

Neonatal survival in rural Tanzania: Home deliveries, neonatal
mortality and subsequent help and health seeking behaviour for the
newborn by mothers in rural Tanzania

INAUGURALDISSERTATION

zur

Erlangung der Würde eines Doktors der Philosophie

Vorgelegt der

Philosophisch-Naturwissenschaftlichen Fakultät

der Universität Basel

von

Mwifadhi Mrisho

aus

Mwanga, Kilimanjaro Tanzania

Basel, 2010

Genehmigt von der Philosophisch-Naturwissenschaftlichen Fakultät auf Antrag
von Herrn Prof. Dr. Marcel Tanner und Frau Dr. Joanna Armstrong Schellenberg.

Basel, den 16. September 2008

Prof. Dr. E. Parlow

Dekan

Dedicated to my seventeen days old son, Shammil who died on the 5th August 2008 following a sudden

respiratory attack

And to

My beloved mother and father

Table of contents

List of Tables	III
List of Figures	IV
List of Abbreviations.....	V
Acknowledgements.....	VIII
Summary	XII
Zusammenfassung	XVI
CHAPTER 1: Introduction	1
1.1 The burden of neonatal deaths: Global and geographical distribution	2
1.2 Causes of newborn deaths	3
1.3 Efforts to prevent newborn deaths	6
1.4 Child mortality in Tanzania.....	9
1.5 Rationale for this study	13
1.6 Gender framework model	13
1.7 References:.....	17
CHAPTER 2: Study aim and objectives	21
2.1 General aim	22
2.2 Objectives	22
Chapter 3: Methodology.....	24
3.1 Study area.....	24
3.2 Study design	28
3.3 Household Survey.....	30
3.4 Health Facility Survey	31
3.5 Qualitative data	31
3.6 Data processing and analytical methods	33
3.7 References.....	34
CHAPTER 4: Health and Survival of young children in southern Tanzania	36
4.1 Abstract.....	38
4.2 Background.....	41
4.3 Methods	44
4.4 Results	53
4.5 Discussion.....	69
4.6 Conclusions	74
4.8 Authors' contributions.....	75
4.9 Acknowledgements.....	75
4.10 References.....	76
Chapter 5: Factors affecting home delivery in rural Tanzania.....	80
5.1 Abstract.....	81
5.2 Introduction	82
5.3 Methodology	86

5.3.2 Methods	87
5.6 Results	92
5.7 Discussion.....	103
5.9 Authors' contribution	109
5.10 Acknowledgments.....	109
5.11 References.....	111
Chapter 6: The use of antenatal and postnatal care: perspectives and experiences of women and health care providers in rural southern Tanzania ..	115
6.1 Abstract:.....	116
6.2 Background.....	117
6.3 Methodology	122
6.4 Results	125
6.5 Discussion.....	139
6.6 Conclusion	144
6.8 Authors' contributions	145
6.9 Acknowledgments.....	145
6.10 References.....	147
Chapter 7: Understanding home-based neonatal care practice in rural southern Tanzania	153
7.1 Summary	154
7.2 Introduction	155
7.3 Methods	158
7.4 Results.....	161
7.5 Discussion.....	177
7.6 Conclusions	183
7.7 Authors' contributions:	183
7.8 Acknowledgements:.....	184
7.12 References.....	186
Chapter 8: General Discussions and Conclusions	192
8.1 Selected results from each paper in the thesis	192
8.2 General discussion of the synthesis of the key results.....	201
8.3 Key messages	203
8.4 Methodological issues.....	207
8.5 Key messages for research community	209
8.6 References:.....	211
Appendices	214
Curriculum vitae	224

List of Tables

Table 3.1: Objectives and data collection tools.....	29
Table 4.1: Distribution of the households and women studied: demographics, outcome of pregnancy and antenatal care (source: household survey).....	55
Table 4.2: Asset ownership of households in each socio-economic status quintile (source: household survey).....	56
Table 4.3: Availability of staff, vaccines and drugs in health facilities on a single day in October 2004 (source: health facility survey)	57
Table 4.4: Preventive care and recent illness in children under two years (source: household survey).....	59
Table 4.5: Inequalities by sex in preventive care and illness in children under two years (source: household survey)	61
Table 4.6: Inequalities by ethnic group in preventive care and illness in children under two years (source: household survey)	62
Table 4.7: Inequalities by socio-economic status in preventive care and illness in children under two years (source: household survey).....	63
Table 4.8: Inequalities by distance from the nearest health facility in preventive care and illness in children under two years (source: household survey)	64
Table 4.9: Differentials in infant mortality rates (source: household survey)	66
Table 5.1: Factors associated with place of delivery in Lindi and Mtwara.....	101
Table 6.1: Components of antenatal and postnatal care.....	120
Table 6.2: Questions included in the topic guide used during FGDs and in-depth interviews with women and health care providers in Lindi rural and Tandahimba districts.....	124
Table 6.3: Perceived reasons for ANC by time of attendance	126

List of Figures

Figure 1.1: Progress towards MDG4 in Tanzania. Source: Opportunities for Africa's Newborns, 2006. Based on TDHS 2005 data	10
Figure 1.2: Coverage along the continuum of care in Tanzania. Source: Opportunities for Africa's Newborns, 2006 [7]. Based on SOWC 2006 & TDHS 2005.....	11
Figure 1.3: Modified Gender framework model.....	15
Figure 3.1: Study area in Southern Tanzania.....	26
Figure 3.2: Study districts	27
Figure 5.1 Gender framework (after Rathgeber, E. & Vlassoff, C. (1993) & Tanner & Vlassoff (1998)	84

List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
BCG	Bacille Calmette-Guerrin
CDD	Control of Diarrhoea Diseases
CHMT	Council Health Management Team
CI 95%	Confidence interval
COD	Cause of Death
DCC	Delayed Cord Clamping
DEAPOC	Data Entry at Point of Collection
DHS	Demographic and Health Survey
DMO	District Medical Officer
DPT-HepB3	Third dose of Diphtheria, Pertussis, Tetanus and Hepatitis B vaccine
EPI	Expanded Program on Immunisation
FGD	Focus Group Discussion
GPS	Global Positioning System
Hb	Haemoglobin
HCP	Health Care Provider
HIV	Human Immunodeficiency Virus
IHI	Ifakara Health Institute
IHRDC	Ifakara Health Research and Development Centre

IMCI	Integrated Management of Childhood Illness
IPTi	Intermittent Preventive Treatment for malaria in infants
IPTp	Intermittent Preventive Treatment for malaria in pregnancy
LBW	Low Birth Weight
MDG	Millennium Development Goal
NBS	National Bureau of Statistics
NGO	Non Governmental Organisation
MNCH	Maternal and Newborn Child Health Services
NMR	Neonatal Mortality Rate
NTPI	Norway-Tanzania Partnership Initiatives
OPV	Oral Polio Vaccine
ORS	Oral Rehydration Solution
PCA	Principal Component Analysis
PDA	Personal Digital Assistant
PMCTC	Prevention of Mother to Child Transmission of HIV
PMNCH	Partnership for Maternal, Newborn and Child Health
PNC	Postnatal Care
PPF	Procaine penicillin
RCHS	Reproductive and Child Health Section

RPR	Rapid Plasma Regain
SES	Socio-Economic Status
SMI	Safe Motherhood Initiatives
SP	Sulphadoxine-Pyrimethamine
STI	Swiss Tropical Institute
TBA	Traditional Birth Attendant
TT	Tetanus Toxoid
UNICEF	United Nations Children's Fund
VA	Verbal Autopsy
VBI	Village Based Informant
VDRL	Veneral Disease Research Laboratory
WHO	World Health Organisation

Acknowledgements

I wish to thank all the mothers and children of the study villages in Lindi Rural, Tandahimba, Newala, Nachingwea and Ruangwa districts, Southern Tanzania, for their participation in this study. I would also like to express my sincere thanks to our local collaborators, especially the Council Health Management teams of the above mentioned districts. I am also grateful to the Ifakara Health Institute (IHI) and Swiss Tropical Institute for their invaluable contributions, for supporting this study, financially and morally. This study received funding from the Bill and Melinda Gates Foundation through the Intermittent Preventive Treatment of malaria in infants (IPTi) Consortium.

It would have been impossible to realise this work without the profound expertise of my supervisor Prof. Dr. Marcel Tanner. His patience, scientific counseling and enthusiasm, friendship, encouragement and sense of humour, and simplicity were the best source of support. Thank you very much for your useful comments on the papers presented in this thesis. Special thanks are due to my internal supervisors Prof. Dr. David Schellenberg and Dr. Joanna Armstrong-Schellenberg for introducing me to this area of research. Thank you very much for the numerous reviews, comments, suggestions and all support you gave me during the whole period of my study. Ahsanteni sana David na Joanna.

I am grateful to Prof. Dr. Brigit Obrist and Dr. Constanze Pfeiffer for stimulating discussions and encouragement during my stays at the Institute. Thank you for

your useful comments on the papers presented in the thesis. I am also very grateful to Karin Gross, a Phd student for her assistance in German translation, with the help of Constanze Pfeiffer and Stefan Dongus. Thank you very much for your kindness.

I wish to Thank Prof. Marcel Tanner, Prof. Maurice Mbago, Prof. Burt Singer, Dr. Joanna Armstrong-Schellenberg, Prof. David Schellenberg, and Prof. Brigit Obrist for being part of my thesis committee. Thank you for your TIME and INPUT for the accomplishment of this thesis.

At Ifakara Health Institute (IHI), formerly called Ifakara Health Research and Development Centre (IHRDC), my deepest appreciation goes to Dr. Hassan Mshinda, the former Director, for establishing an excellent framework and infrastructure for my research at the centre; Dr. Salim Abdulla, the new Director of the Ifakara Health Institute (IHI) and my former project leader (MTIMBA project). This study would not have been possible without your great assistance. I would also like to thank Adiel Mushi, Albert Majura and Ntaru Robert Wa-shija, who were involved in the data collection process. IPTi staff: Fatuma Manzi, Shekha Nasser, Adeline Herman, Stella Magambo, Yuna Hamis, Mwajuma Chemba, Werner Maokola, Peter Madokola, Kizito Shirima, Roman Peter and Evarist Nyanda (Baba Paroko) for their mutual support during the whole period of this study. I would also like to thank Prof. Don de Savigny (STI/IHI), Daniel Anderegg (IHI/STI), Beverly Msambichaka (IHI) and Rachel A. Haws (John

Hopkins Bloomberg School of Public Health, USA) for their editorial work and critical comments on the manuscripts presented in this thesis. Special thanks also go to Ferej Mahboob, Dr. Rose Nathan, Abdulnoor Mulokozi, Honorathy Urassa (Mzee Urassa), Abdallah Mkopi, Naiman Mchomvu and Hassan Karata for their hospitality and administrative support during the whole period of the study.

In Basel, special thanks to Christine Mensch, Margrit Slaoui and Christine Walliser for their hospitality and administrative support during the whole period of study. Special thanks to Prof. Mitchell Weiss the head of the Public Health and Epidemiology Unit; it is from him I learned a lot about cultural epidemiology. I am grateful to my other lecturers: Dr. Penelope Vounatsou, Dr. Amanda Ross, Prof. Dr. Christian Lengeler, Prof. Dr. Thomas Smith, Prof. Dr. De Savigny Don, Dr. Jacob Zinsstag, Dr. Peter Odermatt, Prof. Dr. Jürg Utzinger, Prof. Dr. Brigit Obrist and Prof. Dr. Marcel Tanner. Special thanks also go to my colleagues and friends: Lena Fiebig, Laura Gosoniu, Tippi Mak, Karin Gross, Susan Rumisha, Dominic Gabriel Gosoniu, Stefan Dongus, Stefanie Knopp, Amina Msengwa, Ricarda Merkle, Oscar Mukasa, Valerie Crowell, Rashid Khatib, Daniel Weibel, Bernadette J. Huho, Ellen Stamhuis, Boniphace Idindili, Angelina Lutambi, Julie Balen, Michael Bretscher, Judith Kahama, Claudia Sauerborn, Ritha Njau, Kefas Mugitu, Borna Müller, Angela Dillip, Joshua Yukich, Jasmina Saric, Joseph Pascal Mugassa, Nadine Riedel, Simon Kasasa, Thomas Fürst, Nyaguara Amek, Fatuma Manzi, Manuel Hetzel, Hamisi Malebo, Bianca Plüss, Honorati Masanja

and Nodjiadjim Abdias Laoubaou. I am deeply indebted to Ahmed Rashid, Jacqueline and her husband Dulla in Liestal and my sister Ziada Mgallah in Wohlen, for their friendship while in Basel.

Special thanks to my extended family: my dear wife Sauda Mustafa and sons: Abdulrazaq, Abdulaziz and Luqman; my brothers and sisters (Zenna Mrisho, Fatuma Mrisho, Tabu Mrisho and Mwanahawa Mrisho) who had to cope with my long absences from home during the study period. Lastly but not least I wish to deeply thank my friend Awadh Suluo and his wife Hidaya Dodo to the continuous support they provided to my family during my absence. May Allah reward my late mother and father, Sophia Kinyumu and Mrisho Said (ILWIR-we are all heading in the same way) for sending me to school. Ameen.

Summary

It is unlikely that the fourth Millennium Development Goal (MDG 4: reduce child mortality) will be attained without considerable decline in neonatal mortality. About 4.0 million of the annual 10.8 million global deaths in children younger than 5 years occur in the first month of life. Worldwide, the average neonatal mortality is estimated to be 33 per 1000 live births. Nearly all neonatal deaths (99%) occur in low and middle income countries and about half occur at home. Three quarters of all neonatal deaths occur in the first week of life, suggesting the need for early care. Based on data from the Demographic and Health Survey (DHS) 2004/5, between 2000 and 2004 Tanzania reported a dramatic reduction in mortality in infants and children under 5 years of age, with overall under five mortality dropping from 147 to 112 per 1000 live births and infant mortality dropping from 99 to 68 per 1000 live births. However, the reduction in the neonatal mortality rate was much smaller and not statistically significant, from 40 to 32 per 1000 live births.

The major direct causes of neonatal deaths globally are infections (36%), preterm birth (28%), asphyxia (23%) and remaining, 14% are due to indirect causes such as low birth weight, poverty and maternal complications in labour which carry a high risk of neonatal death.

The general aim of this study was to evaluate the magnitude and determinants of neonatal mortality, home deliveries, and subsequent help and health seeking

behaviour for the newborn by mothers in rural Tanzania. Quantitative data were collected in a cross-sectional household and health facility surveys carried out in five districts in southern Tanzania between July and October 2004 to generate baseline information before evaluation of an intervention on malaria (IPTi). Qualitative data were collected using in-depth interview, focus group discussion (FGD), case studies and through participant observation. This was implemented through the network of village-based informants (*watoa taarifa*) in 8 villages of Lindi rural and Tandahimba districts, southern Tanzania.

Main findings:

The present study revealed key areas for strengthening both the health system and the community. The 2004 health facility survey revealed particular problems with staff absences and drug stock shortages. Staff absences were common, with only about two-thirds of all employed staff present on the day of the survey. A group of seven essential oral treatments was found in less than half of all facilities. Only about one-fifth of all facilities had a supply of clean water.

