeding is well established and hence, there is global consensus to reach out to every newborn with these interventions. This thesis made an important contribution to existing efforts aiming at accurately measuring the proportion of newborns and children who received life-saving interventions such as early initiation of breastfeeding.

9.1 Implications for policy and practice

Global efforts to promote breastfeeding have been guided through new policies, guidelines and national legislations since the early 1980s. Some of these policies include the International Code on Marketing of Breastmilk Substitutes, Ten Steps to successful breastfeeding, Innocenti Declaration on Protection, Promotion and Support of Breastfeeding, Baby Friendly Hospital Initiative (BFHI) and the Global Strategy on Infant and Young Child Feeding. In order to generate accurate prevalence figures and inform policy makers about success or failure of a particular breastfeeding promotion program, WHO recommended a set of standard indicators to measure breastfeeding practices, which were first published in 1991 with further revisions in 2008 and 2010.

This thesis identified gaps in the existing standards in measuring early initiation of breastfeeding which could have implications to whether prevalence reports from household survey reports accurately reflect actual practices of mothers. Therefore, the following three key recommendations are made in order to improve accuracy in prevalence estimates about early initiation:

1. The standard question assessing early initiation needs to be revised to avoid misperceptions and capture maternal responses as intended. Therefore, revising the

household survey question from “how long after birth did you first put [name] to the breast?” to “how long after birth did you first put [name] to the breast even if your breastmilk did not arrive yet?” is recommended.

2. There is also adequate evidence showing it is practically possible for healthy newborn babies to start suckling within one hour after birth and this supports the definition for early initiation as ‘initiation of breastfeeding within one hour after birth’ and consistent use of the standard definition is recommended. Household surveys which report early initiation of breastfeeding should make the time interval clear, for example % prevalence based on ‘within 24 hrs’ definition, so that policy makers or programme managers can make an informed decision in tracking progress by comparing findings with previous estimates.
3. International guidelines on best practice for measurement should include specific probes or follow-on questions following the early initiation question in order to avoid misinterpretations and inconsistencies among data collectors. Standard probes or follow-on questions should be designed using other immediate newborn care practices as reference points so that mothers can accurately recall when breastfeeding was initiated. New guidance should encourage data collectors in using reference points to help mothers recall the time of breastfeeding initiation within the context of other immediate newborn care practices immediately after birth.

Furthermore, there are cross-cutting issues identified in this thesis which have implications to other newborn care indicators used for tracking progress in global newborn health targets.

As discussed in **chapter 1** of this thesis, in the post-MDG era, the Every Newborn Action Plan (ENAP) launched on the 30th June 2014 sets a new newborn health target of reaching an under-five mortality rate of 20 or fewer deaths per 1,000 live births in each country by 2035. Hence, ENAP recommended increasing the prevalence of evidence-

based newborn health essential interventions which save newborn lives such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care.

However, tracking the progress made and making comparisons within and between countries remain a challenge. Whilst there is a wider recognition of this challenge and some initiatives are already in place to improve measurement of newborn health indicators, such as the Newborn Technical Working Group (TWG), findings from this thesis could also contribute in improving future practices. For example, existing newborn indicators could benefit from the measurement issues identified and recommendations made in this thesis such as the need to consistently use a 'standard definition' of indicators to make comparisons between different estimates; to continuously refine household surveys questions in order to capture intended maternal responses about the care their newborn received; and to develop standard probes or follow on questions in order to avoid misinterpretations and inconsistencies among data collectors while probing mothers, particularly about time-dependent newborn health indicators.

9.2 Implications for future research

In this thesis, a revised question assessing early initiation of breastfeeding is recommended but other studies are needed to validate whether the revised question captures actual breastfeeding practices with better accuracy compared to the existing survey question. This can be done by comparing breastfeeding initiation outcomes in two cohorts of populations with similar characteristics after collecting data on breastfeeding initiation using the existing and revised survey question. Alternatively comparison can be made against a 'standard' using DHS, MICS or other available household survey data.

More studies which apply the cognitive interviewing technique, not common in developing countries at the moment, could better assist household surveys in refining survey questions prior to data collection. As demonstrated in this thesis, existing household surveys may not capture intended maternal responses about a given newborn care behaviour. Although there are other ways of pre-testing or piloting questionnaires, cognitive interviewing technique has been proven in social science field to better explain the thought process of interviewees regarding the wording of survey questions.

Appendix 1: Topic guide for cognitive interviews with mothers

Questions

Q1: “how long after birth did you first put [name] to the breast?” or

Q2: “how long after birth did you first put [name] in contact with you on your chest?”

Probes or follow on questions

- What is the first thing you thought up on hearing this question?
- What do you think is this question about?
- Can you repeat the question in your own words?
- Was your baby placed in contact with you on your chest soon after birth?
- Does the time you just gave me refer to when you baby actually started getting your breastmilk or the time when you attempted to initiate breastfeeding?
- How do you find having to give your responses of time as one hour, two hour or in minutes etc.?
- How do you describe time in your daily routines?
- I am sure you heard people talk about minutes and hours, which one do you think is bigger?

Appendix 2: Self-administered questionnaire for data collectors

Informed consent

This survey is being conducted as part of a PhD research on Measurement of newborn behaviours and practices in Ethiopia. It is led by Mihretab M Salasibew in collaboration with Della Berhanu and Girmaye Dinsa from London School of Hygiene and Tropical Medicine in the UK.

The survey aims at assessing your experiences in asking questions on Module 3, section 8 of the IDEAS newborn health household survey. The questionnaire is self-administered and is expected to take not more than 10 minutes of your time. The survey is being conducted anonymously and data will be analysed without reference to your name or the name of the organization you represent or worked for. Data will be accessed only by the primary investigator and all findings from this survey will solely be used for the purpose of this PhD research. There are no known risks to you by participating in this survey and there are no direct benefits to you. However, outcomes of this survey will help in improving Measurement of newborn behaviours and practices in Ethiopia. Taking part in this survey is your choice. If you feel uncomfortable about any of the questions, you can refuse to answer. If you decide not to participate in this survey, you may not lose any services that you are otherwise receiving. Any questions about this survey, you may call Della Berhanu or Girmaye Dinsa on _____.

If you are happy to participate in this survey, you are kindly asked to give your consent by signing below and complete the following questions.

Signature: _____

Date: Day _____, Month __, Year 2006 E.C

S/N	Question	Response
About you		
1	Gender _____ (Please circle your answer)	<input type="checkbox"/> Male <input type="checkbox"/> Female
2	Main occupation __ (Please write your answer)	My main occupation or job is _____
3	Education _____ (please write your answer)	The highest level of education I achieved is - _____
4	Where do you normally live? (Please write the woreda or city, and Region you live)	I live in _____
5	Which language (s) can you speak? (Please circle all that apply)	<input type="checkbox"/> Amharic <input type="checkbox"/> Oromigna <input type="checkbox"/> Guragigna <input type="checkbox"/> Woliyitigna <input type="checkbox"/> Tigrigna <input type="checkbox"/> Sidamigna <input type="checkbox"/> Other (please specify) _____

Please think about the last mother you interviewed on Module 3, section 8 of the IDEAS newborn health household questionnaire and answer the following

- | | | |
|----|---|---|
| 6. | In which region of Ethiopia was that interview carried out? (Please circle one answer) | <input type="checkbox"/> Amhara <input type="checkbox"/> Tigray
<input type="checkbox"/> Oromiya <input type="checkbox"/> SNNP
<input type="checkbox"/> Other (Please specify)
_____ |
| 7. | In which month and year was that interview carried out? For example, if it was in February 2004 E.C, enter 06/2004. | <input type="checkbox"/> Month _____
<input type="checkbox"/> Year _____ E.C |
| 8. | How old is the mother? (Please write your answer) | The mother is _____ years old |

9. What is her level of education?
(Please circle one answer)
- a) Illiterate
b) Elementary school or higher
10. Where did the mother give her last birth?
(Please circle one answer)
- a) Home
b) Health institution
11. How many live births has the mother had including the last birth? (Please circle one answer)
- a) This is her first child
b) More than one child
12. Questions 825-- 828 asked how long after birth did the mother bath her baby. When you first asked this mother this question,
- a) Would you say the mother understood the question on first attempt? YES NO
- b) Did the mother need more explanation in order to help her recall? YES NO
- c) Did the mother need more explanation about how to express time in minutes, hours or days? YES NO
- d) If the mother needed more explanation about bathing recall or to express time, what explanations did you provide? (Please write you explanation)
-
-
13. Question 837 asked how long after birth did the mother start breastfeeding her baby. When you first asked this question,
- a) Would you say the mother understood the question on first attempt?
(please circle one answer) YES NO
- b) Did the mother need more explanation in order to help her recall? (please circle one answer) YES NO
- c) Did the mother need more explanation about how to express time in minutes, hours or days?
(please circle one answer) YES NO
- d) If the mother needed more explanation about breastfeeding recall or to express time, what explanations did you provide? (Please write you explanation)
-
-

Appendix 3: Literature search strategy (Chapter 2, section 2.1)