Data from the 2004 household survey revealed that 38% of all women had personally experienced a child death: this shows how common child deaths are in this area as well as in much of sub-Saharan Africa, where it is no great shock when a child dies. Neonatal and infant mortality were 43.2 and 76.4 per 1000 live births respectively. More surprisingly perhaps, we found little evidence that neonatal mortality rates were associated with maternal education, in contrast to

the post-neonatal period, when mortality rates were 50% higher for mothers with no formal education compared with those who had had at least one year of schooling. We also found that children living over 5km from a health facility had lower vaccine coverage, fewer nets, more anaemia, poorer care-seeking and higher infant mortality than those living closer. Data from the qualitative research revealed that women are forced to prepare materials for childbirth and some set aside money for emergencies. Home deliveries are due in part to transport cost, poor quality of care in health facilities and lack of privacy. Most home births are assisted by unskilled attendants, which contribute to a lack of immediate appropriate care for both mother and baby. The umbilical cord is thought to make the baby vulnerable to witchcraft and great care is taken to shield both mother and baby from bad spirits until the cord stump falls off. Despite many good essential newborn care practices, we also found risky behaviour for the newborn in relation to resuscitation, drying and warming, breastfeeding, cord care, skin care and eye care. Many newborns are denied colostrum and are fed sweetened warm water before breastfeeding or as a supplemental feed. A positive attitude towards antenatal and postnatal care can offer important opportunities for better integration the health system and the community by encouraging women to deliver with a skilled attendant. Efforts to improve antenatal and postnatal care should therefore focus on increasing geographical and economic access while observing cultural sensitivity.

This thesis has revealed key areas for strengthening both the health system and the community. The findings emphasize the need for a systematic approach to overcome health-system constraints, for community based programmes and for scaling-up effective low-cost interventions which are already available. Behaviour change communication strategies capitalizing on common and positive themes in local beliefs about pregnancy and newborn care practices are key steps to improve maternal and newborn health. Women's access to income must be addressed strongly, as it might strengthen their bargaining power to influence place and timing of accessing skilled delivery. Promoting female education, especially primary and higher education, as well as continued health education, accompanied by a suitable and effective health care delivery system should lead to sustainable safer motherhood practices.

Zusammenfassung

Ohne eine deutliche Abnahme der Sterblichkeitsrate bei Neugeborenen ist das Erreichen des vierten Millenniumsentwicklungsziels (MDG 4) zur Reduktion der Kindersterblichkeit unwahrscheinlich. Rund 37% der weltweit jährlich 10,8 Millionen Todesfälle bei Kindern unter 5 Jahren ereignen sich im ersten Lebensmonat. Die durchschnittliche Sterblichkeitsrate in den ersten 28 Tagen wird auf 33 pro 1000 Lebendgeburten geschätzt. Beinahe alle diese Todesfälle (99%) ereignen sich in Entwicklungs- und Schwellenländern, und etwa die Hälfte aller Säuglinge stirbt zu Hause. Zwei Drittel all dieser Neugeborenen sterben in der ersten Woche nach der Geburt, eine Tatsache, die auf die Notwendigkeit von früher Pflege verweist. Wie eine Studie zur Demographie und Gesundheit in Tansania (Demographic and Health Survey (DHS)) aufzeigt, konnte Tansania zwischen den Jahren 2000 und 2004 einen erheblichen Rückgang der Sterblichkeit bei Säuglingen und Kleinkindern unter 5 Jahren verzeichnen: die Sterblichkeitsrate bei Kindern unter 5 Jahren sank von 147 auf 112 pro 1000 Lebendgeburten, bei Säuglingen fiel sie von 99 auf 68 pro 1000 Lebendgeburten. Die Reduktion der Sterblichkeitsrate bei Neugeborenen fiel dagegen sehr viel geringer aus (von 40 auf 32 Lebendgeburten) und ist statistisch nicht signifikant.

Die weltweit häufigsten direkten Ursachen, die zum Tod von Neugeborenen führen, sind Infektionskrankheiten (36%), Frühgeburt (28%) und Erstickungstod (23%). Die restlichen 14% der Todesfälle werden durch indirekte Faktoren wie

zum Beispiel Untergewicht bei der Geburt, Armut und Geburtskomplikationen verursacht, wobei speziell letztere ein hohes Risiko für Säuglingstod bergen.

Ziel dieser Studie ist es, das Ausmass der Sterblichkeit bei Neugeborenen zu evaluieren, und Faktoren für die Wahl des Geburtsortes sowie die medizinische Behandlung im ländlichen Raum Tansanias besser zu verstehen. Von Juli 2004 bis Oktober 2004 wurden in einer Querschnittstudie in Haushalten und Gesundheitszentren quantitative Daten in fünf verschiedenen Distrikten in Südtansania erhoben. Diese Daten lieferten Basisinformationen für eine später durchgeführte Malariaintervention (IPTi). Qualitative Daten wurden in Form von Tiefeninterviews, Fokusgruppensitzungen, Fallstudien und durch teilnehmende Beobachtung erhoben. Für die Datenerhebung wurde ein Netzwerk lokaler Informanten in acht Dörfern (watoa taarifa) in den beiden ländlichen Distrikten Lindi und Tandahimba im südlichen Tansania eingerichtet.

Die vorliegende Arbeit macht auf die Notwendigkeit von Verbesserungsmaßnahmen sowohl im Gesundheitssystem als auch in der Gesellschaft aufmerksam. Die im Jahr 2004 durchgeführte Studie in den Gesundheitszentren verdeutlicht vor allem die durch Personalabsenzen und fehlende Medikamente verursachten Probleme. Personalabsenzen sind alltäglich, und nur rund zwei Drittel der angestellten Personen waren während des Besuchs in den Gesundheitszentren anwesend. Eine Gruppe von sieben essentiellen oralen Medikamenten war in weniger als der Hälfte aller

Gesundheitszentren vorhanden. Nur ein Fünftel aller Gesundheitszentren verfügte über Wasser.

Die Haushaltsumfrage im Jahr 2004 ergab, dass 38% aller Frauen den Tod mindestens eines ihrer Kinder erlebt hatten, was die Häufigkeit und Normalität dieses Ereignisses in der Region und in Afrika südlich der Sahara verdeutlicht. Die Sterblichkeit bei Neugeborenen und Säuglingen liegt bei 43,2 bzw. 76,4 Todesfällen pro 1000 Lebendgeburten. Während in der postnatalen Phase die Säuglingssterblichkeit bei Müttern ohne Schulbildung 50% höher ist als bei Müttern, die mindestens ein Jahr lang die Schule besuchten, kann ein solcher Zusammenhang für die neonatale Phase überraschenderweise nicht aufgezeigt werden. Die Haushaltsstudie zeigt weiter auf, dass die Impfrate und Bettnetzdichte für Kinder, die weiter als 5km vom Gesundheitszentrum entfernt leben, niedriger ist als für Kinder, die in der Nähe von Gesundheitszentren wohnen. Kinder, die weiter entfernt leben, leiden ausserdem häufiger an Anämie, werden weniger häufig behandelt, und die Säuglingsterblichkeit ist höher.

Die qualitativen Daten verdeutlichen, dass von den Frauen erwartet wird, für die Geburt notwendige Utensilien selbst zu besorgen sowie Geld für den Notfall vorzubereiten. Teilweise sind auch hohe Transportkosten, das marode Gesundheitssystem und fehlende Privatsphäre Gründe für Hausgeburten. Bei den meisten Hausgeburten werden die Frauen von Laien unterstützt, die im Notfall nicht über das notwendige Wissen verfügen, um der Mutter oder dem

Säugling ausreichend medizinische Hilfe leisten zu können. Die Nabelschnur wird mit der Verwundbarkeit des Säuglings gegenüber übernatürlichen Kräften und Hexerei assoziiert. Grosse Sorgfalt wird daher darauf verwendet, sowohl die Mutter als auch das Kind vor bösen Geistern zu schützen, bis die Nabelschnur abfällt. Neben korrektem Verhalten wurden auch riskante Praktiken rund um die Reanimation, das Trocknen, Wärmen und Stillen des Neugeborenen sowie rund um die Behandlung der Nabelschnur, der Haut und der Augen des Säuglings beobachtet. Viele der Neugeborenen erhalten keine Vormilch und werden stattdessen zusätzlich mit gesüsstem warmem Wasser gefüttert.

Eine positive Einstellung bezüglich Geburtsvor- und nachsorge kann Möglichkeiten für eine verbesserte Kooperation zwischen dem Gesundheitssystem und der Gesellschaft bieten. Anstrengungen zur Verbesserung der Geburtsvor- und nachsorge sollten sich daher auf einen guten geographischen und ökonomischen Zugang konzentrieren, und dabei kulturelle Sensitivität als zentrales Element integrieren.

Die vorliegende Doktorarbeit zeigt Interventionsmöglichkeiten sowohl im Gesundheitssystem als auch in der Gesellschaft auf. Die Resultate verdeutlichen die Notwendigkeit für einen systematischen Ansatz, der die Schwächen des Gesundheitssystems angeht, für gesellschaftsbasierte Programme und für die Verbreitung (up-scaling) von bestehenden effektiven und kosteneffizienten Interventionen. Kommunikationsstrategien, die auf Verhaltensveränderungen

abzielen und allgemein bekannte positive Themen in den lokalen Vorstellungen rund um Schwangerschaft und Pflege von Neugeborenen nützen, bilden die Basis zur Verbesserung der Mütter- und Kindgesundheit. Der Zugang der Frauen zu ökonomischen Ressourcen muss betont werden, da damit deren Möglichkeit, Ort und Zeit des Zugangs zu professioneller Pflege zu bestimmen, verbessert werden kann. Die Förderung von Frauenbildung, vor allem Grundschul- und höhere Bildung aber auch bezüglich Gesundheit, zusammen mit einem Angebot an angemessenen und effektiven Gesundheitsangeboten, sollte zu nachhaltigen Praktiken rund um Schwangerschaft und Geburt führen.

CHAPTER 1

BACKGROUND



A neonate

Chapter 1: Introduction

1.1 The burden of neonatal deaths: Global & geographical distribution

There is a huge gap in newborn health outcomes between the industrialized world and developing countries. Many industrialized nations have a perinatal mortality rate of less than 5 per 1000 total births, yet sub-Saharan African countries have rates of over 100 per 1000 total birth, a 20-fold difference [1]. Approximately 99% of the four million annual neonatal deaths occur in developing countries, about half of them at home, often outside of the formal health system [2] [3]. In many societies, neonatal deaths and stillbirths are not perceived as a problem, largely because they are very common [4]. Several factors such as women's status in society, their nutritional status at the time of conception, early childbearing, too many closely spaced pregnancies and harmful practices, such as inadequate cord care, leaving the baby wet and cold after birth, discarding colostrum and feeding other food, are deeply rooted in the cultural fabric of societies and interact in ways that are not always clearly understood [4].

The neonatal period lasts only for 28 days and yet accounts for 38% of all deaths in children younger than 5 years [3]. Thus the average daily mortality rate during the neonatal period is close to 30-fold higher than during the post-neonatal period which lasts from the second month to the age of 5 years [3]. Three quarters of neonatal deaths occur in the first week, and at least 1 million babies die during their first 24 hours of life highlighting the need for early care [5], [3].

The Millennium Development Goal 4 (MDG-4) regarding child survival, stipulates a reduction of two-thirds in deaths in children aged under 5 years, from 95 per 1000 in 1990 to 31 per 1000 in 2015. Given that the current global neonatal mortality rate is estimated to be 31 per 1000 live births [6], a substantial reduction in neonatal deaths will be required to meet the MDG-4 [3].

Africa accounts for 11 percent of the world's population but more than 25 percent of the world's newborn deaths [7]. Of the 20 countries in the world with the highest risk of neonatal death, 15 are in Africa [7]. Each year in this region, 1.16 million babies die in their first month of life – up to half on the first day – and another 3.3 million children will die before they reach their fifth birthday [7]. Until recently, newborn deaths in Africa have gone uncounted. Often the baby is unnamed until 1 or even 6 weeks has passed, reflecting a sense of fatalism and cultural acceptance of the high mortality [8]. New attention to Africa's newborns – the most vulnerable members of the society – provides opportunities to accelerate action to reduce newborn deaths but also to strengthen Maternal and Newborn Child Health services (MNCH) and integrate them more effectively into existing programmes [7].

1.2 Causes of newborn deaths

There is little or no information on the causes of death of neonates and early infants in many developing countries as the majority of these deaths occur at home. Moreover, these infants have not been seen in the formal health sector

during their final illness [9], [10]. In preparing child-mortality-reduction strategies it is important for countries to know the magnitude of neonatal mortality in order to assess needs and develop programmes that will reduce avoidable child deaths more quickly. However, national indicators of the health of mothers and newborn infants are often not readily available, especially in countries that lack vital registration systems [4]. Registration systems in the developing world are unlikely to see dramatic improvements in the near future [9]. The verbal autopsy (VA) technique, which involves questioning the family of a dead infant about the features of the child's final illness and supplementing this account with any clinic or hospital records that are available provides the only means of obtaining information on the cause of death (COD) [9], [10], [11], [12]. Population-based information in high mortality settings is largely dependent on verbal autopsy methods of variable quality; hence global estimates are only possible through statistical modeling [3].

Global estimates from 2000 of the distribution of direct causes of death indicate that preterm birth (28%), severe infections (36%, including sepsis/pneumonia [26%], tetanus [7%], and diarrhoea [3%]), and complications of asphyxia (23%) account for most neonatal deaths. Of the remaining 14%, 7% of deaths were related to congenital abnormalities [3], [13]. The underlying social determinants that contribute to the causes of newborn deaths are poverty, low levels of maternal education and inequities in access to quality health care [14]. The distribution of causes of neonatal deaths varies between countries correlating

with the degree of neonatal mortality. The countries with the highest rates of neonatal mortality are mostly in Sub-Saharan Africa. At least half of neonatal deaths arise after home delivery [3].

Until recently, there has been insufficient attention paid to neonatal health and it has received relatively little funding in relation to the large numbers of deaths [14]. Child survival programmes in the developing world have tended to focus on pneumonia, diarrhoea, malaria, and vaccine-preventable conditions, which are important causes of death after the first month of life [3]. Part of the problem has been a lack of reliable information on how many newborns are actually dying, since births and deaths are not always registered [14]. Another obstacle to action on neonatal health has been the erroneous perception that only expensive, high-level technology and facility-based care can reduce mortality [15], [16]. Early success in averting neonatal deaths is possible in settings with high mortality and weak health systems through outreach and family-community care, including health education to improve home-care practices, to create demand for skilled care, and to improve care-seeking [17]. Reductions in neonatal mortality in developed countries preceded the introduction of expensive neonatal intensive care [18]. In England, for example, the NMR fell from more than 30 per 1000 livebirths in 1940 to ten per 1000 livebirths in 1975, a reduction linked to the introduction of free antenatal care, improved care during labour, and availability of antibiotics [15]. Some developing countries, such as Sri Lanka, have also been able to improve neonatal health by investing in similar strategies [19]. The

observed decline in neonatal mortality from 41 per 1000 livebirths to 21 per 1000 livebirths in recent years in northern Ghana had also shown that even in Africa, with minimal resources, high neonatal mortality rates can be reduced [9].

In Sweden, perinatal mortality declined at the end of the 19th century by 15–32% in those who used midwives for home deliveries [20]. The training of midwives at that time, working largely in community settings, emphasised keeping the baby warm, neonatal resuscitation with tactile stimulation, daily cord care, early breastfeeding, and the use of aseptic techniques [21]. Political will, followed by the allocation of adequate resources, can overcome existing constraints to achieving universal coverage by health-care interventions, as exemplified in the global progress in eradication of poliomyelitis and reductions in newborn and child mortality in some countries despite limited resources [22]. By making available the epidemiological information regarding the time, place and causes of neonatal deaths, it is hoped that greater visibility will be given to neonatal deaths in policies and programme planning [8].

1.3 Efforts to prevent newborn deaths

Home birth remains a strong preference, and often the only option for many women in the developing world [23]. It is estimated that 60% of births in the developing world occur outside a health facility with 47% assisted only by traditional birth attendants, family members, or without any assistance at all [24]. Between the 1970s and 1990s, the World Health Organization promoted

traditional birth attendant (TBA) training as one strategy to reduce maternal and neonatal mortality [25]. In recent years, opinions about the use of TBAs have varied broadly. The potential of TBA training to reduce peri-neonatal mortality is promising when combined with improved health services [25]. The Cochrane Database of Systematic Reviews however, had shown that the number of studies were insufficient to provide the necessary evidence for the effectiveness of TBA training [25]. Although cost-effective interventions to prevent neonatal mortality are available, coverage of many of these interventions are low especially in resource-poor settings [17], [26].