CINAHL		Embase		Medline		
Search terms	Results	Search terms	Results	Search terms	Results	
1	benefits	76,554	benefits.mp.	256899	benefits.mp.	188774
2	advantages	13,417	advantages.mp.	216496	advantages.mp.	139213
3	gains	7,129	gains.mp.	41287	gains.mp.	29571
4	early	134,811	early.mp.	1570276	early.mp.	1070626
5	immediate	17,673	immediate.mp.	222791	immediate.mp.	157837
6	within one hour	102	within one hour.mp	2009	within one hour.mp	1148
7	breastfeeding	8,862	exp breast feeding/ or breastfeeding.mp	44999	breastfeeding.mp. or exp Breast Feeding/	31639
8	breastfeeding initiation	369	breastfeeding initiation.mp.	632	breastfeeding initiation.mp.	461
9	breastmilk	316	exp breast milk/ or breastmilk.mp.	23643	breastmilk.mp.	733
10	human milk	1,075	human milk.mp.	10577	human milk.mp. or exp Milk, Human/	18321
11	lactation	4,019	lactation.mp. or exp lactation/	54642	exp Lactation/ or lactation.mp.	45442
12	1 or 2 or 3	95,176	1 or 2 or 3	503264	1 or 2 or 3	349825
13	4 or 5 or 6	150,569	4 or 5 or 6	1753813	4 or 5 or 6	1196048
14	7 or 8 or 9 or 10 or 11	12,593	7 or 8 or 9 or 10 or 11	108935	7 or 8 or 9 or 10 or 11	8342
15	12 and 13 and 14	168	12 and 13 and 14	786	12 and 13 and 14	599

Total studies retrieved from the three databases = 168 + 786 + 599 = **1553**

Appendix 4: Literature search strategy (Chapter 2, section 2.2)

CINAHL		Embase		Medline	
Search terms	Results	Search terms	Results	Search terms	Results
1 accuracy	26,017	exp accuracy/ or accuracy.mp.	560874	accuracy.mp	219438
2 validity	60,269	reliability.mp. or exp reliability/	195797	reliability.mp.	98724
3 reliability	64,968	validity.mp. or exp validity/	162646	validity.mp.	105442
4 specificity	61,474	specificity.mp.	671036	specificity.mp.	845033
5 sensitivity	97,297	sensitivity.mp.	1045260	sensitivity.mp.	809215
6 breastfeeding survey*	12	exp breast feeding/ or breastfeeding survey*.mp.	38827	exp Breast Feeding/ or breastfeeding survey*.mp.	27828
7 infant adj survey*	0	(infant adj survey*).mp.	14	(infant adj survey*).mp	10
8 nutrition* assessment*	11,586	exp nutritional assessment/ or nutrition* assessment*.mp.	19923	exp Nutrition Assessment/ or nutrition* assessment*.mp.	10234
9 nutrition* survey*.	496	nutrition* survey*.mp.	3441	exp Nutrition Surveys/ or nutrition* survey*.mp.	19559
10 nutrition* adj survey*	0	(nutrition* adj survey).mp.	2719	(nutrition* adj survey).mp	1827
11 1 or 2 or 3 or 4 or 5	203,713	1 or 2 or 3 or 4 or 5	2011162	1 or 2 or 3 or 4 or 5	1564954
12 6 or 7 or 8 or 9 or 10	12005	6 or 7 or 8 or 9 or 10	61559	6 or 7 or 8 or 9 or 10	56038
13 11 and 12	1931	11 and 12	3286	11 and 12	3005

Continued to next page

Global health		BIOSIS Citation Index		Web of Science	
Search terms	Results	Search terms	Results	Search terms	Results
1 accuracy.mp.	27230	accuracy	21427	accuracy	66711
2 reliability.mp	11162	validity	12985	validity	38449
3 validity.mp.	13916	reliability	14445	reliability	78601
4 specificity.mp.	48900	specificity	51281	specificity	54611
5 sensitivity.mp.	96438	sensitivity	95015	sensitivity	142504
6 breastfeeding survey*.mp.	5	breastfeeding survey*	49	breastfeeding survey*	118
7 (infant adj survey*).mp.	7	infant adj survey*	312	infant adj survey*	471
8 exp nutritional assessment/ or nutrition* assessment*.mp.	3251	nutrition* assessment*	2054	nutrition* assessment*	2805
9 nutrition* survey*.mp.	4312	nutrition* survey*	29025	nutrition* survey*.	26719
10 (nutrition* adj survey).mp.	5314	nutrition* adj survey*	2427	nutrition* adj survey*	3600
11 1 or 2 or 3 or 4 or 5	154751	1 or 2 or 3 or 4 or 5	188403	1 or 2 or 3 or 4 or 5	365689
12 6 or 7 or 8 or 9 or 10	7474	6 or 7 or 8 or 9 or 10	31173	6 or 7 or 8 or 9 or 10	29855
13 11 and 12	567	11 and 12	226	11 and 12	321

Total studies retrieved from the six databases = 1931 + 3286 + 3005 + 567 + 226 + 321 = **9336**

Appendix 5: Literature search strategy (Chapter 4, section 4.4)

CINAHL		Embase		Medline		
Search terms	Results	Search terms	Results	Search terms	Results	
1	Skin to skin contact	274	Skin to skin contact.mp.	552	Skin to skin contact.mp.	358
2	kangaroo method	25	kangaroo method.mp.	46	kangaroo method.mp.	47
3	kangaroo adj method	0	(kangaroo adj method).mp	46	kangaroo adj method).mp	47
4	initiat*	58,479	initiation.mp.	259907	initiation.mp.	174718
5	latch*	299	latch*	946	latch*.mp.	716
6	suckl*	229	suckl*	15513	suckl*	0
7	breastfeeding	8,862	breastfeeding.mp.	19127	breastfeeding.mp. or exp Breast Feeding/	31639
8	breastmilk	1,993	exp breast milk/ or breastmilk.mp.	23643	breastmilk.mp.	16592
9	human milk	1,075	human milk.mp.	10577	exp Milk, Human	18321
10	lactation	4,019	lactation.mp. or exp lactation/	54642	exp Lactation/ or lactation.mp.	45442
11	1 or 2 or 3	298	1 or 2 or 3	589	1 or 2 or 3	395
12	4 or 5 or 6 or 7 or 8 or 9 or 10	70045	4 or 5 or 6 or 7 or 8 or 9 or 10	360014	4 or 5 or 6 or 7 or 8 or 9 or 10	256840
13	11 and 12	125	11 and 12	221	11 and 12	162

Continued to next page

BIOSIS Citation Index		Web of Science		
Search terms	Results	Search terms	Results	
1	Skin to skin contact	203	Skin to skin contact.mp.	316
2	kangaroo method	22	kangaroo method.mp.	30
3	kangaroo adj method	22	(kangaroo adj method).mp	30
4	initiat*	43449	initiation.mp.	91060
5	latch*	2212	latch*	3602
6	suckl*	5511	suckl*	5304
7	breastfeeding	2711	breastfeeding.mp.	6660
8	breastmilk	135	exp breast milk/ or breastmilk.mp.	249
9	human milk	6322	human milk.mp.	7257
10	lactation	12825	lactation.mp. or exp lactation/	12571
11	1 or 2 or 3	225	1 or 2 or 3	346
12	4 or 5 or 6 or 7 or 8 or 9 or 10	72498	4 or 5 or 6 or 7 or 8 or 9 or 10	125776
13	11 and 12	6	11 and 12	53

Total studies retrieved from all five databases = 125 + 221 + 162 + 6 + 53 = **567**

Appendix 6: Published paper (Chapter 5)

Salasibew et al. International Breastfeeding Journal 2014, 9:13
<http://www.internationalbreastfeedingjournal.com/content/9/1/13>



INTERNATIONAL BREASTFEEDING JOURNAL

RESEARCH

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Measurement of breastfeeding initiation: Ethiopian mothers' perception about survey questions assessing early initiation of breastfeeding

Mihretab Melesse Salasibew^{*}, Suzanne Filteau and Tanya Marchant

Abstract

Background: Although breastfeeding is almost universal in Ethiopia, only 52% newborns benefited from early initiation in 2011. Early initiation is one of the recommended interventions for saving newborn lives but its potential seems not yet realized for Ethiopian newborns and there is a need for continued efforts to increase coverage. To do so, it is also relevant to focus on consistent and accurate reporting of coverage in early initiation.

WHO recommends the question "how long after birth did you first put [name] to the breast?" in order to assess coverage in early initiation. It is designed to measure the time after birth when the mother attempted to initiate breastfeeding regardless of whether breast milk had arrived or not. However, it is unclear how mothers perceive this question and what their responses of time refer to. In this study, we assessed Ethiopian mothers' perception about the question assessing early initiation.

Methods: Cognitive interviews were conducted between April and May 2013 with eligible mothers in Basona and Debrebirhan woredas (districts), 120 km away from Addis Ababa, Ethiopia.

Results: A total of 49 mothers, most from Basona (n = 36) and the rest from Debrebirhan woredas (n = 13) were interviewed. No probes or follow on questions were required for mothers to understand what the WHO recommended question was about. However, further probing was needed to ascertain what maternal responses of time refer to. Accordingly, mothers' response about the timing of early initiation was related to the first time the newborn received breast milk rather than their first attempt to initiate breastfeeding. In addition, considerable probing was required to approximate and code responses of time based on the WHO coding format because some mothers were unable to assess time in minutes or hours.

Conclusion: The existing question is not adequate to identify intended attempts of mothers to initiate breastfeeding. We recommend revising the question as "how long after birth did you first put [name] to the breast even if your breast milk did not arrive yet?" Standard probes or follow on questions are required to avoid subjective interpretation of the indicator.

Keywords: Early initiation, Breastfeeding, Infant feeding, Breast milk, Essential interventions, Saving newborn lives

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Background

Globally, a marked 41% reduction has been recorded in under-five mortality: from 87 deaths per 1,000 live births in 1990 to 51 in 2011. Sub-Saharan Africa, still with the highest mortality rates in the world, achieved double reduction from 1.5 per cent a year in 1990 – 2000 to 3.1 per cent a year in 2000 – 2011. However, most of the reduction has been in deaths of older infants and toddlers so the proportion of all under-five deaths that occurred in the neonatal period (first 28 days of life) worldwide increased from about 36 per cent in 1990 to 43 per cent in 2011 [1]. Ethiopia is among seven high-mortality countries (Bangladesh, Ethiopia, Liberia, Malawi, Nepal, United Republic of Tanzania and Timor-Leste) which have already achieved the fourth millennium development goal with 67% reduction in under-five mortality between 1990 and 2012 although the proportion of neo-natal deaths still remains high [2].