The 1993 World Development report includes, based on innovative research, estimations of the global burden of disease and the cost-effectiveness of interventions that address both mortality and morbidity [27]. The report points out that by adopting the packages of public health measures and essential clinical care developing countries could reduce their burden of disease by 25 percent [27]. Responding to these challenges, institutions such as WHO and UNICEF developed a strategy known as Integrated Management of Childhood Illness (IMCI) [28]. IMCI is a strategy for improving children's health and development through the combined delivery of essential child-health interventions [29]. However, concern about the costs of implementing IMCI has been given as a reason why some countries have not adopted it to a large scale [30].

In 2003 the Lancet Child Survival Series helped raise global awareness to the fact that there are still almost 10 million deaths of under five children in the world each year, and that the universal application of simple, cost-effective interventions can prevent nearly two thirds of these deaths [31], [32], [33], [34], [35]. A second Lancet series focused on a previously neglected subset of child deaths - the almost 40% of all under five deaths that occur in newborn babies. It provided the necessary evidence to revive efforts to reduce child and newborn deaths and to achieve MDG-4, to which all countries have committed [3], [17], [36], [18].

The Partnership for Maternal, Newborn & Child Health (PMNCH), launched in 2005, is a global initiative of 170 member bodies dedicated to ensuring that all women, neonates and children remain healthy and thrive [37]. The partnership advocates proven, cost-effective interventions that – as evidence has shown – can save at least 7 million of the more than 10 million children who die before their fifth birthday and over 500 000 women who die in pregnancy. For improvements to be made, its leadership is urging countries and donors to work better together and avoid duplication of interventions and single-disease approaches. Instead, it calls for integrating maternal, newborn and child health into nationwide health plans [37]. Universal recommendations can be given for evidence-based interventions, but the delivery strategy for a particular intervention varies across settings and needs to be adapted to local realities [38]. The new global Partnership for Maternal, Newborn, and Child Health (PMNCH)

has adopted the continuum of care as one of its guiding principles to bring needed interventions to mothers, newborns, and children in order to improve their health and survival [39]. The concept of the PMNCH continuum of care is based on the assumption that the health and well-being of women, newborns, and children are closely linked and should be managed in a unified way [39]. This model calls for availability of and access to essential health care and reproductive services (a) for women from adolescence through pregnancy, delivery, and beyond; and (b) for newborns during childhood, young adulthood, and beyond; because a healthy start can lead to a healthier and more productive life [39].

The Lancet's Neonatal Survival Series built upon the concept of organizing and packaging neonatal health interventions for effective delivery by three service delivery modes: family-community, outreach, or facility-based clinical care [26], [17], [40]. However, a key challenge for the effective implementation of neonatal intervention packages is developing and sustaining constructive linkages between families, communities and health facilities via community mobilization and education, outreach services, referral capacity and engaging existing cadres of community health workers in neonatal health [41].

1.4 Child mortality in Tanzania

Tanzania is the largest country in East Africa and has a largely rural population of 36 million people. Despite being one of the world's poorest countries, child

mortality improved rapidly between 1999 and 2004 with a 28% reduction in under five mortality (Figure 1.1). In the meantime, newborn mortality has remained relatively stable over the past two decades and accounts for 30% of under five deaths: the most recent national estimate is 32 per 1000 live births from 2000-2004 (Figure 1.1). The national maternal mortality ratio, estimated through Demographic and Health Surveys (DHS), has also shown no measurable recent reduction.

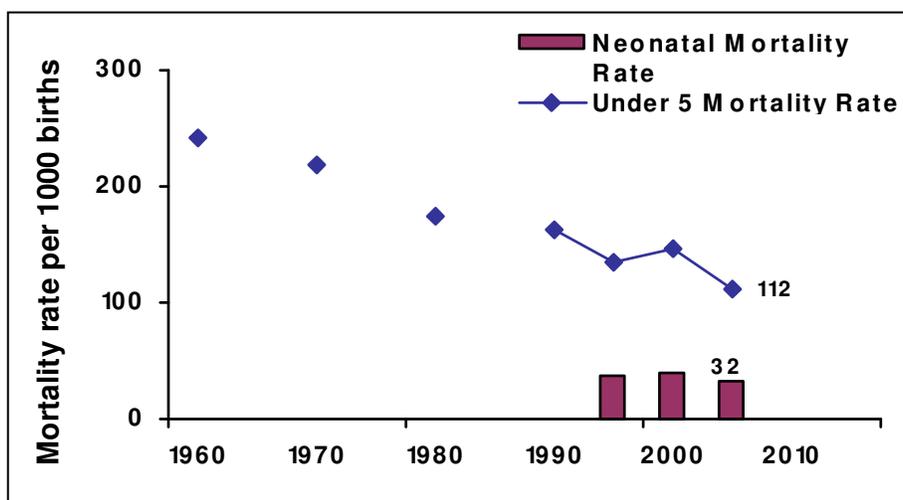


Figure 1.1: Progress towards MDG4 in Tanzania. Source: Opportunities for Africa's Newborns, 2006. Based on TDHS 2005 data

Less than half of the women have a skilled attendant at childbirth (43%), and only 41% of the babies under 6 months of age are exclusively breastfed: national coverage along the continuum of care is shown in Figure 1.2. Innovative approaches are clearly needed to achieve gains in newborn health and survival.

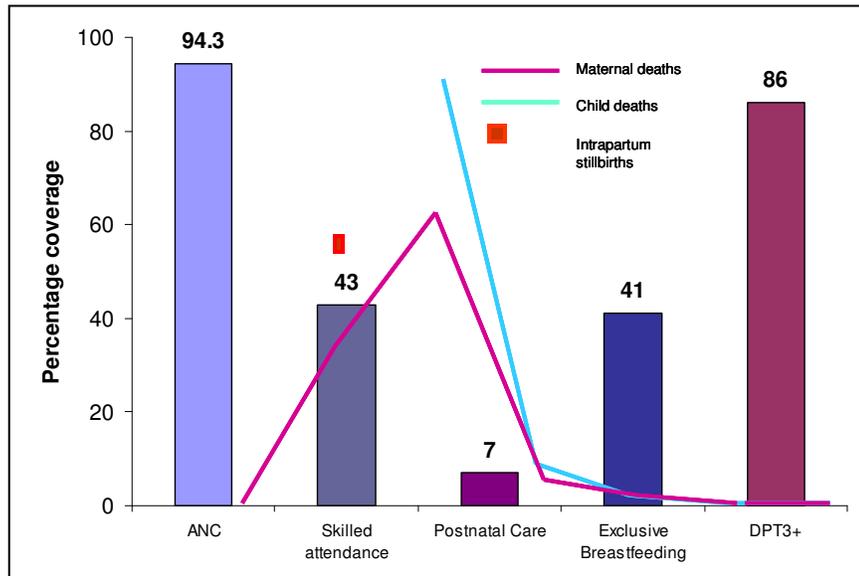


Figure 1.2: Coverage along the continuum of care in Tanzania. Source: Opportunities for Africa’s Newborns, 2006 [7]. Based on SOWC 2006 & TDHS 2005

Alongside the background of the health sector reform, the Government has shown a high level of commitment to child, maternal, and newborn health. In the late 1990s, Tanzania was the first country in Africa to start implementing IMCI. The EPI programme achieves consistently high national coverage. Tanzania was one of 11 countries to sign the New Delhi declaration on Maternal Newborn and Child Health in April 2005. There is an active national Partnership for Maternal Newborn and Child Health. In April 2008, the national “Road Map”, a strategic plan (2008-2015) to accelerate reduction of maternal and newborn deaths was

officially launched. A national focal person for newborn health has recently been appointed by the Ministry of Health and Social Welfare.

Local government and health sector reforms are ongoing. Districts have increasing autonomy and District Council Health Management Teams (CHMTs), under the leadership of District Medical Officers (DMOs), are able to plan according to their needs. The so-called “basket funding” enables them to choose which interventions to adopt in their districts, with the Ministry of Health and Social Welfare providing guidance and leadership on a minimum package of essential health interventions [48]. The Government of Norway, through the Norway-Tanzania Partnership Initiative (NTPI), is committed to work with the Government of Tanzania to move towards MDG 4 and 5 by bridging existing gaps in such a way as to complement the efforts of other development partners. Among other things, NTPI will provide additional basket funding to enable districts to scale up interventions for maternal newborn and child health. The Tanzanian health system comprises of a well-established network of health facilities throughout the country and all pregnant women are encouraged to deliver at health facilities [42]. The government also has mandated that the maternal and child health services including deliveries should be exempted from paying fee at any government facility [43]. But as in many African countries, more than half of births occur at home notwithstanding a high coverage (94%) of antenatal care [44].

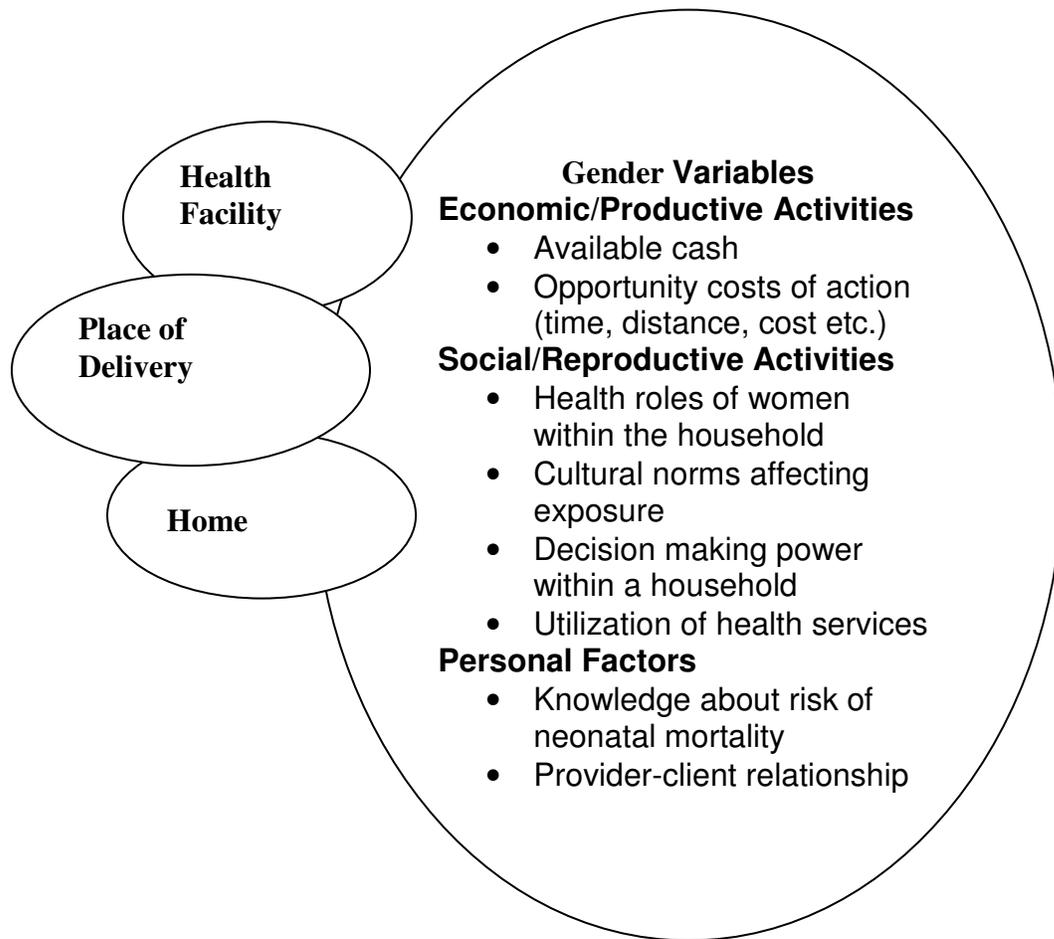
1.5 Rationale for this study

Despite this high-level commitment to improve child survival in Tanzania, newborn mortality has remained relatively stable over the past two decades (Figure 1.1). Since neonatal mortality remains constant and forms an increasing share of the mortality in children younger than 5 years, it could appear as an obstacle to the continued reduction of mortality and the attainment of the MDG 4 [45]. It is therefore useful to identify the determinants of home deliveries and to evaluate the magnitude of neonatal mortality and subsequent help and health seeking behaviour for newborns by mothers in rural Tanzania.

1.6 Gender framework model

If we want to identify the determinants of home delivery and to evaluate the magnitude of neonatal mortality and health seeking behaviour for newborns by their mothers within the households, we must have a framework. Based on the gender framework (Fig 1.3 as proposed by Rathgeber & Vlassoff [46] and further applied by Tanner M & Vlassof [47]), this thesis combines an understanding of gender issues relating to health and help-seeking behaviour with epidemiological knowledge concerning neonatal survival. The framework consists of three components; 1) personal factors distinct for each individual but a consequence of socio-cultural environment 2) social and reproductive activities and 3) economic and productive activities. Each of the three areas is broken down into components.

Gender relations analysis reveals power relations between men and women in which women are usually subordinate in most cultures. It also examines power relations between people of the same sex but having different social status or other attributes. Starting from the place of delivery, a modified gender approach was applied to examine knowledge about the risk of neonatal mortality, opportunity cost of action, health roles of women within the household, cultural norms affecting exposure, decision making power within the household, utilization of health service and factors influencing utilization such as provider-patient relationship. In this thesis we focus specifically on the importance of gender relations for neonatal survival and argue that an understanding of gender differences in the determinants and consequences of place of delivery and gender relations within the household and community are keys to ensure effective neonatal survival strategies at the community level.

Fig: 1.3 Modified Gender framework model

The gender framework model (Fig 1.3), which provides the key for discussions, will be supported by the evidence based on variables such as demographics, wealth quintiles and utilization pattern of health services. In addition, current practices will be studied in relation to the gender relation framework from the study districts in Southern Tanzania.

Chapter 2 briefly describes the objectives of this study. Chapter 3 provides descriptions of the study area, the methods used as well as information on data

processing and analysis. This is followed by chapter 4 which informs about health and survival in children under two years. Chapter 5 discusses the determinants of home births, followed by chapter 6 which describes the perspectives and experiences of women and health care providers regarding the use of antenatal and postnatal care. Chapter 7 documents childbirth and neonatal care practices which can provide a basis for the development of strategies to improve neonatal survival in Tanzania. The final chapter, (chapter 8) summarises the findings and makes recommendations for further work in this research area.

1.7 References:

1. Lawn JE; McCarrthy B & Ross SR, *The health of newborn: a reference guide for program managers*. Atlanta: CDC and CARE, 2001. 2001.
2. Black R & Kelley L 1999, *Reducing perinatal and neonatal mortality. Child health research project special report: Report of a meeting, Vol. 3, No. 1. Baltimore, MD, May 10-12 1999, Johns Hopkins University, Baltimore, MD.*
3. Lawn JE; Cousens SN & Zupan J, *Neonatal survival 1.4 million neonatal deaths: When? Where? Why?* Lancet., 2005. **365**.: p. 891-900.
4. WHO, *Neonatal and Perinatal Mortality: Country, Regional and Global Estimates*. 2006, World Health Organisation.: Geneva, Switzerland.
5. Darmstadt GL, H.M., Winch PJ, Haws RA, Lamia M, El-Said MA, Gipson RF & Santosham M., *Neonatal home care practices in rural Egypt during the first week of life*. Tropical Medicine and International Health, 2007. **12** (6): p. 783-797.
6. Save the children, *Saving the Newborn Lives. The State of the World's Newborns: A report from Saving Newborn Lives*. Washington, DC: Save the children; 2001:1-44
(http://www.savethechildren.org/publications/newborns_report.pdf accessed March 20, 2006). 2001.
7. Lawn J & Kerber K, *Opportunity for Africa's Newborns: Practical data, policy and programmatic support for newborn care in Africa*. eds. PMNCH. Cape Town. 2006.
8. Lawn JE; Cousens S; Bhutta ZA; Darmstadt GL; Martines J; Paul V; Knippenberg R; Fogstadt H; Shetty P; Horton R, *Why are 4 million newborn babies dying each year?* Lancet, 2004. **364** (9432): p. 399-401.
9. Baiden F; Hodgson A; Adjuik M; Adongo P; Ayaga B and Binka F, *Trend and causes of neonatal mortality in the Kassena-Nankana district of northern Ghana, 1995-2002*. Tropical Medicine and International Health, 2006. **11** (4): p. 532-539.
10. Greenwood B, *Maternal immunisation in developing countries*. Vaccine, 2003. **21**: p. 3436-3441.
11. Snow, R., Armstrong, J., Forster, D., Winstanley, M., Marsh, V. and Newton, C., *Childhood deaths in Africa: uses and limitations of verbal autopsies*. Lancet, 1992. **340**: p. 351-355.
12. Taylor CE, *Surveillance for equity in primary health care: policy implications from international experience*. International Journal of Epidemiology, 1992. **21**: p. 1043-1049.
13. Bang A; Reddy MH; Deshmukh MD, *Child mortality in Maharashtra*. Economic Political Weekly, 2002. **37**: p. 4947-65.
14. Mason E, *"Newborns in sub-Saharan Africa: how to save these fragile lives"*
(http://findarticles.com/p/articles/mi_m1309/is_4_44/ai_n25396973/pg_3)
UN Chronicle. Dec 2007. FindArticles.com.

- http://findarticles.com/p/articles/mi_m1309/is_4_44/ai_n25396973. Accessed 15th July 2008. 2007.
15. MacFarlane AJ; Johnson A & Mugford M, *Epidemiology*. In Rennie JM, Robertson, NRC, eds. *Textbook of neonatology (3rd edn)*. Edinburgh: Churchill Livingstone. 1999. 3-33.
 16. McKeown T; Record R; Turner R, *An interpretation of the decline in mortality in England and Wales during the twentieth century*. Pop Stud, 1975. **29**: p. 391-422.
 17. Darmstadt GL; Bhutta ZA; Cousens S; Adam T; Walker N & de Bernis L, *Evidence-based, cost-effective interventions: how many newborn babies can we save?* Lancet, 2005. **365**: p. 977-988.
 18. Martines J; Paul VK; Bhutta ZA; Koblinsky M; Soucat A; Walker N; Rajiv B; Fogstad H; Costello A, *Neonatal survival: a call for action*. Lancet, 2005. **365**: p. 1189-1197.
 19. Bhutta ZA; De Silva H; Awasthi S; Gupta I; Hussain SM; Manandhar D; Salam MA, *Maternal and child health: is South Asia ready for change?* BMJ, 2004. **328**: p. 816-19.
 20. Hogberg U, *The decline in maternal mortality in Sweden: then and now*. Am J Public Health, 2004. **94**: p. 1312-20.
 21. Andersson T; Hogberg U; Bergstrom S, *Community-based prevention of perinatal deaths: lessons from nineteenth-century Sweden*. Int J Epidemiol, 2000. **29**: p. 542-48.
 22. Mason E, *Child survival: time to match commitments with action*. Lancet, 2005. **365**: p. 1286-88.
 23. Walraven G and Weeks A, *The role of (traditional) birth attendants with midwifery skills in the reduction of maternal mortality*. Tropical Medicine and International Health, 1999. **4** (8): p. 527-529.
 24. WHO, *Coverage of Maternity Care. A Listing of Available Information*. World Health Organization, Geneva. WHO/RHT/MSM/96.28. 1997.
 25. Sibley LM; Sipe TA; Brown CM; Diallo MM; McNatt K; Habarta N, *Traditional birth attendant training for improving health behaviours and pregnancy outcomes*. Cochrane Database of Systematic Reviews 2007, Issue 3. Art. No.: CD005460. DOI: 10.1002/14651858.CD005460.pub2. 2007.
 26. Bhuta ZA; Darmstadt GL; Hasan BS & Haws RA, *Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of the evidence*. Pediatrics, 2005. **115**: p. 519-617.
 27. World Bank, *World development report 1993: investing in health*. 1993, World Bank: Washington, DC.
 28. Tulloch J, *Integrated approach to child health in developing countries*. Lancet, 1999. **354** (suppl II): p. 16-20.
 29. Armstrong-Schellenberg JRM, A.T., Mshinda H, Masanja H, Kabadi G, Mukasa O, John T, Charles S, Nathan R, Wilczynska K, Mgalula L, Mbuya C, Mswia R, Manzi F, De Savigny D, Schellenberg D and Victora C.,

- Effectiveness and cost of facility-based Integrated Management of Childhood Illness (IMCI) in Tanzania.* Lancet, 2004. **364**: p. 1583-94.
30. Adam T; Manzi F; Armstrong-Schellenberg JRM; Mgalula L; De Savigny D and Evans DB, *Does the Integrated Management of Childhood Illness cost more than routine care? Results from United Republic of Tanzania.* Bulletin of the World Health Organisation, 2005. **83**: p. 369-377.
 31. Black RE; Morris SS; Bryce J, *Where and why are 10 million children dying every year?* Lancet, 2003. **361**: p. 2226-34.
 32. Jones G; Steketee R; Black RE and the Bellagio Child Survival Study Group, *How many child deaths can we prevent this year?* Lancet, 2003. **362**: p. 65-71.
 33. Bryce J; Arifeen S; Pariyo G and the Multi-Country Evaluation of IMCI Study Group, *Reducing child mortality: Can public health deliver?* Lancet, 2003. **362**: p. 159-64.
 34. Victora CG; Wagstaff A; Armstrong-Schellenberg J; Gwatkin D; Claeson M; Habicht JP, *Applying an equity lens to child health and mortality: more of the same is not enough.* Lancet, 2003. **362**: p. 233-41.
 35. The Bellagio Study Group on Child Survival, *Knowledge into action for child survival.* Lancet, 2003. **362**: p. 323-27.
 36. Knippenberg R; Lawn JE; Darmstadt GL; Begkoyian G; Fogstad H; Walelign N; Paul VK, *Systematic scaling up of neonatal care in countries.* Lancet, 2005. **365**: p. 1087-98.
 37. Songane SS, *Stronger national plans for maternal, newborn and child health.* Bulletin of the World Health Organisation, 2007. **85**(8): p. 577-9.
 38. Freedman L; Wirth ME; Waldman R; Chowdhury M & Rosenfield A, *Task Force 4 on Child Health and Maternal* <http://www.unmillenniumproject.org/documents/tf04apr18.pdf> (accessed *June 25th, 2008*). 2003.
 39. Sines E; Tinker A and Ruben J, *The Maternal-Newborn-Child Health Continuum of Care: A Collective Effort to Save Lives. Policy Perspectives on New born Health. Save the children and Population Reference Bureau.* 2006., Save the Children: Washington, D.C.
 40. World Bank, *The World Development Report 2004: Making services work for the poor.* Washington, DC: The World Bank. 2004.
 41. Haws RA; Thomas AL; Bhutta ZA and Darmstadt GL, *Impact of packaged interventions on neonatal health: a review of the evidence.* Health Policy and Planning, 2007. **22**: p. 193-215.
 42. Winani S; Wood S; Coffey P; Chirwa T; Moshia F & Changanalucha J, *Use of A Clean Delivery Kit and Factors Associated with Cord Infection and Puerperal Sepsis in Mwanza, Tanzania.* J Midwifery Womens Health, 2007. **52**: p. 37-43.
 43. MoHSW (Tanzania), *Fact Sheet on Cost Sharing. Fact Sheet number 1, Ministry of Health, May 2005* (<http://www.districthealthservice.com/moh.php?id=9>) accessed on 20th March 2006). 2005.

44. NBS [Tanzania] and ORC Macro, *Tanzania Demographic and Health Survey 2004-2005 - Key Findings*. National Bureau of Statistics, Dar es Salaam and ORC Macro, Calverton, MD.
<http://www.nbs.go.tz/publications/index.htm> [accessed 9 April 2008]. 2005.
45. Masanja H; de Savigny D; Smithson P; Schellenberg J; John T; Mbuya C; Upunda G; Boerma T; Victora C; Smith T & Mshinda H, *Child survival gains in Tanzania: analysis of data from demographic and health surveys*. *Lancet*, 2008. **371**: p. 1276-83.
46. Rathgeber E & Vlassoff, C. *Gender and Tropical diseases: a new research focus*. *Social Science & Medicine*, 1993. **37**: p. 473.
47. Tanner M & Vlassof C, *Treatment-Seeking Behaviour for Malaria: A Typology Based on Endemicity and Gender*. *Social Science & Medicine*, 1998. **46** (4-5): p. 523-532.
48. de Savigny D, Kasale H, Mbuya C, Reid G: *In_focus: Fixing Health Systems*. Ottawa: IDRC; 2004.

CHAPTER 2

STUDY AIM AND OBJECTIVES



Mothers and their newborns

Chapter 2: Study aim and objectives

In this chapter, I present the general aim and objectives of this study. Until recently, there has been inadequate attention paid to neonatal health and it has received relatively little financial support in relation to the large numbers of deaths.

2.1 General aim

The general aim of this study was to evaluate the magnitude and determinants of neonatal mortality, home deliveries, and mothers' subsequent help and health seeking for their newborns in rural Tanzania.

2.2 Objectives

- Describe the context and determinants of neonatal mortality in rural Tanzania
- Evaluate the determinants of home deliveries in southern Tanzania
- Describe women's perspective and experiences of using antenatal care and postnatal care and the rationale of their choice of place of delivery
- Identify beliefs and practices which impact on newborn's survival in Southern Tanzania

CHAPTER 3

METHODOLOGY



Fieldworkers, IPTi Survey 2004

Chapter 3: Methodology

3.1 Study area

Lindi and Mtwara regions are located in the southern part of Tanzania. Lindi region is located between $7^{\circ} 55''$ and 10° South and $36^{\circ} 51''$ and 40° East [1]. The region was formed in 1971 and it's the fourth largest in the country with an area of 67,000 sq.km or 7.6% of Tanzania Mainland. The area includes the famous Selous Game Reserve (18,000 sq.km) [1]. Mtwara region is located between longitudes 38° and $40^{\circ} 30''$ East Greenwich, latitudes $10^{\circ} 05''$ and $11^{\circ} 25''$ south of the Equator and covers an area of 16,720 sq. km. or 1.9% of Tanzania Mainland. It is the second smallest region within Tanzania Mainland [1].

The study took place in Nachingwea, Lindi Rural and Ruangwa districts in Lindi region and Tandahimba and Newala districts in Mtwara region. All districts (*Figure 3.1 and 3.2*) have a total population of about 900,000 people [2]. There are a total of 24 divisions in the surveyed districts. A division is a local administrative area comprising a number of villages: there are between 3 and 10 divisions in each district. Parts of Tandahimba and Newala are on the Makonde Plateau, up to 900m above sea level. Lindi Rural, Ruangwa and Nachingwea are characterised by mountainous areas as well as low lying plains. The major permanent rivers in the region are Ruvuma, Lukuledi, Matandu and Mavuji. There are two main rainy seasons, November-December and February to May. The area has a wide range of ethnic groups, including Wamakonde, Wamakua,

Wayao, Matumbi, Mwera, Ndengereko, Nyagatwa, Pogoro and Zaramo. Although most people communicate in the language of their own ethnic group, Swahili is widely spoken. The most common occupations are subsistence farming, fishing and small scale trading. Cashew nuts, sesame and groundnuts are the major cash crops, while the dominant food crops are cassava, maize, sorghum and paddy. Most people live in mud wall and thatched roof houses. Some houses have corrugated roofs. Common water supplies are hand-dug wells, communal boreholes, natural springs and river water. Most rural roads are unpaved: some are not passable during rainy seasons while others are so steep that some villages are not accessible by car.

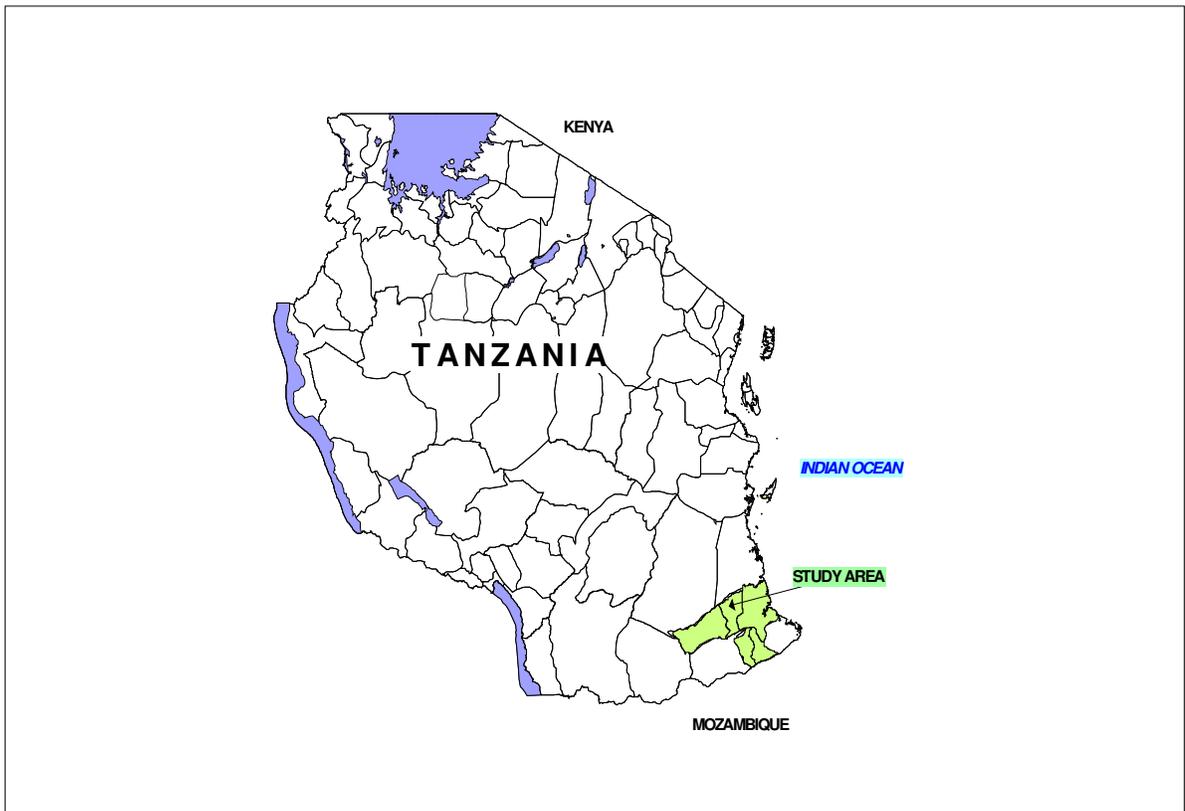


Fig. 3.1 Study area in southern Tanzania. Source: Schellenberg JRMA et al. BMC Public Health 2008, 8:194