Interventions immediately after birth such as breastfeeding, thermal care to prevent hypothermia (through immediate drying, warming, skin-to-skin contact and delayed bathing) and hygienic cord and skin care have been recommended to save newborn lives [3]. It was estimated that if coverage was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively [4]. Further, studies have estimated that up to 16% of all neonatal deaths could be saved if all infants were breastfed within the first day of life, and 22% if breastfed within the first hour after birth (also referred to as 'early initiation') [5]. Although breastfeeding is almost universal in Ethiopia, with over 98% of all children ever breastfed, the 2011 Demographic and Health Survey (DHS) estimated that only 52% of Ethiopian newborns benefited from early initiation of breastfeeding which is far from the government's own target of 92% [6]. As such, the potential of early initiation of breastfeeding to save newborn Ethiopian lives has not yet been realized and there is a need for continued efforts to increase coverage.

To do so, it is also relevant to focus on consistent and accurate reporting about coverage in early initiation since

these are needed to inform policy makers and programme managers about successes and failures of actions, and to make comparison of results across time and place. In 1991, the World Health Organization (WHO) recommended standard questions and indicators for the assessment of early initiation of breastfeeding in household surveys (Table 1). The main purpose of setting standards was to have a common set of measurement tools in order to assess practices and evaluate promotional programs [7]. These standards were revised in 2007 following changes in infant feeding recommendations [8]. In 2010, WHO published a further guideline on how breastfeeding indicators should be measured. These include detailed guidance on the text description of survey questions, sampling strategy, choice and interpretation of indicators [9].

Eligible mothers to be asked the question assessing early initiation of breastfeeding are those between 15 to 49 years old and ever breastfed a child born two years preceding the survey. WHO also provides the following guidance about the questions assessing 'ever breastfeeding' and 'initiation of breastfeeding'.

Child ever breastfed

For this question it does not matter how long the respondent breastfed the child, only whether or not she ever gave the child the breast (even if the baby died very young). It does not matter whether or not the mother's milk had arrived at the time she gave the child the breast.

Initiation of breastfeeding

This question asks about when the child was first put to the breast. For this question, it also does not matter whether or not the mother's milk had arrived at the time of first putting the child to the breast. [9], p.18

Accordingly, the indicator for early initiation is designed to measure the length of time after birth when the mother attempted to initiate breastfeeding regardless

Table 1 Standards recommended for assessing coverage in early initiation of breastfeeding

WHO standard definition		breastfeeding initiation within an hour after birth.
Indicator	Children born in the last 24 months who were put to the breast within one hour of birth divided by children born in the last 24 months.	
Survey question	How long after birth did you first put (NAME) to the breast?	
Coding format	If mother reports she put the infant to the breast immediately after birth, circle '000' For 'Immediately'.	IMMEDIATELY ... 000
	If less than 1 hour, circle '1' for hours AND RECORD '00' hours.	HOURS..... 1 __ __
	If less than 24 hours, circle '1' and record number of completed hours, from 01 to 23.	HOURS..... 1 __ __
	Otherwise, circle '2' and record number of completed days.	DAYS 2 __ __

of whether breast milk had arrived or not. A mother putting her baby directly to her breast and trying to get the baby's mouth to latch to the nipple is an attempt to initiate breastfeeding. Similarly, having the newborn baby placed on mother's chest with skin-to-skin contact could also be regarded as attempting to initiate breastfeeding. Because, studies have shown that newborn babies placed on mothers' chest with skin-to-skin contact would naturally make predictable movements or crawl towards the breast and are likely to initiate and successfully continue breastfeeding afterwards [10- 14]. Such evidence formed the basis for the WHO recommendation of an arbitrary but practical minimum timing for mother-baby skin-to-skin contact to start within at most half an hour of birth and to continue for at least 30 minutes [15].

However, it is not clear how mothers participating in breastfeeding surveys perceive the early initiation question and what their responses of time refer to. Such understanding is necessary in order to ensure accuracy in reported coverage figures about early initiation. In this study, we investigated how Ethiopian mothers perceive the early initiation question and whether their responses of time refer to their first attempt to initiate breastfeeding either by putting the baby to the breast or placing baby on mother's chest with skin-to-skin contact even if baby didn't manage to get breast milk.

Methods

Study design

We used a qualitative study design for in-depth understanding about how mothers perceive the wording or text description of the question assessing early initiation of breastfeeding.

Study setting

The study was conducted in two woredas (districts) namely; Basona (predominantly rural) and Debrebirhan (predominantly urban) woredas. These woredas are located in Amhara regional state and 120 km away from Addis Ababa, the capital city of Ethiopia.

Study participants

Women residents either in Basona and Debrebirhan woredas, aged 15–49 years, who had at least one live birth in the last two years and with the most recent child ever breastfed were participants of the study as per WHO criteria for inclusion and eligibility to be asked the question assessing early initiation of breastfeeding [9]. Health extension workers, who provide integrated preventative care services within communities in Ethiopia, assisted in the identification and selection process. These workers have a list of all 15–49 years old mothers in their catchment area, which we used to select study participants based on the eligibility criteria.

Data collection

We used cognitive interviewing technique with verbal probing to interview eligible mothers over a 6 weeks period between April and May 2013. The principal investigator conducted all interviews using the local language Amharic. The number of interviews conducted was determined by reaching the saturation point i.e. when there are no more new emerging views coming from mothers. In Basona woreda, interviews were held in a room provided by the local government administrative unit whereas in Debrebirhan they were held in residential homes of eligible mothers. A total of 49 mothers, most from Basona (n = 36) and the rest from Debrebirhan woredas (n = 13), were interviewed in the study. All interviews were tape-recorded after receiving informed written consent or thumb prints in order to do so. Prior to each interview, we completed a form to collect demographic characteristics of eligible mothers including their woreda (Basona or Debrebirhan), level of education (illiterate or \geq primary level education), place of delivery (home or hospital), time since last birth (<6 or 6–24 months) and parity (first time mother or with more than one child).

To identify attempts of breastfeeding initiation either by putting the baby directly to the breast or placing the baby on mother's chest with skin-to-skin contact, we asked mothers either of the following two questions and assessed their perception.

Q1: "how long after birth did you first put [name] to the breast?" (Standard WHO question).

Of the total 49, we interviewed 11 eligible mothers using this question when saturation point was reached.

Q2: "how long after birth did you first put [name] in contact with you on your chest?" (Revised WHO question in order to detect attempts to initiate breastfeeding through skin-to-skin contact).

Of the total 49, we interviewed 38 mothers using this question; 6 in Debrebirhan and 32 in Basona woreda. More mothers were interviewed using this question (Q2) to get to saturation point especially in the rural woreda Basona.

During the cognitive interview process, we first read the questions either Q1 or Q2 and asked mothers the first thing they thought upon hearing the questions before they responded with a time for breastfeeding initiation. We then used further probes to determine whether or not their responses of time refer to the time between birth and the mother attempting to initiate breastfeeding even if baby actually didn't start getting mothers' milk. (See Additional file 1: Topic guide).

Data analysis

All interviews were transcribed verbatim directly from Amharic audios into English transcripts initially by an academic from Debrebirhan University and then by the principal investigator. Data was analysed deductively using the

frame work analysis approach. Using qualitative data analysis software package NVIVO version 10, each transcript was carefully screened and coded. These codes were in turn grouped in to major themes representing similar views or perception about the questions.

Ethical issues

The study received ethical approval from Observational/Interventions Research Ethics Committee at the London School of Hygiene and Tropical Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in April 2013. Further support letters were also obtained from Ethiopian Ministry of Health, Debrebirhan University and the health bureaus in Basona and Debrebirhan wore-das. All eligible mothers gave written informed consent or thumb print prior to interviews.

Results

A total of 49 mothers, most from Basona (n = 36) and the rest from Debrebirhan woredas (n = 13), were interviewed in the study (Table 2). Of those interviewed in Basona woreda, 16 and 20 were from rural villages called Ametsegna and Kachamba respectively whereas in Debrebirhan, all mothers interviewed were from Kebele 09 (sub-district).

Immediate perception up-on hearing the questions

1.1 Q1: “how long after birth did you first put [name] to the breast?”

We asked 11 mothers this question and the first thing these mothers thought upon hearing the question was

Table 2 Characteristics of mothers interviewed

Characteristic	N (%)
Woreda	
Basona	36 (74)
Debrebirhan	13 (26)
Educational level	
Illiterate	19 (39)
≥ primary level education	30 (61)
Place of delivery	
Home	27 (55)
Hospital	22 (45)
Parity	
Primiparous	10 (20)
Multiparous	39 (80)
Time since last delivery	
< 6 months	12 (24)
6-24 months	37 (76)

about their practice of breastfeeding initiation and tried to recall the time it took them to do so immediately after birth.

“Your question is about what I fed my baby immediately after birth? ...you asked if she breastfed immediately or waited for a while. . . . I don't think it took 2 hrs, because she is my first daughter [other children are boys] and I was eager to have her with me soon after birth. When I asked them [traditional birth attendants] to give me my daughter, they told me to wait a bit until they give her bath and do other things. When they gave me about 2 hrs later, I gave her my breast and she got milk soon” [Mother of 3, illiterate, home delivery, Basona woreda].

“ . . . well, you asked me about breastfeeding and it is one and half hour later that I started breastfeeding and she got milk soon” [First time mother, literate, with 2 weeks old baby born in hospital, Debrebirhan woreda].