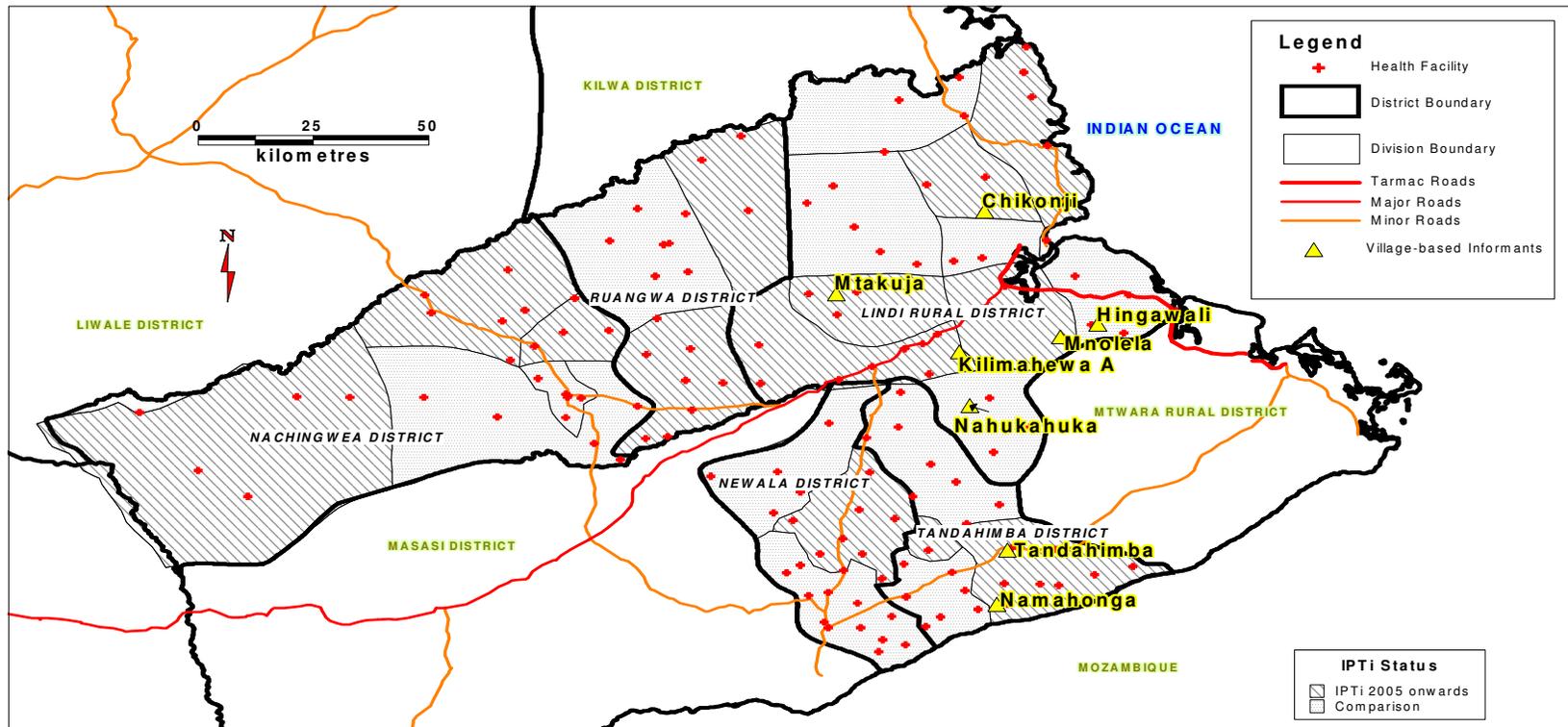


Fig. 3.2 Study districts. Source: Schellenberg JRMA et al. BMC Public Health 2008, 8:194

The public health system comprises a network of dispensaries, health centres and hospitals offering a varying quality of care. With the exception of Lindi Rural, each district has a District hospital. Most villages have village health workers.

3. 2 Study design

The study was done within the framework of Intermittent Preventive Treatment for infants (IPTi) [3]. The details of the data collection and methods are described in the respective papers. However, we looked at a number of objectives (Table 3.1) and therefore used a methodological approach combining both quantitative and qualitative research techniques ([4], [5]). Triangulation allowed for a cross-checking of the data collected by different methods and guaranteed consistency and reliability ([6], [7]).

Table 3.1: Objectives and data collection tools

Objectives	Methods	Tool applied
1. Describe the context and determinants of neonatal mortality in rural Tanzania	Household survey Health facility survey	A modular questionnaire using a PDA and a Health Facility Survey tool
2. Evaluate the determinants of home delivery in southern Tanzania	Household survey, FGD, in-depth interviews, case studies and participant observation	Appendix 1
3. Describe women's perspectives and experiences regarding their use of antenatal care and postnatal care and their rationale behind the choice of place of delivery	FGD and in-depth interviews	Appendix 2
4. Identify beliefs and practices which impact on newborn survival in Southern Tanzania	FGD, in-depth interviews, case studies and participant observation	Appendix 1

3.3 Household Survey

Quantitative data were collected in a cross-sectional household survey carried out between July and August 2004 to generate baseline information before the start of a malaria intervention for infants (IPTi) [3]. The mortality data were collected to give an estimate of the infant mortality and neonatal mortality in the study area before the implementation of the IPTi strategy. The lack of a vital registration system forces many developing countries to depend on special surveys. Household surveys and some censuses have been the sole sources of data for measuring infant and child mortality in much of Asia, Latin America and most of Africa ([8], [9]). Cross-sectional household surveys are widely used for data collection, priority setting and programme evaluation in developing countries. They are now being promoted to assess a number of health care interventions such as Control of Diarrhoeal Diseases (CDD), Expanded Programme on Immunization (EPI), AIDS control and child survival programmes [10]. In developing countries the estimation of causes of death becomes more difficult because neither health-facility-based information system nor vital registration exist in order to provide adequate data on the cause of mortality [11]. Cause specific mortality data were also collected from a household survey carried out from June 2007 to October 2007. However, the analysis was done separately, and is not included in this thesis. The development of Personal Digital Assistants (PDAs) and related software has made data entry at the point of collection (DEAPOC) a realistic prospect [12].

3.4 Health Facility Survey

We did a survey in all 134 health facilities in the study area (Fig. 3.2 above) in October 2004, including hospitals, health centres and dispensaries of the public health care delivery system, non-governmental not-for-profit organizations and the private sector. The overall focus was the availability and accessibility of maternal and child health care ([13], [14]).

3.5 Qualitative data

Ethnographic approaches aiming at triangulation [in-depth interviews, focus group discussions (FGD), participant observation and case studies] were used to explore determinants for home births, antenatal care and newborn care practices. These methods are briefly described below.

3.5.1 Focus group discussion

The usefulness of this approach has been acknowledged [15]. We conducted a total of 24 FGDs, three in each of the study villages with six to eight women who were pregnant or had experienced at least one delivery and had similar backgrounds and experiences. The FGD generally took place at the village based informant's home or sometimes at a school when it was raining. An experienced moderator (a trained sociologist) along with a note-taker led the discussions, each one taking notes. The FGDs and in-depth interviews were recorded using an MP3 voice recorder.

3.5.2 In-depth interview

We used in-depth interview technique [16] to solicit information about maternal and newborn care practices from different individuals in the community. We conducted 56 in-depth interviews with pregnant women, women who had recently delivered at home or at a health facility, TBA, health care providers and village based informants.

3.5.3 Participant observation

The work was facilitated by a network of female village based informants (VBIs) (Figure 3.2 above). The framework was established to provide knowledge about and understanding of various issues related to the acceptance of IPTi in the community [3]. These women were recruited among the pregnant women and mothers of young infants based in the study areas. The VBI were trained to carry out informal interviews in their community and to keep notebooks in which to record observations and discussions that they had with mothers and other community members about maternal and child health issues.

3.5.4 Case studies

Besides in-depth interviews and FGDs we also included case studies of four women who had recently given birth, each from a different village. These were noted by the VBIs and followed up with interviews by the study team. Two of their babies died and two survived.

3.6 Data processing and analytical methods

For the household survey, all data were entered into PDAs at the point of data collection and standard range, consistency and completeness checks were carried out at that time ([12] [14]). Analysis of household data was done in Stata (version 8, College Station, Texas, USA) in accordance with the design of the survey, using “svy” commands such as svytab to summarise and adjust for the clustered nature of the data [17]. For the health facility survey, data was collected using conventional paper forms. Double data entry was done, with range and consistency checks on entry and discrepancies between the two versions resolved with reference to the original forms. Data were summarised using tables. For the qualitative data, after conducting the FGDs and in-depth interviews the note-taker and the moderator reviewed their hand written notes while listening to the recordings. The transcripts were typed, translated, saved and exported to the Nvivo software for analysis. We applied qualitative content analysis, identifying major key themes from the coded transcripts [18].

3.7 References

1. *Welcome to Lindi and Mtwara Regions: Available at: <<http://www.lindi-mtwara-regions.com/eng/index.html>>* (Accessed on 17th July 2008).
2. *Tanzania National Census, 2002* [<http://www.tanzania.go.tz/census/>].
3. IPTi Consortium, 2008. <http://www.ipti-malaria.org/> [accessed 8 April 2008].
4. Sharp K, *Squaring the "Q"s? Methodological Reflections on a Study of Destitution in Ethiopia*. *World Development*, 2007. **35** (2): p. 264-280.
5. Carvalho S & White H, *Combining the quantitative and qualitative approaches to poverty measurement and analysis: the practice and the potential*. *World Bank Technical Paper 366*, World Bank, Washington, DC. 1997.
6. Golafshani N, *Understanding Reliability and Validity in Qualitative Research*. *The Qualitative Report Volume*, 2003. **8** (4): p. 597-607.
7. Patton MQ, *Qualitative evaluation and research methods (3rd ed.)*. *Thousand Oaks, CA: Sage Publications, Inc.* 2002.
8. Moser K; Shkolnikov V; Leon DA, *World mortality 1950-2000: Divergence replaces convergence from the late 1980s*. *Bulletin of the World Health Organisation*, 2005. **83**: p. 202-9.
9. Setel PW; Sankoh O; Rao C; Velkoff VA; Mathers C; Gonghuan Y; Hemed Y; Jha P and Lopez AD, *Sample registration of vital events with verbal autopsy: a renewed commitment to measuring and monitoring vital statistics*. *Bulletin of the World Health Organisation*, 2005. **83**: p. 611-617.
10. Forsberg BC; Van Ginneken JK and Nagelkerke NJD, *Cross-Sectional Household Surveys of Diarrhoeal Diseases- A Comparison of Data from the Control of Diarrhoeal Diseases and Demographic and Health Surveys Programmes*. *International Journal of Epidemiology.*, 1993. **22**(6): p. 1137-1145.
11. Gajalakshmi V and Peto R, *Commentary: verbal autopsy procedure for adult deaths*. *International Journal of Epidemiology*, 2006. **35**: p. 748-750.
12. Shirima K; Mukasa O; Armstrong Schellenberg J; Manzi F; John D; Mushi A; Mrisho M; Tanner M; Mshinda H and Schellenberg D, *The use of personal digital assistants for data entry at the point of collection in a large household survey in southern Tanzania*. *Emerging Themes in Epidemiology*, 2007. **4**: p. 5.
13. WHO, *Health Facility Survey: Tool to evaluate the quality of care delivered to sick children attending outpatient facilities (using the Integrated Management of Childhood Illness clinical guidelines as best practices)*. *Department of Child and Adolescent Health and Development Family and Community Health Cluster*. 2003, World Health Organisation: Geneva.
14. Armstrong-Schellenberg JRM; Mrisho M; Manzi F; Shirima K; Mbuya C; Mushi AK; Ketende SC; Alonso PL; Mshinda H; Tanner M; Schellenberg D, *Health and survival of young children in southern Tanzania*. *BMC Public Health.*, 2008. **8**: p. 194 doi:10.1186/1471-2458-8-194.

15. Dawson S; Manderson L & Tallo V, *A Manual for the Use of Focus Groups. International Nutrition Foundation for Developing Countries (INFDC), Boston, MA. 1993.*
16. Boyce C & Neale P, *Conducting In-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input.* 2006, Pathfinder International
[\[http://www.pathfind.org/site/DocServer/m_e_tool_series_indepth_interviews.pdf?docID=6301\]](http://www.pathfind.org/site/DocServer/m_e_tool_series_indepth_interviews.pdf?docID=6301) accessed 7 August 2008.
17. Etling JL, S.W. *svy1: some basic concepts for design-based analysis of complex survey data.* Stata Tech Bull, 1996. **31**: p. 3-6.
18. Hsieh H-F and Sarah ES, *Three approaches to qualitative content analysis.* Qual. Health Res., 2005. **15**: p. 1277-1288.

CHAPTER 4

RESULTS

Health and survival of young children in southern Tanzania



An interviewer at work

Chapter 4: Health and survival of young children in southern Tanzania

Joanna RM Armstrong Schellenberg,^{1,2§} Mwifadhi Mrisho,^{1, 5} Fatuma Manzi,^{1, 5} Kizito Shirima,¹ Conrad Mbuya,³ Adiel K Mushi,^{1,2} Sosthenes Charles Ketende,¹ Pedro L Alonso,⁴ Hassan Mshinda,¹ Marcel Tanner,⁵ David Schellenberg^{1,2}

¹Ifakara Health Research & Development Centre, Ifakara, Tanzania

²Department of Infectious and Tropical Disease, London School of Hygiene & Tropical Medicine, London, UK

³Ministry of Health, Tanzania

⁴Hospital Clinic I Provincial, Barcelona, Spain

⁵Swiss Tropical Institute, Basel, Switzerland

[§]Corresponding author

This paper has been published in the BMC Public Health 2008, 8:194 (June)

4.1 Abstract

Background

With a view to developing health systems strategies to improve reach to high-risk groups, we present information on health and survival from household and health facility perspectives in five districts of southern Tanzania.

Methods

We documented availability of health workers, vaccines, drugs, supplies and services essential for child health through a survey of all health facilities in the area. We did a representative cluster sample survey of 21,600 households using

a modular questionnaire including household assets, birth histories, and antenatal care in currently pregnant women. In a sub sample of households we asked about health of all children under two years, including breastfeeding, mosquito net use, vaccination, vitamin A, and care-seeking for recent illness, and measured haemoglobin and malaria parasitaemia.

Results

In the health facility survey, a prescriber or nurse was present on the day of the survey in about 40% of 114 dispensaries. Less than half of health facilities had all seven 'essential oral treatments' and water was available in only 22%. In the household survey, antenatal attendance (88%) and DPT-HepB3 vaccine coverage in children (81%) were high. Neonatal and infant mortality were 43.2 and 76.4 per 1000 live births respectively. Infant mortality was 40% higher for teenage mothers than older women (RR 1.4, 95% confidence interval (CI) 1.1 – 1.7), and 20% higher for mothers with no formal education than those who had been to school (RR 1.2, CI 1.0 – 1.4). The benefits of education on survival were apparently restricted to post-neonatal infants. There was no evidence of inequality in infant mortality by socio-economic status. Vaccine coverage, net use, anaemia and parasitaemia were inequitable: the least poor had a consistent advantage over children from the poorest families. Infant mortality was higher in families living over 5km from their nearest health facility compared to those living closer (RR 1.25, CI 1.0 – 1.5): 75% of households live within this distance.

Conclusions

Relatively short distances to health facilities, high antenatal and vaccine coverage show that peripheral health facilities have huge potential to make a difference to health and survival at household level in rural Tanzania, even with current human resources.

4.2 Background

More than ten million children under five years die every year [1]. Most of these deaths are in developing countries and roughly two-thirds could be prevented by interventions that are already available. The leading causes of these deaths are malaria, pneumonia, respiratory infections and deaths during the neonatal period due to pre-term birth, infections, and birth asphyxia. Malnutrition is the most common underlying cause of child deaths. These hard facts continue to shock, and have led to calls for action to prevent child deaths and reduce inequities in child survival [2, 3]. The Millennium Development Goal (MDG) for child survival is intended to encourage national governments to focus both policies and finances on child health issues, but progress in sub-Saharan Africa is trailing behind that in other parts of the world [4].