No probes or follow on questions were required for these mothers to understand what the question was about. However, probes were needed to ascertain whether or not their responses of time referred to the time after birth when they attempted to initiate breastfeeding even if baby didn't actually get their breast milk yet.

1.2 Q2: “how long after birth did you first put [name] in contact with you on your chest?”

Thirty eight mothers were asked this question. The majority thought the question was about breastfeeding and didn't need further probes or follow on questions to understand what the question was about. However, 5 mothers asked for further clarification and needed probing before they were able to give their responses of time as illustrated below:

“What do you mean when you say on my chest?” [Mother of 3, literate, hospital delivery, Basona woreda].

“ . . . do you mean hugging her while I was at the hospital?” [Mother of 2, literate, hospital delivery, Basona woreda].

Others (n = 7) perceived the question differently and the first thing they thought upon hearing the question was about the time when they started hugging or hold-ing the baby on their chest.

“After 6 months . . . I mean she becomes stronger after 6 months and even she tries to stand when I

hold her in my chest" [illiterate, 2 children, Basona woreda].

"After 5 months . . . you asked me how long after birth did I put my baby in to my chest and that is after 5 months" [Literate, 3 children, Basona woreda].

Even after repeating the question and further probes, a mother [Mother of 3, illiterate, home delivery and Basona woreda] still did not understand the question asked was about breastfeeding initiation as shown in the extract below:

MS: how long after birth did you first put [name] in contact with you on your chest?

Mother: it is after 3 days or so that the baby becomes slightly stronger for me to hug and hold her in upright position in my chest. We can't hug the baby soon after her birth and sit down...rather you wrap the baby soon after birth and get her to sleep or rest . . .

MS: Ok thanks, can I ask if you understood my question please?

Mother: you asked me about the circumstances around [name's] birth...

MS: Ok, may be let me repeat the question . . . how long after birth did you first put [name] in contact with you on your chest?

Mother: I said it is not possible to hug the baby soon after birth, which means it would be on the 3rd or 4th day after birth that I hug my baby.

This particular mother was able to give relevant responses of time for breastfeeding initiation once the phrase "start breastfeeding" was included in the question.

MS: Ok, how long after birth did you start breastfeeding [name] then?

Mother: we don't give breast milk soon after birth. We give the baby slightly warm water with some sugar using a spoon. This continues until the breast milk bursts and the mother gets ready to feed. We don't give butter these days either, she was born at 2 am and she started breastfeeding around 12 pm noon [10 hrs after birth].

Therefore, revising the early initiation question as Q2 (how long after birth did you first put [name] in contact

with you on your chest?) confused some mothers resulting in unintended responses of time for breastfeeding initiation and considerable probing was required. Although we revised the standard WHO question to detect attempts of breastfeeding initiation by placing baby on mother's chest with skin-to-skin contact, none of the mothers we interviewed reported having skin-to-skin contact with their babies immediately after birth. Instead during home deliveries, babies were given bath immediately after birth, dried and wrapped up in a towel before attempting to initiate breastfeeding.

"When the baby came out, she (traditional birth attendant) cut the cord using clean blade and tied it. After that, she wrapped the baby in a towel and gave me to breastfeed . . ." [First time mother, literate, Basona woreda].

Therefore, maternal responses of time to both questions Q1 & Q2 refer to the first time the newborn received breast milk rather than their first attempt to initiate breastfeeding. In fact, some mothers did not even consider colostrum as part of breast milk and they re-reported the time after birth when their milk 'bursts' or 'came in': in other words, when full lactation was established. For example, a first time mother, illiterate and from Basona woreda reported that it took her up to 3 days to initiate breastfeeding although colostrum was available to the baby during her earlier attempts to initiate breastfeeding.

MS: how long after birth did you first put [name] in contact with you on your chest?

Mother: . . . I started feeding 3 days later because the milk was not coming until 3 days.

MS: ok, have you actually tried to breastfeed your baby soon after birth even if the milk was not coming?

Mother: yes, I tried but no success. The milk came 3 days later. I gave her cow milk for the first 3 days until the breast milk came in . . .

Mothers' understanding of time

The indicator for early initiation is time-dependent and the WHO coding format (Table 1) [9] is designed to capture responses of time in minutes, hours or days. However, some mothers we interviewed found it difficult to assess the time as such.

"I don't know time . . . ? It is difficult to say . . ." [Mother of 2, illiterate, home delivery, Basona woreda].

When mothers were able to give responses of time, it was not as specific as required by the WHO coding format. For example, two mothers we interviewed gave responses of time for breastfeeding initiation as follows;

“After a while . . . ” [Mother of 4, illiterate, home delivery, Basona woreda].

“I gave birth in the morning and breastfed him in the afternoon . . . ” [Mother of 2, illiterate, home delivery, Basona woreda].

We also asked mothers if they can tell the difference between minutes and hours in order to understand how accurate their responses of time were and the following extracts show how some mothers found it difficult to differentiate between minutes and hours.

MS: I am sure you heard people talk about minutes or hours, what do you understand with that and which one do you think is bigger?

“Well, when described in hours it means something has taken too much time . . . I don't know which is bigger . . . I am illiterate. I can't say what is what... minutes, hours etc. . . .no . . . [Mother laughs]” [Mother of 4, illiterate, Basona woreda].

“I don't know that. I only know to say 12 o'clock when it is lunch time after asking people. I don't understand time myself” [mother of 5, illiterate, Basona woreda].

“well, it is the husbands who say minutes, hours etc., not me . . . and their mobile also tells time . . . [Mother laughs] . . . the mobile may not tell about minutes but it shows the hour . . . [Mother laughs]” [Mother of 3, literate, Basona woreda].

Mothers interviewed in this study, especially those in the rural woreda Basona, describe time in their day to day life using one or more of the following methods including by looking at sun shine shadows, cattle coming home (6 pm), asking others about the time, sun set (6 pm), husbands coming home from farming (lunch time-noon), listening to the radio to know the time, children coming from school (lunch time-noon), hearing chicken make noise (3 am) and own watch or mobile. For example, a mother of 2, illiterate and who gave birth at home in Basona woreda described how she uses the shadow from sun shine to tell the time of the day;

“We have sunshine during the day almost always. There is associated shadow that is seen in my house

compound i.e. you see in the ground an area with and without shadow (sun). The shadow moves according to the intensity of the sun shine. For example, earlier in the morning, you get more shadow than the sun. As the day progress, the area covered by the sun becomes bigger and there will be less shadow. Later in the evening, the shadow increases and the sun decreases as it is getting to sun set. I have marked certain places in my house compound that correspond to the actual time of the day by monitoring the movement of the shadow and that's how I know what time it is”.

Discussion

Three challenges in the measurement of breastfeeding initiation have been identified in this study. Mothers' response about the timing of early initiation of breastfeeding was related to the newborn receiving breast milk rather than their first attempt to initiate breastfeeding. In addition, we reported on how revising phrases or the wording in the early initiation question affects mother's perception of the question. Finally, we identified difficulties among mothers in expressing time with minutes or hours which needed considerable probing.

The small sample size in this study is a limitation and the findings may not be applicable to other Ethiopian population or elsewhere in developing countries. However, it still provided an in-depth insight into how mothers could perceive the question and potential implications to accuracy in coverage reports about early initiation of breastfeeding.

Despite existing guidance, breastfeeding measurement remains a complex process and there are still variations among different breastfeeding surveys, even in how they define breastfeeding indicators [16]. For example, a recent study on breastfeeding defined early initiation as “breastfeeding initiation within the first 24 hours after birth” [17] instead of the WHO standard definition “breastfeeding within an hour after birth” [8]. DHS has two indicators for early initiation; one which measures breastfeeding within an hour after birth and a second for breastfeeding within 24 hours after birth [18]. Breastfeeding surveys rely heavily on self-reporting by mothers and in any population-based epidemiological survey self-reporting is subject to bias affecting accuracy in reported outcomes. A number of studies about dietary or energy intakes [19- 22] and sexual health behavior reports [23- 26] have demonstrated problems associated with self-reporting. The extent to which outcomes could be accurately reported depends on a number of factors including the length of recall period [27- 30], demographic characteristics of respondents [31], inter- or intra- observer variations between data collectors [32,33], social desirability i.e. reporting about own practice based on socially acceptable norms [34- 36] and approaches in data collections [34,37].

In this study, we provided evidence on how maternal responses could be influenced by how the question was asked including the wording or text description of the question i.e. approaches in data collection. WHO recommends the question (Q1 in our study) “how long after birth did you first put [name] to the breast?” in order to assess early initiation of breastfeeding [9]. However, we found out that mothers reported the time when their baby actually started receiving breastmilk rather than the time when they first put the baby to the breast. Such perceptions remained the same after we revised the question as (Q2 in our study) “how long after birth did you first put [name] in contact with you on your chest?”. The revised question (Q2), however, was mis-interpreted by some mothers due to changes in the text or wording of the question. None of the mothers we interviewed reported having skin-to-skin contact with their baby immediately after birth and there is evidence that local traditional birth attendants did not practice as such during home deliveries. Furthermore, some mothers were not even considering colostrum as part of breast milk and instead reported the time when their ‘milk came in’ or ‘burst’. This phenomenon in the process of breast milk production is technically described as lactogenesis II and some mothers do not feel increased breast fullness or the sense of ‘milk coming in’ until 72 hours after birth [38,39]. Other studies in Ethiopia also reported that even some health professionals did not consider colostrum as part of breast milk [40].

This study also identified problems related to coding maternal responses using the WHO recommended for-mat because some mothers were unable to express time in minutes or hours. These mothers needed considerable probing in order to approximate and code their responses of time. To our knowledge, no studies have previously highlighted this concern about difficulties in expressing time by mothers. Understanding time and being able to express it in minutes, hours or days is crucial for accurate reporting about early initiation of breastfeeding. If the mother’s response is “immediately” or “less than an hour after birth”, this will be coded as early initiation of breastfeeding. If, however, her response is more than an hour after birth, then this will not be counted as early initiation of breastfeeding [9].