Why are life-saving interventions not reaching poor mothers and children? Interventions need a delivery system and health systems are often weakest where child mortality is highest [5]. New interventions and initiatives are often developed with little attention given to how they would be delivered, particularly to the poorest or most marginalised groups, and with relatively little investment directed at the health system itself [6, 7]. An analysis of current funding priorities for research to address the leading causes of death in children showed that the National Institutes of Health and the Bill and Melinda Gates Foundation allocated 97% of funding for research to develop better technologies and just 3% for delivering interventions to those who need them [8].

Although it is no great surprise that poorer children are more likely than their better-off peers to be exposed to health risks [9], action to redress these inequities has been slow. Not only does poverty lead to conditions that increase exposure and reduce resistance to infection, but also poorer children tend to have worse care-seeking for both curative and preventive services than those who are better-off; and the chances of getting the preventive and curative interventions they need are also worse [6]. The “equity lens” approach of analyzing child health indicators by socio-economic status, sex or ethnicity, to look at inequalities in child health issues, can reveal gaps in coverage in certain groups that cannot be redressed without policy change [10, 11]. In particular, universal coverage is only possible if the poorest children are reached.

Tanzania, with a population over 36 million people, is one of the poorest countries in the world [12]. Recent trends in infant survival are encouraging, with a drop in infant mortality rate (IMR) from 99 in 1994-9 to 68 in 2000-2004 [13]. National figures, however, obscure local variations: in the 20 regions of the country infant mortality varies widely with estimates for 1999 ranging from 41 per 1000 live births for Arusha Region to 129 for Lindi Region in 1999 [12]. The health system has broader reach than in many sub-Saharan African countries, with one health facility for every 9,000 people. Health sector and local government reform is ongoing, and local councils have increased autonomy and control over their own health budgets and plans. The Ministry of Health and development partners (at the time of this study, the World Bank and the

Governments of Denmark, Ireland, the Netherlands, Norway, Switzerland and the UK) pool resources in a common “basket” from which funds are then directly disbursed to districts through special accounts of the Council Health Management Teams. A limited amount of this donor-supported “basket” funding from the health Sector-Wide Approach is therefore available for local councils to implement their own plans. Nationally, spending on health is estimated to be \$11.34 per capita, of which almost half is contributed by households [14].

In Tanzania, as in many developing countries, vital registration and routine health information are incomplete. Cross-sectional household surveys are often used to estimate levels and trends in mortality, morbidity and intervention coverage from the community perspective. More rarely, cross-sectional health facility surveys are used to assess aspects of the structure and function of the health system, including quality of care. As an example, consider a poor rural family who happen to live close to a peripheral dispensary. They may take their children to this clinic for vaccination, but unless effective drugs and trained well-motivated staff are also there when they are sick, they will not receive the interventions they need. Large-scale linked data from both household and health facility perspectives provide an opportunity to study the health delivery system in parallel with health and social issues at community level.

The aim of this paper is to provide a comprehensive description of a rural malaria endemic area, including the health systems context, in which integrated malaria

control strategies can be implemented and tested for community effectiveness and equity effectiveness. We present information on health in children under two years and on infant survival from both household and health facility perspectives, using information from a 21,000-household survey in five districts of southern Tanzania and a census of health facilities serving this population. We assess evidence of inequalities by sex, ethnic group, socio-economic status and distance to health service providers. Describing differentials in intervention coverage and infant mortality is important because reducing inequalities in health has been singled out as the major challenge to be addressed in order to improve global health [15]. Of particular relevance is the finding that interventions for promoting child health may in fact increase inequalities before they reduce them [16]. The surveys were part of the baseline work of an effectiveness study of Intermittent Preventive Treatment for malaria in infants (IPTi), within the IPTi Consortium [17].

4.3 Methods

4.3.1 Study area

Nachingwea, Lindi Rural, Ruangwa, Tandahimba and Newala Districts are in Southern Tanzania and had a total population of about 900,000 people in 2002 (Figure 3.1) [12]. These districts are sub-divided into administrative areas called divisions, with 3 to 10 divisions in each district and a total of 24 divisions in the study area. Parts of Tandahimba and Newala are on the Makonde Plateau, up to 900m above sea level. Lindi Rural, Ruangwa and Nachingwea have hilly areas

as well as low lying plains. The major permanent rivers in the region are the Lukuledi, Matandu, Mbwemkulu and Mavuji. There are two main rainy seasons, November to December and February to May, but rain is not uncommon in any month. Malaria is endemic and transmission occurs all year round. The area had a wide mix of ethnic groups, including the Makonde, Mwera, Yao and many others. Although most people speak the language of their own ethnic group, Swahili is also widely spoken. The most common occupations are subsistence farming, fishing and small scale trading. Cashew nuts, sesame and groundnuts are the major cash crops while food crops are cassava, maize, sorghum and rice. Most people live in mud-walled and thatched-roof houses: a few houses have corrugated iron roofs. Common water supplies are hand-dug wells which rely on seasonal rain, communal boreholes, natural springs and river water. Most rural roads are unpaved: some are not passable during rainy seasons while others are too steep for vehicles to pass. The public health system comprises a network of dispensaries, health centres and hospitals offering a varying quality of care. Not all health facilities have a qualified prescriber (Medical Officer, Assistant Medical Officer, Clinical Officer or Assistant Clinical Officer) and sick children are not infrequently managed by nursing cadres (Nursing Officers, Nurse Midwives, Public Health Nurse 'B' or Maternal and Child Health Aides) even though these staff are, strictly speaking, not supposed to prescribe. Staffs in these nursing cadres are generally responsible for preventive services such as antenatal care and well-child visits for weighing and vaccination. With the exception of Lindi Rural, each district has a District hospital. Some villages have village health

workers. Children under five years of age are exempted from paying fees at any government health facility. In the five years prior to the 2002 National Census, the infant mortality rate estimated by indirect methods (probability of dying by the first birthday) was 129/1000 and 126/1000 in Lindi and Mtwara Regions respectively.

4.3.2.1 Health Facility Survey

We did a survey in all 134 health facilities in the area in October 2004, including hospitals, health centres and dispensaries of the public health care delivery system, non-governmental not-for-profit organizations and the private sector. The overall focus was the availability and accessibility of maternal and child health care. Our aim was to undertake a structural and functional assessment by documenting the availability of vaccines, drugs, supplies and services essential for child health. We interviewed health workers, checked availability and functioning of equipment, and checked drug and vaccine stocks. The survey was conducted using an adapted World Health Organisation (WHO) health facility survey tool [18], without case-management observation or exit interviews. The tool included modules on health services, equipment and supplies. The survey was done by 16 interviewers working in groups of two, forming eight teams, with two supervisors who assisted the survey co-ordinator. Training was carried out over a period of five days and included interview technique, group work, role-plays and practical fieldwork including a pilot-test of the survey instruments. A letter of introduction from each Council Health Management Team, signed by the

District Medical Officer and the District Executive Director, was given out at each facility before the interviews. To help assure the quality of data, at least one interview was accompanied by a supervisor each day. All forms completed each day were reviewed in the evening and feedback given to the interview teams.

4.3.2.2 Household Survey

We did a cross-sectional survey in a representative cluster sample of households from the five districts in July-August, 2004. Thirty clusters of 30 households were sampled from each division, giving a total of 720 clusters and approximately 21,600 households. Within any division, every household had an equal chance of being selected. The number of clusters selected from each ward (an administrative sub-unit of a division) was determined by probability proportional to the size of the ward, on the basis of the 2002 National Census population figures. The required number of clusters was then selected at random from a list of all sub-villages (*vitongoji*, singular *kitongoji*), as supplied by the district council. Within each sub-village, 30 households were selected at random using a modified Expanded Programme of Immunisation (EPI) - type sampling scheme that ensured an equal chance of any household being selected. Since there was no list of all households in the *kitongoji*, the supervisor went to the centre of the *kitongoji* and threw a pen to choose a random direction. He or she walked in the direction indicated until he reached the edge of the *kitongoji*, sketching a map of all the households passed, and numbering them as he went. For this purpose a household is a group of people who eat from the same cooking pot. One of these

houses was selected at random as the starting point, or house 1 of the cluster. Throwing a pen to choose a random direction, the supervisor walked in that direction until he came to another household, which was the second house of the cluster, and so on. If there was a junction in the path, a pen was thrown again to select from the choices available. This procedure was repeated until 30 households were counted. All households were selected for an interview regardless of whether there were any women or children. Villages were visited one day before the survey interviewers arrived, and an invitation letter left in each of the selected households. Both village and kitongoji leaders were briefed about the visit. Interviewers went from house to house, and if there was nobody at home an interviewer returned later in the day. No substitute household was included if the owner was repeatedly absent or did not wish to participate. The supervisor visited all households where people were reportedly absent or did not wish to take part, as a quality control measure.

We administered a modular questionnaire using handheld computers (Personal Digital Assistant or PDA) [19]. A household module included information on who lived in the household, dates of birth, education, and occupation, and ethnic group of the household head. We collected information on proxy markers of household socioeconomic status including ownership of a radio, a bicycle, animals, and poultry, whether the house had a corrugated iron roof, whether the house was owner-occupied or rented, and whether it was connected to the mains electricity supply. We also recorded the location of the household using a

handheld Global Positioning System (GPS). In a birth history module, similar to that used in the Demographic and Health Surveys, we obtained information on survival of all children born in the five years prior to the survey with a view to getting complete and accurate information for the three years prior to the survey, July 2001 – June 2004. Mothers were asked about dates of birth, the sex of the baby, whether they were twins or singletons, and whether the child was still alive. For those who had died, we asked for the date of death. We also asked about antenatal care as well as the use of sulphadoxine-pyrimethamine (SP) for Intermittent Preventive Treatment for malaria in the most recent completed pregnancy (IPTp), and about mosquito net use for women who reported being pregnant at the time of the interview. For a sub-group of 8 in every 30 clusters (27% of households), stratified on division, we also included modules about the health of all children under two years. Mothers or carers (here we use the term 'mother' to denote the main carer) of all children under two years were interviewed about whether or not the child was currently breastfed and if so what other food or drink the child had received over the previous 24 hours. Information on routine vaccinations was documented directly from health cards or other written records. Where no such record was available we asked about the number of doses and type of vaccines received, but we did not ask for dates of each dose. It should be noted that estimates of vaccine coverage reported here are based on written information alone and are likely to be conservative. Mothers were asked whether the child had received vitamin A supplementation, and if so, how many months ago. Mothers were then asked about use of mosquito nets

and their treatment, the name and location of their nearest health facility, and about any illness each child had during the 2 weeks prior to the survey, and what action had been taken. For children who had been sick, we asked about utilisation of appropriate (non-traditional) health care providers including village health workers, dispensaries, health centres, hospitals, or private doctors. Children under 2 years were invited to attend a measuring station set up in the middle of the village where they were weighed using hanging scales (Salter, UK). A finger-prick sample of blood was collected and haemoglobin (Hb) concentration measured using a battery-powered Hemocue photometer (HemoCue AB, Angelholm, Sweden). We tested for *Plasmodium falciparum* malaria parasitaemia using the Paracheck rapid diagnostic test device (Orchid Biomedical Systems, Goa, India). Children found to be anaemic (Hb<11g/dl) or parasitaemic were offered treatment according to Tanzanian national guidelines (14 day course of ferrous sulphate, SP, or both). Children with Hb<5g/dL were encouraged to attend a hospital urgently and their transportation facilitated.

The survey was carried out by 91 interviewers in 13 teams of 7, each with a supervisor, a driver and a car. Interviewers were trained for two weeks. All teams worked in all divisions. The training included interview technique and probing for dates using local event calendars. A detailed field manual was prepared, piloted during the training sessions and carried in the field by all interviewers. The trainees included participants from all study districts. At the end of the training period a pilot survey was carried out in part of Mtwara Rural district. During the

survey, at least one interview was accompanied by a supervisor each day and he/she also repeated key aspects of further interviews independently at random. In these repeat interviews, the head of household and one woman aged 15-49 were asked a subset of questions. Any discrepancies between the initial and repeat interviews were discussed with the interviewer and appropriate action taken.

4.3.3 Data processing and analytical methods

For the health facility survey, data were collected using conventional paper forms. Double data entry was done using DMSys software for clinical trials (SigmaSoft International), with range and consistency checks on entry and discrepancies between the two versions resolved with reference to the original forms. Data were summarised using tables. For the household survey, all data were entered into PDAs at the point of data collection. Standard range, consistency and completeness checks were carried out at that time. Particular attention was paid to the accuracy of dates of vital events because of the rapid change in the risk of death within the first year of life and the fact that age is typically prone to errors of recall. Analysis of household data was done in Stata (version 8, College Station, Texas, USA) in accordance with the design of the survey, using “svy” commands such as svytab to summarise and adjust for the clustered nature of the data. We created an index of household wealth based on ownership of assets. The household wealth index was the weighted sum of household characteristics including whether they owned the house they

occupied, whether they owned consumer durables such as a bicycle, radio, or tin roof, whether they owned animals or poultry, whether they used wood for cooking, and whether they had mains electricity. The weights for the assets in the index were generated by Principal Components Analysis (PCA) on the correlation matrix [20]. Households were categorized into one of five equal sized groups from the most poor to the least poor. P-values for testing hypotheses concerning inequalities by sex, ethnic group and distance from the health facility were from design-based F-tests, equivalent to ordinary chi-squared tests adjusted for clustering. P-values for testing hypotheses concerning inequalities by socio-economic status quintile were based on a test for trend with socio-economic status from a logistic regression model adjusted for clustering. Mortality rates were derived from the birth histories from all births between July 2001 and June 2004, with time at risk calculated from the date of birth until the date of the first birthday or the end of June 2004, whichever was the earliest, or the date of death for those who died before their first birthday. Mortality rates were modelled using Poisson regression with robust standard errors to adjust for clustering. Weight for age Z-scores were calculated with reference to the US National Centers for Health Statistics standards using the EPINUT module of EPI-Info (CDC Atlanta, Georgia, US). Underweight was defined as weight-for-age z-score of less than -2 , excluding outliers (z-score of <-5 or >5). GPS data were cleaned by removing outliers in each cluster (households more than 10km from the median location of households in that cluster) and straight-line distance to the

nearest health facility was calculated, then categorised as over or under 5km, which is roughly one hour's journey on foot.

4.3.4. Ethical approval

The study was undertaken within the framework of the assessment of the community effectiveness of IPTi, part of the IPTi Consortium [17]. We received ethical approval from the local and national institutional review boards (Ifakara Health Research and Development Centre, Ifakara, and the National Tanzania Medical Research Co-coordinating Committee) through the Tanzania Commission for Science and Technology. In addition ethical and research clearance was also obtained from institutional review board of the London School of Hygiene and Tropical Medicine, UK, and Ethics Commission of the Cantons of Basel-Stadt and Basel-Land, Switzerland. During field work, information sheets in Swahili about the study were given out, explaining why it was being done, by whom, and what it would involve. In the household survey, written consent of all household heads was sought. Confidentiality of all study participants was assured.

4.4 Results

During the household survey in July and August 2004 we visited 21,474 households in 720 clusters. In 497 households (2%) no-one was present to give consent and in a further 91 (0.4%) the household head was not willing to participate. Characteristics of the remaining 20,886 households are shown in

table 4.1 mean household sizes was 3.9 people and one-fifth of all households had more than six residents. Makonde and Mwera were the most common ethnic groups, with over 80% of all household heads coming from these two groups. The majority of household heads were male (76%). The median distance to the nearest health facility was 3.2km with an inter-quartile range from 0.8km to 5.2km.

We attempted to interview all 19,935 women aged 15-49 years living in these households (Table 4.1). About one-quarter had no formal education (28%), but of those who had been to school most had completed primary education (73%). We did a birth history interview with 19,007 (95%) of the women, and found that 38% had experienced at least one child death. Only 39% of the most recent births took place in a health facility, with the majority taking place at home. Nevertheless, antenatal clinic attendance was very common, with 88% of women having attended clinic during their most recent (completed) pregnancy. Sixty percent of the women said they had taken one or more doses of antimalarials as Intermittent Preventive Treatment of malaria in pregnancy (IPTp), although only 42% recalled that they had been given sulphadoxine-pyrimethamine (SP) as IPTp. We asked women who said they were pregnant at the time of the survey whether they had slept under a mosquito net the previous night, and if so whether it was treated. One-quarter of pregnant women (25%) said they had used a net the previous night and just 9% had used a net ever treated with insecticide.