Conclusion

Existing question assessing early initiation is not adequate to identify intended attempts of mothers to initiate breastfeeding. We recommend the question to be revised as “how long after birth did you first put [name] to the breast even if your breast milk did not arrive yet?”. Standard probes or follow on questions are required to avoid subjective interpretation and these should specify what early initiation is intended to measure. More guidance will

also help data collectors on how to identify local socio-cultural beliefs related to breastfeeding such as colostrum avoidance and how to approximate responses of time reported by mothers who are unable to express in minutes or hours.

Additional file

Additional file 1: Topic guide.

Competing interests

All authors declare that they have no competing interests.

Authors’ contributions

MS conceived and designed the study, collected and analyzed data and drafted the manuscript. SF and TM advised in the design of the study, data collection, analysis and interpretation of findings as well as critically commenting on the draft manuscript. All authors read and approved the final manuscript.

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Appendix 7: Published paper (Chapter 6)

Salasibew et al. BMC Pregnancy and Childbirth (2014) 14:412
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RESEARCH ARTICLE

Open Access

A qualitative study exploring newborn care behaviours after home births in rural Ethiopia: implications for adoption of essential interventions for saving newborn lives

Mihretab Melesse Salasibew^{*}, Suzanne Filteau and Tanya Marchant

Abstract

Background: Ethiopia is among seven high-mortality countries which have achieved the fourth millennium development goal with over two-thirds reduction in under-five mortality rate. However, the proportion of neonatal deaths continues to rise and recent studies reported low coverage of the essential interventions saving newborn lives. In the context of low uptake of health facility delivery, it is relevant to explore routine practices during home deliveries and, in this study, we explored the sequence of immediate newborn care practices and associated beliefs following home deliveries in rural communities in Ethiopia.

Methods: Between April-May 2013, we conducted 26 semi-structured interviews and 2 focus group discussions with eligible mothers, as well as a key informant interview with a local expert in traditional newborn care practices in rural Basona woreda (district) near the urban town of Debrebirhan, 120 km from Addis Ababa, Ethiopia.

Results: The most frequently cited sequence of newborn care practices reported by mothers with home deliveries in the rural Basona woreda was to tie the cord, immediately bath then dry the newborn, practice 'Lanka mansat' (local traditional practice on newborns), give pre-lacteal feeding and then initiate breastfeeding. For 'Lanka mansat', the traditional birth attendant applies mild pressure inside the baby's mouth on the soft palate using her index finger. This is performed believing that the baby will have 'better voice' and 'speak clearly' later in life.

Conclusion: Coverage figures fail to tell the whole story as to why some essential interventions are not practiced and, in this study, we identified established norms or routines within the rural communities that determine the sequence of newborn care practices following home births. This might explain why some mothers delay initiation of breastfeeding and implementation of other recommended essential interventions saving newborn lives. An in-depth understanding of established routines is necessary, and community health extension workers require further training and negotiation skills in order to change the behaviour of mothers in practicing essential interventions while respecting local values and norms within the communities.

Keywords: Newborn care, Newborn behaviours, Newborn practices, Essential interventions, Delayed bathing, Cord tying, Thermal care, Breastfeeding

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Background

Globally, a marked 41% reduction has been recorded in under-five mortality: from 87 deaths per 1,000 live births in 1990 to 51 per 1,000 in 2011. Although sub-Saharan Africa still has the highest mortality rates in the world, the region doubled its annual rate of mortality reduction from 1.5 per cent a year between 1990 to 2000 to 3.1 per cent a year between 2000 to 2011. However, similar improvements in newborn survival (first 28 days of life) have not been observed, and therefore the percent of all under-five deaths that occur in the newborn period increased from 36 percent in 1990 to 43 percent in 2011 [1]. Essential interventions immediately after birth such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care are recommended to save newborn lives [2]. It has been estimated that if coverage was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively [3].

Between 1990 and 2010, seven high-mortality countries (Bangladesh, Ethiopia, Liberia, Malawi, Nepal, United Republic of Tanzania and Timor-Leste) had reduced their under-five mortality by two-thirds or more. Ethiopia recorded a 67% reduction in under-five mortality; hence it already achieved the fourth millennium development goal [4]. However, in 2012 a large population-based survey in Ethiopia [5] reported that only 50% of newborns had early initiation of breastfeeding, 41% had clean cord care, 43% immediate drying and 47% delayed bathing. These sub-optimal coverage estimates were consistent with other surveys from Ethiopia [6] and elsewhere in Africa [7-9] and Asia [10-14].

The potential of essential interventions to save newborn Ethiopian lives, therefore, has not yet been realized and there is a need for continued efforts to increase coverage especially in rural areas where access to health services and information about newborn care is limited. Nine of every ten mothers in Ethiopia deliver at home [15] and, in the context of low uptake of health facility delivery, it is relevant to explore routine immediate newborn care practices that follow the birth of a baby at home within rural communities in Ethiopia. Therefore, in this study, we report on the sequence of newborn care practices and associated beliefs following home births in rural Ethiopia.

Methods

We used qualitative methods to gain an in-depth understanding about newborn care practices and associated beliefs in rural Ethiopia.

Setting

A breastfeeding measurement study [16] was conducted between April and May 2013 in Basona (rural) and

Debrebirhan (urban) woredas (districts) in Ethiopia which are located in Semen Shewa Zone (sub-region) in Amhara regional state and 120 km away from Addis Ababa, the capital city of Ethiopia. These districts were chosen for convenience, being close to Debrebirhan University where a research assistant facilitated the data collection process. Basona woreda has a total population of 120,930, is predominantly rural and women aged 15–49 years old constitute one fifth of its total population [17]. As part of the breastfeeding measurement study, we explored the sequence of immediate newborn care practices and associated beliefs following home deliveries in the rural Basona woreda.

Study participants

Mothers aged 15–49 years who had at least one live home birth in the last two years, and who had ever breastfed that child, and who were resident in the rural Basona woreda, were participants of the study. Health extension workers, who keep a list of women aged 15–49 years old in their catchment area, assisted during recruitment by identifying and contacting eligible mothers in their homes. Mothers who agreed to participate in the study were then invited for interview in a venue within their community in a room provided by the local government administrative unit.

Data collection

Data was collected using 26 semi-structured interviews, 2 focus group discussions (9 participants in each group) and a key informant interview with a local expert on traditional newborn care practices.

During the semi-structured interviews, we asked mothers an open-ended question about the context within which they initiated breastfeeding and all events and newborn care practices they remember taking place during that home delivery. Stories of mothers covered a range of topics including who assisted them, which family member was around, whether they had difficulty with labour, whether the baby was given a bath, dried, breastfed etc. At the end of their story, we probed mothers to establish the sequence of newborn care practices or the order in which those events happened [Table 1: topic guides for semi-structured interviews and focus group discussions].

In order to gather views of mothers from diverse backgrounds, we categorized eligible mothers based on two key characteristics: level of education (illiterate or \geq primary level education) and parity (first time mother or with more than one child). We continued to interview mothers in one category until saturation was reached and before we moved on to the second category.

On days when a sufficient number of women attended, mothers interviewed were then invited to stay to attend the focus group discussions. This way, we managed to do 2 focus group discussions on 2 separate days with

Table 1 Topic guides for semi-structured interviews and focus group discussions

Semi-structured interviews	Focus group discussions
Question	Question
I try not to interrupt you; so please feel free to tell me everything you remember about this birth and the context when it happened starting from when you went to labour, newborn care your baby received and other events that followed immediately after the birth of [name].	During the interviews, you told me about the context within which you initiated breastfeeding and all events and newborn care practices you remember taking place following the birth [name]. In this focus group discussion, I would like to discuss some of these practices further in order to understand how common these practices are within your community and more details about how each newborn care behavior is practiced and underlying beliefs, if any
Probes	Discussion points
Who attended the birth?	Cord care
Cord care = what was used to cut and tie the cord? Did you apply anything on it?	Immediate bathing & drying
Thermal care = was the baby given immediate bath and dried?	
Breastfeeding initiation = when did you start breastfeeding your baby, did you give baby anything other than breastmilk soon after birth?	Lanka mansat
Any other newborn care practice you would like to mention please?	Pre-lacteal feeding and early initiation of breastfeeding

18 mothers (9 in each focus group discussion). In these discussions we further explored whether the sequence of newborn care practices reported during semi-structured interviews were regarded as a norm within the community at large.

All interviews and facilitated focus group discussions were conducted in the Amharic language. The number of interviews conducted was determined by reaching the saturation point, i.e. when there were no more new emerging views. Interviews and focus group discussions were conducted with only mothers and the interviewer present and were recorded using a digital-audio recorder.

Data analysis

All interviews and focus group discussions were transcribed verbatim directly from Amharic audios into English transcripts initially by a lecturer from Debrebirhan University and then by the principal investigator. Data was analysed deductively using the framework analysis approach [18]. Using qualitative data analysis software package NVIVO version 10, each transcript was carefully screened and coded. These codes were in turn grouped into major themes representing reported newborn care practices such as bathing, cord care or breastfeeding initiation. For each mother, identified themes were outlined in a chronological order starting from the first newborn care practice immediately after birth to the time when breastfeeding was initiated. Finally, the most frequently cited sequence of newborn care practices was identified among all mothers interviewed in the study.

Ethics

The study received ethical approval from research ethics committee at the London School of Hygiene and Tropical

Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in April 2013. Further support letters were also obtained from Ethiopian Ministry of Health, Debrebirhan University and Basona woreda health bureau. All eligible mothers gave written informed consent or thumb print prior to interviews.