Table 4.1: Distribution of the households and women studied: demographics, outcome of pregnancy and antenatal care (source: household survey)

Characteristic	Category	Number	Percentage
Household size	1-3	9,396	45%
	4-5	7,346	35%
	6 and over	4,144	20%
Ethnic group of household head*	Makonde	8,828	42%
	Mwera	8,518	41%
	Yao	1,009	5%
	Other	2,530	12%
Sex of household head	Male	15,794	76%
	Female	5,092	24%
Distance to nearest health facility**	Under 5km	14,183	71%
	5km and over	5,712	29%
Women aged 15-49 years	Total resident	19,935	
	Interviewed	19,007	95%
	Gave birth in previous 3 years	7,413	39%
Experience of at least one child (under 5 years) death	Yes	7,157	38%
	No	11,850	62%
Place of delivery for the most recent birth	Health Facility	4,029	39%
	Elsewhere	6,255	61%
Antenatal clinic use in most recent pregnancy [§]	Yes	2,431	88%
	No	345	12%
IPTp in most recent pregnancy [§]	Yes	1,662	60%
	No	1,114	40%
Net last night in current pregnancy ^{§§}	Yes	271	25%
	No	800	75%
Ever-treated net last night in current pregnancy ^{§§}	Yes	92	9%
	No	979	91%

* Missing for 1 household

** Missing for 991 households (5%)

[§] For pregnancies in the year before the survey, excludes current pregnancies

^{§§} Missing for 2 women

A summary of the assets owned by households in each quintile of the socio-economic status score from principal components analysis is shown in table 4.2.

Typically, a household in the poorest quintile would have no bicycle, radio, or poultry, and would have a thatched roof. A typical household in the least poor quintile would own a bicycle and radio, a few chickens or ducks, and a tin roof.

Table 4.2: Asset ownership of households in each socio-economic status quintile (source: household survey)

				Household “assets”: percentage with....								
Socio-economic status quintile	Number of households	Percentage of households	Mean SES score	Rent the house they occupy	Bicycle	Radio	Use wood for cooking	Animals	Poultry	Mains electricity	Tin roof	
Most poor	4,419	21%	-1.354	0%	0%	0%	100%	0%	9%	0%	0%	
Very poor	4,622	22%	-0.875	0%	13%	21%	100%	11%	62%	0%	0%	
Poor	3,341	16%	-0.272	9%	30%	37%	100%	13%	75%	0%	21%	
Less poor	4,121	20%	0.486	6%	72%	74%	99%	18%	65%	0%	21%	
Least poor	4,125	20%	2.164	15%	83%	87%	82%	37%	78%	4%	70%	
All	20,628	100%		6%	39%	43%	96%	16%	57%	1%	22%	
				<i>Factor loadings</i>	0.22	0.42	0.43	0.38	0.26	0.28	0.32	0.45

Availability of staff, vaccines and drugs on a single day in October 2004 in the health facilities serving this population is shown in table 4.3. Of 118 facilities supplying vaccination services, 77% had Bacille Calmette-Guerrin (BCG), Diphtheria-Pertussis-Tetanus-Hepatitis B (DPT-HepB), oral polio vaccine (OPV), measles and tetanus toxoid (TT) vaccine in stock and almost all (97%) had a fridge. However, as a rough indication of how effective the fridges were, only about half of all facilities had a fridge that would freeze water (54%). Most of the 134 facilities providing treatment services had oral rehydration solution (ORS) (93%) and SP (93%) in stock and slightly fewer had co-trimoxazole (73%). Less than half (42 %) had all seven ‘essential oral treatments’ available, i.e. ORS, SP,

co-trimaxazole, vitamin A, ferrous sulphate, paracetamol and mebendazole. Water was only available in 22% of the facilities. Injectable treatment for pre-referral care was available in

Table 4.3: Availability of staff, vaccines and drugs in health facilities on a single day in October 2004 (source: health facility survey)

Characteristic	Categories	Number of facilities	% of facilities	95% CI*	
VACCINES AND EQUIPMENT FOR VACCINATION (in all 118 facilities supplying vaccination services)					
All essential vaccines available (BCG, DPT-HepB, OPV, Measles, TT)		91/118	77%	68,84	
Fridge	Available	115/118	97%	93,99	
	Available & freezes	64/118	54%	45,63	
ORAL AND INJECTABLE DRUGS (in all 134 facilities)					
Essential oral treatments available (ORS, SP, co-trimoxazole, vitamin A, ferrous sulphate, paracetamol, mebendazole) (SP was the first-line antimalarial drug at the time of the survey)	All available	57/134	42%	34,51	
	ORS	125/134	93%	88,97	
	SP	124/134	93%	87,96	
	Co-trimoxazole	98/134	73%	65,80	
Water available		30/134	22%	16,30	
Injectable treatment for pre-referral care (quinine, gentamicin or ampicillin or chloramphenicol, benzylpenicillin or cristapen or PPF (procaine penillin))	In dispensaries	59/113	52%	43,62	
	In health centres	6/14	43%	18,71	
HUMAN RESOURCES (in all 127 health centres & dispensaries)					
Prescribers (Medical Officers, Assistant Medical Officer, Clinical Officer or Assistant Clinical Officer)	Dispensaries	Present	46/113	41%	32,50
		Employed	85/113	75%	66,83
	Health Centres	Present	8/14	57%	29,82
		Employed	12/14	86%	57,98
Nurses (Nursing Officer, Nurse Midwife, Public Health Nurse 'B' or Maternal and Child Health Aides)	Dispensaries	Present	49/113	43%	34,53
		Employed	86/113	76%	67,84
	Health Centres	Present	11/14	79%	49,95
		Employed	13/14	93%	66,100

SUPERVISION & REFERRAL (in all 134 facilities)			
At least one supervision visit in previous 6 months	112/134	84%	76,89
At least one supervision involving case-management observation in previous 6 months	23/134	17%	11,25
Transport for referral (bicycle or ambulance)	21/134	16%	10,23
Has the in-charge ever wanted to refer a sick child but been unable to?	34/134	25%	18,34

*Assuming binomial distribution

roughly half of both dispensaries and health centres (52% and 43% respectively). We assessed human resources at health centres and dispensaries in terms of qualified prescribers and nurses. Only three-quarters of dispensaries had at least one prescriber and a similar proportion had at least one nurse (75% and 76% respectively). Furthermore, absenteeism was common in both nursing and prescribing cadres: only about 40% of dispensaries had a prescriber or a nurse present on the day of the survey (41% and 43% respectively). The most common reasons for absence were official travel (including meetings and seminars), leave and long-term training. Most facilities had received a supervision visit in the 6 months prior to the survey (84%, 112/134) but only a few recalled supervision visits including observation of case-management (17%, 23/134). (It should be noted that some under-reporting of this issue is possible: on a few occasions the interviewee was not the person in-charge of the facility and they may not have been present during all supervision visits.) Transport for referral care was rarely available, either by bicycle or ambulance (16%, 21/134), and one-quarter of those in-charge of a health facility said that they had wanted to refer a sick child at some point but had been unable to (25%, 34/134).

During the household survey we interviewed mothers of all 1,414 children under two years about preventive care and recent illness in a randomly selected subgroup of 27% of households (192 clusters out of 720). Vaccine coverage was high, with 80-90% of all children aged 12-23 months having received BCG, three doses of DPT, and at least three doses of OPV before one year of age (table 4.4). Measles vaccine coverage was slightly lower at 69%. Almost one-third of children had slept under a mosquito net the night before the survey (30%) but most of these nets were untreated. This is a conservative estimate because net use is likely to be a few percentage points higher in the rainy season, when mosquito densities are higher (unpublished observations). Only about one in ten children used a net that had ever been treated with insecticide (11%) or one which had been treated in the last year (9%). Malaria parasitaemia due to *P falciparum* was found in 62%

Table 4.4: Preventive care and recent illness in children under two years (source: household survey)

Indicator	Number of children	Percentage of children
VACCINE COVERAGE & VITAMIN A (in children aged 12-23 months)		
BCG before 12 months of age	647/724	89%
DPT-HepB3 before 12 months of age	588/724	81%
OPV3 before 12 months of age	657/724	91%
Measles before 12 months of age	496/724	69%
Vitamin A in previous 6 months	500/710	70%
MOSQUITO NETS (in children aged 0-23 months)		
Slept under a net last night	417/1,401	30%
Slept under a treated net last night	159/1,401	11%
Slept under a recently-treated net last night	125/1,401	9%
MALARIA AND ANAEMIA (in children aged 0-23 months)		

Malaria parasitaemia	780/1,254	62%
Severe anaemia (Hb<8g/dL)	384/1,256	31%
RECENT ILLNESS AND CARE-SEEKING (in children aged 0-23 months)		
Illness in the last two weeks	674/1,410	48%
Sought care from a Western-style health care provider (hospital, health centre, dispensary etc)	309/674	46%
Admissions in the previous year	227/1,414	16%
NUTRITION		
Exclusive breastfeeding in children under 6 months old	79/332	24%
Underweight (weight-for-age z-score under -2) in children 0-23 months old	400/1,243	32%

of children under two years and severe anaemia (Hb<8g/dL) in 31%. Almost half of all children had been ill in the two weeks before the survey (48%), and of those who had been ill almost half had sought care from a so-called “Western-style” care provider such as a hospital, health centre, or dispensary (46%). Roughly one in every 6 children had been admitted to a health centre or hospital for care in the year before the survey (16%), with malaria being the most common reported primary cause (52%) followed by diarrhoea (15%), pneumonia and anaemia (11% each). Exclusive breastfeeding in children under six months of age was reported in only one-quarter of children (24%). Roughly one-third of all under-two-year-olds were underweight, with a weight-for-age z-score of minus 2 or lower (32%).

Table 4.5: Inequalities by sex in preventive care and illness in children under two years (source: household survey)

Indicator	Number of children	Percentage of children		P
		Boys	Girls	
VACCINE COVERAGE & VITAMIN A (in children aged 12-23 months)				
BCG before 12 months of age	647/724	88%	91%	0.17
DPT-HepB3 before 12 months of age	588/724	82%	80%	0.37
OPV3 before 12 months of age	657/724	90%	92%	0.40
Measles before 12 months of age	496/724	66%	71%	0.19
Vitamin A in previous 6 months	500/710	71%	70%	0.87
MOSQUITO NETS (in children aged 0-23 months)				
Slept under a net last night	417/1,401	32%	28%	0.11
Slept under a treated net last night	159/1,401	13%	10%	0.19
Slept under a recently-treated net last night	125/1,401	11%	7%	0.03
MALARIA AND ANAEMIA (in children aged 0-23 months)				
Malaria parasitaemia	780/1,254	62%	62%	0.90
Severe anaemia (Hb<8g/dL)	384/1,256	67%	72%	0.07
RECENT ILLNESS AND CARE-SEEKING (in children aged 0-23 months)				
Illness in the last two weeks	674/1,410	49%	47%	0.53
Sought care from a Western-style health care provider (hospital, health centre, dispensary etc)	309/674	44%	48%	0.28
Admissions in the previous year	227/1,414	19%	13%	0.008
NUTRITION				
Exclusive breastfeeding in children under 6 months old	79/332	23%	25%	0.68
Underweight (weight-for-age z-score under -2) in children 0-23 months old	400/1,243	34%	31%	0.32

We looked for inequalities in indicators of preventive care and recent illness by sex, ethnic group of the household head, household socio-economic status and distance from health facilities. We found little evidence of inequalities by sex, although admissions in the previous year were slightly more common in boys than girls (19% vs 13%, $p=0.008$, table 4.5). Children living in Makonde-headed

households were less likely to be anaemic and to be underweight than those in other groups (Table 4.6: 25% vs 34%-37% for severe anaemia, $p=0.007$; 29% vs 37% for underweight, $p=0.04$).

Table 4.6: Inequalities by ethnic group in preventive care and illness in children under two years (source: household survey)

Indicator	Number of children	Percentage of children				P
		Mak- onde	Mw- era	Yao	Other	
VACCINE COVERAGE & VITAMIN A (in children aged 12-23 months)						
BCG before 12 months of age	644/721	92%	86%	92%	89%	0.19
DPT-HepB3 before 12 months of age	586/721	84%	79%	88%	77%	0.24
OPV3 before 12 months of age	654/721	90%	91%	88%	90%	0.96
Measles before 12 months of age	496/721	71%	67%	65%	68%	0.61
Vitamin A in previous 6 months	499/707	74%	67%	68%	68%	0.35
MOSQUITO NETS (in children aged 0-23 months)						
Slept under a net last night	415/1,395	28%	28%	35%	39%	0.07
Slept under a treated net last night	159/1,395	12%	9%	10%	16%	0.19
Slept under a recently-treated net last night	125/1,395	10%	7%	6%	12%	0.19
MALARIA AND ANAEMIA (in children aged 0-23 months)						
Malaria parasitaemia	779/1,249	61%	62%	65%	65%	0.82
Severe anaemia (Hb<8g/dL)	383/1,251	25%	34%	37%	37%	0.007
RECENT ILLNESS AND CARE-SEEKING (in children aged 0-23 months)						
Illness in the last two weeks	673/1,404	44%	51%	58%	49%	0.07
Sought care from a Western-style health care provider (hospital, health centre, dispensary etc)	308/673	42%	47%	71%	45%	0.02
Admissions in the previous year	226/1,408	17%	15%	17%	16%	0.41
NUTRITION						
Exclusive breastfeeding in children under 6 months old	78/330	30%	20%	9%	21%	0.11
Underweight (weight-for-age z-score under -2) in children 0-23 months old	398/1,238	29%	37%	37%	27%	0.04

Coverage of all vaccines was 10% to 20% lower in the poorest households than in the least poor, with the trend of lower coverage in poorer children reaching

statistical significance for DPT-HepB3 and measles vaccine (table 4.7: ratio of poorest to least poor 0.8 – 0.9, p for trend <0.05). Mosquito net use was 70% to 80% lower in the poorest children than in the least poor, for both treated and untreated nets (ratio of poorest to least poor 0.2 – 0.3, p for trend <0.0001). Malaria parasitaemia was more common in the poorest children compared to the least poor (68% in poorest compared with 50% in least poor, ratio 1.4, p for trend <0.0001). There was an even more marked inequality for severe anaemia (Hb<8g/dL), which was found in 46% of the poorest children but only in 21% of the least poor (ratio 2.2, p for trend <0.0001).