Results

Although there were some differences between maternal reports about which newborn care behaviours they practiced, if at all, the most frequently cited sequence of newborn care practices among mothers with home deliveries in the rural Basona woreda was to tie the cord, immediately bath then dry the newborn, practise 'Lanka mansat' (local traditional practice on newborns and described below), give pre-lacteal feeding and then initiate breastfeeding (Figure 1: Sequence of newborn care practices for home deliveries in rural Basona woreda).

Cord care

Almost all mothers interviewed said they used clean blades for cutting the cord, tied the cord using a string or thread and did not apply anything on the cord during the process of drying.

"They [Traditional birth attendants (TBAs)] cut the placenta using clean blades and tied the cord there and then with a thread ... we don't apply anything on the cord" [First time mother, literate]

Bathing and drying

Immediate bathing was a common practice and mothers reported that either the TBA or families

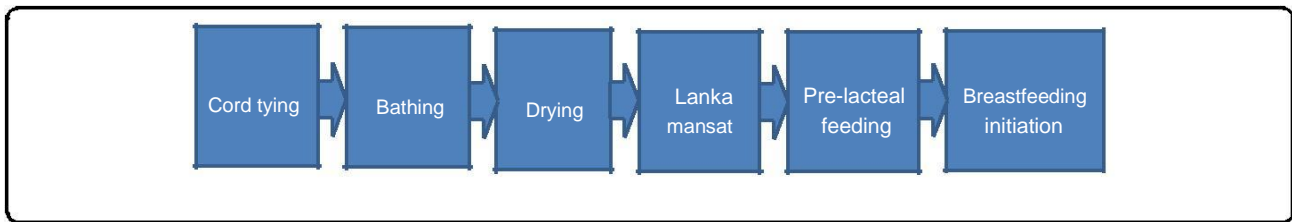


Figure 1 Sequence of newborn care practices for home deliveries in rural Basona woreda.

who attended the birth give the baby a bath immediately after birth, dried and wrapped the baby in a clean towel before passing it to another family member or a friend to hug the baby for a while.

“Soon after birth, she gave the baby a bath, wrapped her with a towel; she hugged her a bit and then gave me back to breastfeed” [Mother of two, literate]

“...I gave birth on the street on my way to hospital, we returned back home and my family gave a bath to the baby while I sat down waiting for the placenta to come...” [First time mother, literate]

However, some mothers claimed that they had had health education from health professionals and community health extension workers about delaying bath. As a result, they no longer bathed newborns immediately after birth.

“She only dried and wrapped the baby in a clean towel soon after birth, that’s the first thing she did. She said we don’t bath babies any more. I also heard this in trainings from the health professionals before” [Mother of 5, illiterate]

In the focus group discussions, all mothers agreed that immediate bathing of newborn babies was the norm when a mother gives birth at home. A few mothers, who argued for changing this behaviour, made reference to the information they heard from community health extension workers or recent health education sessions they attended about delaying bathing. However, there were discrepancies as to how long these mothers thought bathing should be delayed for, with responses ranging from 2 hours to 24 hours after birth. Therefore, despite their awareness about delaying bathing, mothers were not clear about for how long bathing babies should be delayed.

Lanka Mansat

This is not part of the essential interventions [2] and is not a recommended practice to save newborn lives. However, it was reported that while the mother waits for the placenta to be delivered, the

TBAs or family members who attended the birth perform a traditional practice on the newborn baby which they refer to as ‘Lanka Mansat’. ‘Lanka mansat’ is a local traditional practice whereby the TBA applies mild pressure inside the baby’s mouth on the soft palate using her index finger which is made wet using a mixture of warm water and a local herb called ‘ersho’ or honey. Some mothers preferred to do ‘Lanka mansat’ just after tying the cord and before immediate bathing.

“After birth, she picked the baby up and applied Ersho [local herb] to his Lanka [soft palate]. She then gave the baby a mixture of water and sugar using a spoon [pre-lacteal feeding] before letting him sleep a bit. The placenta came out and after they gave me some food to eat, I got my baby to breastfeed” [Mother of 2, literate]

“...no one eats meal in the house until ‘Lanka Mansat’ is done and the baby is given bath, dried and wrapped up in a towel” [Mother of 2, illiterate]

“...the way they [TBAs] do it is, first they put some honey in to a small cup and then immerse their index finger in to the cup and apply mild pressure in the baby’s mouth [soft palate] using their index finger lifting it [soft palate] upwards ...” [Mother of 4, illiterate]

Mothers believed this helps the baby to have a ‘better voice’ and ‘be able to speak clearly’ when he or she gets older.

“I don’t know how it works but in our tradition people believe children will have better voice when they grow up and can be listened to from distance if they had ‘Lanka mansat’ done” [Mother of 2, literate]

“...because, if ‘Lanka mansat’ is not done, babies cannot talk properly when they grow up” [Mother of 3, literate]

A total of 16 out of 26 mothers confirmed that their last child had Lanka mansat performed, but all

multiparous mothers said this was a practice performed with their older children. In the focus group discussions, there was a broad consensus among mothers in practising 'Lanka mansat' as part of their culture or tradition in their community. A few mothers argued they no longer practise it because of advice from health professionals and community health extension workers about not giving anything to the newborn baby other than breastmilk. However, there was no mention of health workers advising them against practising 'Lanka Mansat' specifically. We also noted during these discussions that some mothers strongly believed in the tradition and, despite hearing the advice from the professionals, they were keen to continue practising it.

Findings from the key informant interview with a local expert on traditional newborn care practices revealed that 'Lanka mansat' was not listed as one of the traditional practices they identified in the rural Basona woreda.

"...I am not aware of this; we run a number of projects to raise awareness in harmful traditional newborn care practices common in this area which are female genital mutilation, uvula cutting, milk teeth extraction, marriage before 15 years and marriage by abductionwe also try to enforce the law on some individuals as some of the harmful traditional practices I mentioned are now illegal..."

Initiation of breastfeeding

Pre-lacteal feeding i.e. feeding babies anything other than breastmilk before the initiation of breastfeeding [19] is common among most mothers who gave birth at home in the rural woreda Basona. Immediately after birth, newborn babies were usually given a mixture of warm water and sugar until the mother was ready to breastfeed regardless of whether that baby had Lanka Mansat done or not.

"My mother gave the baby warm water with sugar using a spoon [pre-lacteal feeding]. She then gave me the baby after I become stronger and ready to breastfeed" [Mother of 2, literate]

Timing for initiation of breastfeeding varied from 30 minutes to 7 or 8 hours after birth. However, accuracy in all reports about timing for breastfeeding initiation needs to be interpreted with caution as most mothers, especially those in rural settings, found it difficult to describe time in minutes or hours.

"I don't know the time...? It is difficult to say..." [Mother of 2, illiterate]

"I gave birth in the morning and breastfed him in the afternoon..." [Mother of 2, illiterate,]

Discussion

Beyond reported coverage figures about interventions saving newborn lives, in this study, we provided an in-depth insight into reported behaviours and sequences of immediate newborn care practices during home deliveries in rural Ethiopia. Reported practices in clean cord care appeared to be in line with those recommended as life-saving interventions. However, maternal reports about thermal care and immediate breastfeeding do not currently align with recommended practices, although there was some evidence that health education messages were beginning to change maternal practices.

There are established norms or routines within communities [20- 23] and, in this study, we identified the most commonly cited sequence of newborn care practices following home births in the rural Barona woreda in Ethiopia. Almost all mothers in our study reported that they did not apply anything on the cord in the dry-ing process. However, we found that immediate bathing followed by drying of the newborn was the norm, similar to findings in other studies in Ethiopia [6]. Pre-lacteal feeding was reported by almost all mothers we interviewed. All respondents reported breastfeeding their newborn, consistent with evidence that breastfeeding is almost uni-versal in Ethiopia with over 98% of children ever breastfed at some point [15], but we found that initiation of breast-feeding within an hour after birth was problematic for some women. This may be because of challenges when reporting time for breastfeeding initiation [16] but can also be partly explained by competing newborn care practices that families prioritise over immediate breastfeeding.

We also identified a local traditional newborn care practice referred to as 'Lanka mansat' which was performed by TBAs or family members during home births. A study in Ethiopia [24] did not list 'Lanka mansat' as one of the traditional practices in the area and this was confirmed in the interview with a local expert. To our knowledge, no studies have been conducted to explore and understand more about such traditional newborn care practices. The soft palate is anatomically located at the back of the roof of the mouth and consists of mainly muscle tissues with no bone structure. One of its functions is to assist in making speech sounds and any abnormalities in the soft palate can cause inability to articulate certain sounds [25]. It is this structure on which the TBAs apply mild pressure while performing 'Lanka mansat'.

In generating this evidence we experienced three important limitations. First, the findings were limited to

home births and don't apply to mothers who gave birth in health facilities. Second, the results represent one rural community in Ethiopia and may not be indicative of practices beyond this study area. Finally, participants of the focus group discussions were the same mothers who attended individual semi-structured interviews and this meant a more limited number of perspectives were included in the study. However, we believe inviting the same mothers who attended individual interviews to also participate in focus group discussions was useful in order to establish (1) whether practices they described individually were also accepted as a norm or a culture within the community at large and (2) how strongly these mothers believe and argue about newborn care practices they mentioned during one-to-one interviews.

Conclusion

Coverage figures fail to tell the whole story as to why some essential interventions are not practiced – or have low coverage – and, in this study we identified established norms or routines within the rural communities that determine the sequence of newborn care practices following home births. These findings help to explain why some mothers delay initiation of breastfeeding or choose to bath their baby immediately after birth, for example.

The findings have implications to the adoption and implementation of the essential interventions saving newborn lives such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care. Therefore, we recommend an in-depth understanding about established routines in immediate newborn care practices within communities prior to designing programs and implementation strategies which aim to promote and increase coverage in the essential interventions. Community health extension workers also require further training and negotiation skills in order to attempt to change the behaviour of mothers, while respecting local values and norms within the communities.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

MS conceived and designed the study, collected and analysed data and drafted the manuscript. SF and TM advised in the design of the study, data collection, analysis and interpretation of findings as well as critically commenting on the draft manuscript. All authors read and approved the final manuscript.

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Appendix 8: Published paper (Chapter 7)

Salasibew et al. BMC Pediatrics (2015) 15:35
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RESEARCH ARTICLE

Open Access

Measurement of delayed bathing and early initiation of breastfeeding: a cross-sectional survey exploring experiences of data collectors in Ethiopia

Mihretab Melesse Salasibew^{*}, Girmaye Dinsa, Della Berhanu, Suzanne Filteau and Tanya Marchant

Abstract

Background: Delayed bathing and early initiation of breastfeeding are among the essential interventions recommended to save newborn lives. Although survey coverage reports are key to monitoring these interventions, few studies investigated whether such reports accurately reflect the proportion of mothers and children who received these interventions. In order to gather accurate data, guidance on how to interview and probe mothers is provided. In this study, we investigated experiences of data collectors when asking mothers survey questions that assessed delayed bathing and early initiation of breastfeeding.

Methods: In November 2013, using a self-administered semi-structured questionnaire, we interviewed data collectors who had taken part in a population-based newborn health household survey in Ethiopia during October-November 2013. A total of 130 out of 160 invited data collectors completed and returned the self-administered questionnaire. Descriptive statistics were used to analyse quantitative data using SPSS software version 19. Qualitative data showing the variety of probes used by data collectors was analysed by listing, screening to identify common themes, and grouping by category.

Results: Most data collectors reported that, in their opinion, mothers were able to understand the meaning of the question about newborn bathing ($n = 102$, 79%) and breastfeeding initiation ($n = 106$, 82%) without the need for probes. However, fewer mothers were able to recall the event for either newborn behaviours and describe it in minutes, hours or days without the need for probes. Overall, only 26% ($n = 34$) and 34% ($n = 44$) of all data collectors reported that they did not need any probing for the questions related to newborn bathing and breastfeeding initiation questions, respectively. We identified a variety of probes used by data collectors and present examples.

Conclusion: Considerable probing was necessary to facilitate maternal recall of the events and approximate their responses of time regardless of mothers' age, level of education and parity. This could potentially lead to inaccurate coverage reports due to subjective and inconsistent interpretation of the indicators. Therefore, we recommend inclusion of standard probes or follow-on questions to the existing survey tools assessing the two indicators. Data collectors also require further guidance in using appropriate probes to gather accurate maternal responses.

Keywords: Newborn care, Newborn behaviours, Newborn practices, Essential interventions, Delayed bathing, Breastfeeding initiation, Household survey, Data collectors, Interviewers, Probes

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Background

Essential interventions immediately after birth such as thermal care (immediate drying and delayed bathing), early initiation of breastfeeding (within one hour) as well as hygienic cord and skin care are recommended to save newborn lives [1- 3] and there is global consensus in reaching out to more newborn babies [4]. It has been estimated that if coverage was universal, exclusive breastfeeding, thermal care and cord care could save up to 13%, 2% and 4% of all under-five deaths respectively [5]. Furthermore, up to 16% of all neonatal deaths could be prevented if all infants were breastfed from day one and 22% if breastfed within the first hour after birth [6].

Accurate measurement of essential interventions, including delayed bathing and early initiation, could inform policy makers in tracking progress made in saving newborn lives and permit comparison of coverage figures within and between countries. In many high mortality settings, tracking the extent to which every newborn benefits from these care components is limited by the lack of well-established routine health information systems. Population-based household surveys such as the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) remain the main source of coverage reports based on which national and regional newborn health policies and strategic decisions are made. However, few studies have evaluated validity and reliability of such household surveys and it is unclear whether survey reports accurately reflect the proportion of mothers and children who accessed and received life-saving interventions [7].

A recent review [8] identified some challenges related to measurement of immediate care behaviours and practices for newborns, including: 1) lack of routine collection of data about immediate newborn behaviours (other than breastfeeding) during national household surveys, 2) variations in the questions asked, and 3) maternal recall and timing of specific newborn care interventions. In response to these challenges, the authors of the review recommended standardised indicators for thermal care (drying, skin-to-skin care, and delayed bathing) and hygienic skin and cord care (clean cord cutting and dry cord care; hand washing prior to delivery) be included in national household surveys, suggested that questions about immediate newborn behaviours and practices be asked of all mothers irrespective of place of birth, and also simplification of questions about timing of events.

We propose another challenge related to measurement of immediate newborn care behaviours and practices, which is the experience of the data collectors themselves. In order to gather accurate data, guidance on how to interview and probe mothers is provided to enumerators prior to data collection [9,10]. In this study, we investigated experiences of data collectors in how they asked and coded the questions assessing delayed bathing and

early initiation of breastfeeding - both of which require maternal responses of time. Specifically, we report on 1) whether data collectors needed to use probes to facilitate mothers' understanding of the questions and 2) examples of the probes used by data collectors to assist mothers' understanding of the wording of the question, and recall of newborn events (bathing, breastfeeding initiation), including timing.

Methods

Data were collected by inviting a large team of household survey interviewers, who were still in the field, to complete a self-administered semi-structured questionnaire and provide answers based on the most recent interview they had conducted with a mother of a newborn child.

Setting

A population-based newborn health survey was conducted between October-November 2013 in four major regions of Ethiopia: Amhara, Oromiya, Tigray and Southern Nations, Nationalities and Peoples' region (SNNP). The household survey, implemented as part of a measurement, learning and evaluation grant to the IDEAS project (Informed Decisions for Actions in maternal and newborn health), at London School of Hygiene and Tropical Medicine, was designed to measure population level coverage of newborn behaviours and practices, including immediate breastfeeding and delayed bathing. The survey tools were modular, consistent with the DHS structure, and included a module for women aged 13–49 years who had a recent live birth. DHS tools include a coded response 'immediately' but this response was not included in this survey and the wording of the question assessing early initiation, shown in Table 1, was translated to local languages. As part of the survey, eligible mothers were specifically asked about timing of breastfeeding initiation and bathing their newborn babies.

In order to minimize language and cultural barriers, data collectors were recruited from the same region where the interviews took place and all of them had college-level or above education in health and social sciences. In addition to participating in intensive training on

Table 1 Questions assessing delayed bathing and early initiation of breastfeeding in the newborn health household survey in Ethiopia

Question	Coding
Delayed bathing:	<input type="checkbox"/> Within an hour, write minutes ____
“How long after birth did you first bath [name]?”	<input type="checkbox"/> After an hour, write hours ____ <input type="checkbox"/> After the first day, write days ____
Early initiation:	<input type="checkbox"/> Within an hour, write minutes ____
“How long after birth did you start breastfeeding [name]?”	<input type="checkbox"/> After an hour, write hours ____ <input type="checkbox"/> After the first day, write days ____

the data collection tool and field guide, data collectors also participated in one-day pilot testing of the tool before they started actual interviews. A total of 160 data collectors were employed for the survey and all were invited to participate in this study sharing their experiences of inter-viewing eligible mothers.

Data collection

We developed a self-administered, semi-structured, paper-based questionnaire. An additional pdf file shows this in more detail [see Additional file 1: Self-administered questionnaire]. We specifically explored data collectors' views of whether mothers understood the questions upon hearing them for the first time, and were able to recall the event and describe the timing of bathing and breastfeeding initiation in minutes, hours or days without probing or further explanation. To minimise recall bias, we asked data collectors to complete the questionnaire during the field work period and to base their responses on their experience of interviewing the most recent eligible mother. The questionnaire was translated to local languages depending on the region each data collector worked in: Amharic (Amhara and SNNP region), Tigrigna (Tigray region) and oromifa (Oromiya region).

Data management and analysis

Completed questionnaires were returned to the central office in Addis Ababa, Ethiopia where they were double data entered using SPSS software version 19 and differences reconciled. Quantitative data was analysed using this software where mean values were calculated for continuous variables and percentages were described for categorical variables. Evidence of statistical association between maternal characteristics (age, education level, place of last birth, and parity) and reported frequency of probing by data collectors was sought using the chi square test.

Qualitative data showing examples of probes reported to have been used by data collectors were analysed by listing all reported probes in a table, screening them to identify common themes and finally grouping each probe under a specific category.

Ethics

The study received ethical approval from the research ethics committee at the London School of Hygiene and Tropical Medicine in October 2012 and in Ethiopia from the National Research Ethics Committee under the Ministry of Science and Technology in April 2013. Participants of the study received an information sheet and a written consent form together with the questionnaire. They were asked to read these and, if they agreed, sign the consent form before completing the questionnaire. Each questionnaire was pre-assigned a number and data were analysed anonymously.

Results

A total of 130 out of 160 invited data collectors completed and returned the questionnaire: 53 out of 72 in Oromiya, 15 out of 16 in Tigray, 26 out of 36 in SNNP and all 36 in Amhara region. The average age of the last mother the data collectors interviewed was 29 years ($SD = \pm 7$) and most were reported to have been multiparous ($n = 103, 79\%$), had no education ($n = 89, 69\%$) and gave birth at home ($n = 96, 74\%$).

Delayed bathing

Question: How long after birth did you bath [name]?"

Most data collectors ($n = 102, 79\%$) reported that, in their opinion, mothers were able to understand the meaning of the question upon hearing it for the first time without the need for probes. However with regards to responses about timing of when the newborn was bathed, only 39% ($n = 51$) and 46% ($n = 60$) of data collectors reported that mothers were able to recall the event and describe it in minutes, hours or days without probing, respectively. There was evidence that a higher percentage of mothers who gave birth at home were able to give responses without requiring any probing compared to mothers with a health facility delivery (31% compared to 12%, $p 0.03$). Overall, just over a quarter of all data collectors 26% ($n = 34$) reported that they did not need any probing to help mothers understand the meaning of the question, recall the event of newborn bathing, or describe it in minutes, hours or days (Table 2).

Early initiation of breastfeeding

Question: How long after birth did [name] start breastfeeding?"

Most data collectors ($n = 106, 82\%$) reported that, in their opinion, mothers understood the question about breastfeeding initiation upon hearing it for the first time without the need for probes. However, only 48% ($n = 62$) reported that they didn't need to probe mothers both to help them recall the event of breastfeeding initiation or describe the time in minutes, hours or days. Overall, only a third of all data collectors 34% ($n = 44$) reported that they did not need any probing to help mothers understand the meaning of the question, recall the event of breastfeeding initiation or describe it in minutes, hours or days (Table 3).

Probes

Data collectors reported using a variety of probes to help mothers understand the questions about newborn bathing and breastfeeding initiation, recall the event, and describe timing in minutes, hours or days. We identified three groups of probes used by data collectors: 1) probes which simply re-phrased the wording of the question, 2) probes that used some reference points during birth such as

Table 2 Data collector reports of mothers who understood the question, recalled and described timing for bathing babies with no probing at all

Maternal characteristics	N	Understood question without probes	Recalled timing without probes	Described timing without probes	No probing at all	
		n (%)	n (%)	n (%)	n (%)	P-value*
Total	130	102 (79)	51 (39)	60 (46)	34 (26)	
Age						
15-24	36	29 (80)	18 (50)	18 (50)	12 (33)	0.29
25-34	59	47 (80)	23 (39)	28 (48)	16 (27)	
35 ⁺	35	26 (74)	10 (29)	14 (40)	6 (17)	
Education						
No education	89	66 (74)	31 (35)	37 (42)	19 (21)	0.07
Primary level or above	41	36 (88)	20 (49)	23 (56)	15 (37)	
Place of birth						
Home	96	76 (79)	42 (44)	45 (47)	30 (31)	0.03
Health institution	34	26 (77)	9 (27)	15 (44)	4 (12)	
Parity						
Primiparous	27	22 (82)	14 (52)	16 (59)	10 (37)	0.15
Multiparous	103	80 (78)	37 (36)	44 (43)	24 (23)	

*P values were obtained from chi-square tests.

delivery of placenta, and 3) probes that sequentially listed all events surrounding birth in order to facilitate maternal recall.

Examples of probes which simply re-phrased the wording or text description of the questions include the following.

“From the time you gave birth, when was the first time the baby come in contact with water?” (Male data collector, degree level qualified, Amhara region)

“As per the advice from health extension workers, did you delay bathing your baby to prevent baby getting

Table 3 Data collector reports of mothers who understood the question, recalled and described timing for breastfeeding initiation with no probing at all

Maternal characteristics	N	Understood question without probes	Recalled timing without probes	Described timing without probes	No probing at all	
		n (%)	n (%)	n (%)	n (%)	P-value*
Total	130	106 (82)	62 (48)	62 (48)	44 (34)	
Age						
15-24	36	31 (86)	22 (61)	20 (56)	16 (44)	
25-34	59	49 (83)	27 (46)	27 (46)	19 (32)	0.23
35 ⁺	35	26 (74)	13 (37)	15 (43)	9 (26)	
Education						
No education	89	69 (78)	37 (42)	35 (39)	26 (29)	0.10
Primary level or above	41	37 (90)	25 (61)	27 (66)	18 (44)	
Place of birth						
Home	96	78 (81)	50 (52)	48 (50)	36 (38)	0.14
Health institution	34	28 (82)	12 (35)	14 (41)	8 (24)	
Parity						
Primiparous	27	23 (85)	17 (63)	14 (52)	12 (44)	0.19
Multiparous	103	83 (81)	45 (44)	48 (47)	32 (31)	

*P values were obtained from chi-square tests.

cold and by how long?" (Male data collector, degree level qualified, Oromiya region)

"How many minutes or hours after (name) was born did you get her to breastfeed?" (Male data collector, diploma level qualified, SNNP region)

"Did he breastfeed as soon as you gave birth? Or did the baby breastfeed on the same day of his birth, or the second day, or the following consecutive days?" (Female data collector, degree level qualified, SNNP region)

Probes which used reference points of an event around birth in order to help mothers recall the event and describe the time include the following.

"How long after the placenta was delivered did you bath your baby?" (Female data collector, Nurse, SNNP region)

"When you bath your baby for the first time after birth, was it breakfast time, lunch, dinner or time when the cattle came back home?" (Female data collector, diploma level qualified, SNNP region)

"When did you start breastfeeding your baby? Was it before the placenta came out or after? If it is, how long after delivery of the placenta did you start breastfeeding?" (Female data collector, diploma level qualified, SNNP region)

"Did you start breastfeeding after the placenta came out and you were given kacha (traditional meal given to mothers soon after birth)? How long after birth was that?" (Female data collector, degree level qualified, SNNP region)

Finally, probes which were used to ask mothers sequentially going through all events following birth in order to estimate approximate time for bathing the baby include the following.

"What happened after the baby was born and placenta delivered? Did they dry the baby and wrap him in a cloth? What time did they bath him?" (Male data collector, degree level qualified, Amhara region)

"Who attended the birth? Did they bath your baby? Where was the baby kept after that and when did they give you your baby to start breastfeeding?" (Male data collector, degree level qualified, Amhara region)

"Did they bath your baby at the health center or was it after you went back home? How long did you stay in

the health center after giving birth? Did you start breastfeeding in the health center or once you got back home? How long after birth could this be?" (Male data collector, degree level qualified, Tigray region)

Discussion

Although most data collectors reported that the majority of mothers they interviewed understood the meaning of the essential newborn care questions, considerable probing was still needed to facilitate recall and approximate responses of time regardless of maternal age, educational level, parity and place of delivery. We also identified variation in the types of probes that the data collectors used.

A limitation of this study was whether data collectors accurately recalled and reported their experience of interviewing mothers using the self-administered questionnaires provided. Attempts were made to minimize recall bias, for example by asking them to base their answers on the most recent interviews, and by providing them information sheet and orientation in order to help them accurately complete the questionnaire. Nonetheless, data collectors might have chosen to share their experiences based on the "best or worst" interviewee they had and therefore, their perception of how mothers understood the questions could still be inaccurate.

Despite this limitation, some consistent results emerged. According to data collector reports, although most mothers were clear about the wording or text descriptions of both questions, considerable probing was necessary to facilitate maternal recall of the event and approximate their responses of time as per the recommended coding format. Consistent with a study in South Africa [11], we found no statistical evidence of association between mothers' characteristics (age, education or parity) and their ability to understand the questions, recall the event and describe timing without any probing.

However, we did observe that mothers who gave birth at home could answer questions without probing more frequently than mothers who gave birth in a health facility. This could partly be explained by limited involvement of mothers with immediate newborn care practices due to hospital protocols even when they had non-emergency deliveries, and therefore mothers may need more prompting to remember the sequence of events. We also identified different examples of probes used as follow-on questions for mothers who needed clarification about the questions. Currently, there are no standard probes or follow-on questions recommended in household surveys such as DHS [9,12] and MICS [10,13] to avoid leading questions or subjective and possibly inaccurate interpretations of questions assessing the two time-dependent newborn indicators i.e. delayed bathing and early initiation of breastfeeding.

Accuracy in self-reports of mothers who participated in population-based household surveys have been assessed

[14,15] and recommendations made to improve measurement and reporting of coverage estimates [8]. Accuracy of survey data can depend on a number of factors including the length of recall period [16–18], demographic characteristics of respondents [11] inter- or intra-observer variations [19,20], social desirability i.e. reporting about own practice based on socially acceptable norms [21–23] and approaches to data collection [21–24]. In this study, we have revealed variations in how data collectors interviewed and probed mothers to explain time-dependent questions about newborn bathing and breastfeeding initiation.

Conclusion

Data collectors reported that considerable probing was necessary to facilitate maternal recall of the event and approximate their responses of time regardless of mothers' age, level of education and parity. This could potentially lead to inaccurate coverage reports due to subjective and inconsistent interpretation of the indicators, which makes it difficult to track progress in the implementation of new-born life-saving interventions. Therefore, we recommend inclusion of standard probes or follow-on questions to the existing survey tools assessing the two newborn indicators. Data collectors also require further guidance about the purpose and interpretation of the indicators as well using appropriate probes to gather accurate maternal responses.

Availability of supporting data

The data set is published on LabArchives with DOI: 10.6070/H4SQ8XDD.

Additional file

Additional file 1: Self-administered questionnaire. This file shows the 13 questions we asked data collectors in order to explore their experiences of asking mothers survey questions that assessed delayed bathing and early initiation of breastfeeding.

Abbreviations

DHS: Demographic and Health Survey; MICS: Multiple Indicator Cluster Survey; SNNP: Southern Nations, Nationalities and Peoples' region; IDEAS: Informed Decisions for Actions in maternal and newborn health.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

MS conceived and designed the study, developed data collection tools, analysed data and drafted the manuscript. DB and GD collected data and commented on the draft manuscript. SF and TM advised in the design of the study, data collection, analysis and interpretation of findings as well as critically commenting on the draft manuscript. All authors read and approved the final manuscript.

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in Ethiopia who volunteered to share their experiences in our study and spent their time completing the questionnaire.

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