Table 4.7: Inequalities by socio-economic status in preventive care and illness in children under two years (source: household survey)

Indicator	Number of children	Percentage of children					Ratio Q1 / Q5	P *
		Q1	Q2	Q3	Q4	Q5		
VACCINE COVERAGE & VITAMIN A (in children aged 12-23 months)								
BCG before 12 months of age	642/719	84	89	93	88	92	0.9	0.15
DPT-HepB3 before 12 months of age	584/719	76	79	86	75	90	0.8	0.03
OPV3 before 12 months of age	652/719	87	90	94	90	92	0.9	0.25
Measles before 12 months of age	495/719	61	68	68	71	74	0.8	0.02
Vitamin A in previous 6 months	499/705	67	64	75	72	76	0.9	0.15
MOSQUITO NETS (in children aged 0-23 months)								
Slept under a net last night	413/1,389	16	21	28	29	50	0.3	<0.001
Slept under a treated net last night	159/1,389	4	5	11	10	25	0.2	<0.001
Slept under a recently-treated net last night	125/1,389	3	4	6	9	20	0.2	<0.001
MALARIA AND ANAEMIA (in children aged 0-23 months)								
Malaria parasitaemia	778/1,244	68	67	68	64	50	1.4	0.001
Severe anaemia (Hb<8g/dL)	383/1,246	46	31	33	29	21	2.2	<0.001
RECENT ILLNESS AND CARE-SEEKING (in children aged 0-23 months)								
Illness in the last two weeks	670/1,398	44	50	51	47	47	0.9	0.90

Sought care from a Western-style health care provider (hospital, health centre, dispensary etc)	307/670	44	47	45	42	49	0.9	0.81
Admissions in the previous year	226/1,402	20	13	13	18	17	1.2	0.77
NUTRITION								
Exclusive breastfeeding in children under 6 months old	77/327	30	20	33	21	17	1.8	0.09
Underweight (weight-for-age z-score under -2) in children 0-23 months old	397/1,233	43	32	30	35	25	1.7	0.001

* Test for trend

In contrast, there was little evidence of inequality in recent illness, care-seeking or admissions in the previous year by socio-economic status. Exclusive breastfeeding in children under 6 months was almost twice as common in the poorest children compared to the least poor, with the trend not quite reaching statistical significance (p for trend=0.09, ratio poorest to least poor 1.8). Underweight (weight-for-age z-score <-2) was 1.7 times more common in the poorest children compared to the least poor (P for trend = 0.001). Inequalities by distance from the nearest health facility were also apparent: coverage of all vaccines was 5 to 11 percentage points lower in households further than 5km from their nearest facility than in those living closer (table 4.8: $p < 0.05$).

Table 4.8: Inequalities by distance from the nearest health facility in preventive care and illness in children under two years (source: household survey)

Indicator	Number of children	Percentage of children		P
		Under 5km	5km and over	
VACCINE COVERAGE & VITAMIN A (in children aged 12-23 months)				
BCG before 12 months of age	558/619	93	83	0.0001
DPT-HepB3 before 12 months of age	567/619	93	88	0.04
OPV3 before 12 months of age	507/619	85	76	0.02
Measles before 12 months of age	429/619	73	62	0.01

Vitamin A in previous 6 months	433/606	73	67	0.18
MOSQUITO NETS (in children aged 0-23 months)				
Slept under a net last night	362/1,207	33	25	0.05
Slept under a treated net last night	137/1,207	12	9	0.23
Slept under a recently-treated net last night	105/1,207	10	6	0.06
MALARIA AND ANAEMIA (in children aged 0-23 months)				
Malaria parasitaemia	671/1,082	60	66	0.11
Severe anaemia (Hb<8g/dL)	334/1,083	29	35	0.06
RECENT ILLNESS AND CARE-SEEKING (in children aged 0-23 months)				
Illness in the last two weeks	599/1,215	49	50	0.82
Sought care from a Western-style health care provider (hospital, health centre, dispensary etc)	277/599	51	37	0.002
Admissions in the previous year	182/1,219	15	14	0.62
NUTRITION				
Exclusive breastfeeding in children under 6 months old	70/290	25	23	0.69
Underweight (weight-for-age z-score under -2) in children 0-23 months old	324/1,069	29	32	0.31

Mosquito net use was also more common in children living closer to health facilities (33% for those living under 5km away and 25% in others: $p=0.05$). Although illness in the last two weeks was equally common in those living nearer and further from a health facility, appropriate care-seeking was more common in those living closer to health facilities (51% and 37%, $p=0.002$). Despite this, admissions in the previous year showed no disparity by distance from the nearest health facility (15% and 14%, $p=0.62$).

Table 4.9: Differentials in infant mortality rates (source: household survey)

	Category	Deaths	Child-years	Mortality rate per 1000 child-years	RR	95% CI*	P*
Year (July-June)	2001-2	184	2,218.8	82.9	1		0.72 (for trend P=0.75)
	2002-3	183	2,324.7	78.7	0.95	0.8 – 1.2	
	2003-4	227	2,659.8	85.3	1.03	0.8 – 1.3	
Mother's age at delivery	20-29	261	3,398.7	76.8	1		0.005
	30-39	124	1,702.2	72.8	0.95	0.8 – 1.2	
	40-49	27	364.5	74.1	0.96	0.6 – 1.4	
	Under 20	181	1,718.8	105.3	1.37	1.1 – 1.7	
Mother's education	One or more years	399	5,123.9	77.9	1		0.038
	None	194	2,063.6	94.0	1.21	1.0 – 1.4	
Sex	Girls	287	3,537.7	81.1	1		0.70
	Boys	307	3,665.5	83.8	1.03	0.9 – 1.2	
Twins	Singleton	518	6,980.1	74.2	1		<0.0001
	Twin	76	223.2	340.5	4.59	3.4 – 6.2	
Age	0-27 days	337	574.2	586.9	1		<0.0001
	28-365 days	257	6,629.0	38.8	0.07	0.06 – 0.08	
Ethnic group of household head	Makonde	220	3,075.8	71.5	1		0.01
	Mwera	246	2,867.3	85.8	1.20	1.0 – 1.4	
	Yao	29	318.7	91.0	1.27	0.8 – 2.0	
	Other	99	926.2	106.9	1.49	1.2 – 1.9	
Gender of household head	Male	478	5,695.9	83.9	1		0.48
	Female	116	1,493.2	77.7	0.93	0.7 – 1.1	
SES quintile of household	Poorest	109	1,291.1	84.4	1		0.90 (test for trend)
	Very poor	122	1,577.9	77.3	0.92	0.7 – 1.2	
	Poor	102	1,182.1	86.3	1.02	0.8 – 1.4	
	Less poor	129	1,540.9	83.7	0.99	0.8 – 1.3	
	Least poor	120	1,513.7	79.3	0.94	0.7 – 1.2	
Distance to nearest health facility	<5km	363	4,778.9	76.0	1		0.02
	≥5km	196	2,061.2	95.1	1.25	1.0 – 1.5	

Continued over/

/Table 4.9 continued

Effect of child's age on the relationship between twinning and mortality:							
Twins under 28 days (neonates)	Singleton	280	556.6	503.0	1		<0.0001
	Twin	57	17.6	3,242.6	6.45	4.5 – 9.2	
Twins over 28 days (1-11m)	Singleton	238	6,423.4	37.1	1		<0.0001
	Twin	19	205.6	92.4	2.49	1.5 – 4.0	
Effect of child's age on the relationship between maternal education and mortality:							
In neonates: Mother's education	≥ 1 year	238	407.4	584.3	1		0.93
	None	98	165.9	590.8	1.01	0.8 – 1.3	
In 1-11 month olds: Mother's education	≥ 1 year	161	4,716.7	34.1	1		0.003
	None	96	1,897.8	50.6	1.48	1.1 – 1.9	
Effect of distance from the health facility on the relationship between maternal education and mortality							
In those living <5km from a health facility: mothers education	≥ 1 year	239	3,466.	68.9	1		0.005
	None	123	1,305.3	94.2	1.4	1.1 – 1.7	
In those living ≥5km from a health facility: mothers education	≥ 1 year	140	1,421.5	98.5	1		0.47
	None	56	637.9	87.8	0.9	0.7 – 1.2	

* From Poisson regression, adjusted for clustering from survey design

We elicited information about dates of birth, sex of the child, whether they were singleton or twin births, and the date of death for any child who had died of the 7,413 women (39%) who gave birth in the three years prior to the survey, in order to estimate infant survival rates from July 2001 - June 2004 (table 4.9). Neonatal mortality per 1000 live births was 43.2 (336/7,779) and infant mortality per 1000 live births was 76.4 (594/7,779). We also calculated infant mortality rates per 1000 per year and looked for trends in this indicator over time and differentials by other factors. Between July 2001 and June 2004 the infant mortality rate per 1000 per year was 82.5 (CI 75.6 – 90.1), and there was no evidence that it had changed over this time period (table 9, P=0.72). Infant mortality was almost 40% higher for teenage mothers than for older women (rate ratio (RR) 1.37, CI 1.1 –

1.7, $p=0.005$), and 20% higher for mothers who had no formal education (RR 1.2, CI 1.0 – 1.4, $p=0.004$). Boys and girls had similar infant mortality rates (RR 1.03, $p=0.70$) and rates were also similar in male-headed and female-headed households (RR 0.93, $p=0.48$). Twins had more than four times the infant mortality rate of singleton births (RR 4.59, CI 3.4 – 6.2, $p<0.0001$). Neonatal mortality per 1000 child-years was more than ten times the mortality rate in children aged 1-11 months (RR=15.1, $p<0.0001$). There was some evidence of differences in infant mortality by ethnic group, with the rate in Makonde being 71.5 per 1000 CYAR and that in the Mwera and in the combined other ethnic groups being 20 to 50% higher (RR for Mwera =1.2, RR for others=1.5, compared with Makonde, $P=0.01$). There was no evidence of inequality in infant mortality by socio-economic status (84.4/1000 child-years-at-risk (CYAR) in the poorest and 79.3/1000 CYAR in the least poor quintiles, RR=0.94, P for trend=0.90). However, there was evidence that infant mortality rates were higher in those living more than 5km from the health facility compared to those living closer (95.1/1000 CYAR and 76.0/1000 CYAR respectively, RR=1.25, $P = 0.02$).

Of the tests for effect modification, three were statistically significant, (a) age and twinning, (b) age and mother's education, and (c) distance to the health facility and mother's education (p -value for interaction between age and twinning 0.002, between age and education 0.039, between distance and mother's education $p=0.03$). These findings are explained in turn below.

Firstly, we found strong evidence that the neonatal period is particularly risky for twins, with the neonatal mortality rate for twins being over 6 times higher than that for singleton babies (RR=6.45, CI 4.5 – 9.2, $p<0.0001$). The mortality rate for twins aged 1-11 months was 2.5 times higher than that for singleton babies (RR=2.49, CI 1.5 – 4.0, $p=0.0002$).

Secondly, we found some evidence that the effect of maternal education was different in neonates and in older infants. Neonatal mortality was similar among mothers with no formal education and those who had studied (RR=1.01, CI 0.8 – 1.3, $p=0.93$), but the rate of mortality in the post-neonatal period (1-11 months of age) was about 1.5 times higher for those with no education than for mothers who had spent one or more years at school (RR=1.48, CI 1.1 – 1.9, $p=0.003$).

Thirdly, we found that the positive effect of maternal education was only apparent in families living less than 5km from the health facility (RR=1.4, CI 1.1 – 1.7, $p=0.005$). For those living more than 5km from the health facility there was no evidence of any association between maternal education and infant survival (RR=0.9, CI 0.7 – 1.2, $p=0.47$).

4.5 Discussion

Most current global health efforts, including those for malaria, HIV and vaccine-preventable diseases, need to deliver in the context of rural health systems like the one described here. By including a functional and structural assessment of

the health system itself, it is possible to gain insights into why some interventions work while others do not. The “staircase effect” denotes the reduction in effect at the community level of an efficacious intervention due to factors such as coverage, availability and compliance [21]. The size of the steps can differ between socio-economic groups: the poorest tend to have worse access, diagnosis, compliance and adherence, meaning that efficacious interventions do not result in equitable community effectiveness [22, 23]. Delivery systems that reduce the gap between poorest and least poor are needed. The relatively short distances to health facilities, high antenatal care and good vaccine coverage suggest that peripheral health facilities have huge potential to make a difference to health and survival at the household level in rural Tanzania, even with current human resources. Nevertheless, drug shortages, staff absenteeism and water supply problems show that there is a long way to go before facilities are able to optimise the quality of care they provide.

This broad-based cross-sectional study includes both facility-based and household-based aspects of health and health care in a poor rural Tanzanian population. We had limited ability to reveal the reasons behind some of our findings. More in-depth research is needed to investigate why, for example, children born in households headed by Makonde are at lower risk of anaemia, malnutrition and infant death than those in households headed by other common ethnic groups. Although the Makonde are slightly less poor on average than other ethnic groups, the tendency for better infant survival among the Makonde

was seen in all socio-economic status (SES) quintiles (data not shown). The Makonde are socially the deepest-rooted ethnic group in the area, and this may give them better social status and networks that influence well-being other than through better socio-economic status. In-depth qualitative work is ongoing that may explain what behaviours might be responsible for these findings. Furthermore, our analysis involved a large number of significance tests and thus findings should be treated with caution as it is possible that some results may be due to chance alone.

The health facility survey revealed particular problems with staff absence and drug stocks. Staff absences were common, with only about two-third of all employed staff present on the day of the survey. A group of seven essential oral treatments was found in less than half of all facilities. District-level health staffs are responsible both for supportive supervision visits and drug supplies, and it seems that these aspects of their work are not prioritised. Referral is often difficult given large distances to referral centres and the lack of transport: the lack of pre-referral drugs, which may be given when referral is not possible, is of particular concern. Given the staff absences and drug shortfalls, and the fact that only about one-fifth of all facilities had a supply of clean water, it could be considered surprising that as many as 39% of women give birth in health facilities. In contrast, both childhoods vaccine coverage and antenatal clinic attendance are almost universal, which means that universal coverage of preventive interventions may be an achievable goal.

We found that 38% of all women had personally experienced a child death. This is a stark illustration of how “ordinary” child deaths are in this area, as in much of sub-Saharan Africa: when a child dies, it is no great surprise. Infant and neonatal mortality rates are in keeping with findings from other sources [12, 13] and although we found no evidence of a change from 2001-2004 our results are compatible with a drop in mortality around 1999-2001 [13].

In keeping with previous studies our results show that infants born to teenage mothers are at particularly high risk, as are twins, and infants born to mothers with no formal education [24, 25]. More surprisingly, perhaps, we found little evidence that neonatal mortality rates were associated with maternal education, in contrast to the post-neonatal period, when mortality rates were 50% higher for mothers with no formal education compared with those who had had at least one year of schooling. In the first few days of life newborn babies and their mothers are often confined indoors at home (M Mrisho, unpublished data): it is possible that this behaviour, together with a general lack of knowledge of how to prevent newborn deaths, is the reason for similar newborn survival among babies born to mothers who had, and had not, been to school.

We found that the neonatal period is especially risky for twins, who have over six times the mortality rate of single births. A similar pattern has been reported elsewhere: in studies conducted in Nepal and Bangladesh, the neonatal mortality

rate was respectively 7 times and 15 times higher than for singleton babies [26, 27].

We found some evidence of disparities in vaccination coverage by socio-economic status, with ratios of coverage in the poorest to least poor of 0.8 to 0.9, as reported elsewhere [28]. We also found stark inequalities in the use of mosquito nets, parasitaemia and anaemia, similar to those found before a social marketing program for nets in another part of the country [29]. Inequalities in underweight were also in keeping with a previous survey in another part of rural Tanzania (J Schellenberg unpublished data). However, we were surprised to find no evidence of socio-economic disparities in either care-seeking for mild illness, admission to hospital, or infant survival, in contrast to findings both nationally [28] and locally [6, 29-31]. This seems unlikely to be due to a lack of power as we had over 100 child deaths in each quintile. The most likely explanation is that the communities we studied are relatively homogeneous with regards to factors that influence care-seeking, such as knowledge, beliefs and means to travel.

Distance to health facilities has long been described as a barrier to their use [32-36]. In our study, children living over 5km from a health facility had lower vaccine coverage, fewer nets, more anaemia, poorer care-seeking and higher infant mortality than those living closer. This is despite the Tanzanian public health system which reaches to village level and is relatively well used for child illness: neighbouring Uganda, for example, has roughly twice the population per health

facility and care-seeking for recent childhood illness is just 8% compared with 40% in Tanzania [37, 38]. The Tanzanian advantage is that three-quarters of the population live within about 5km of their nearest facility.

4.6 Conclusions

Observational studies such as ours reveal functional and structural aspects of the health system as well as household and community issues that might be amenable to affordable, deliverable and sustainable child survival interventions. Recent work on the mid-term assessment of the MDGs has indicated the crucial role of health systems strengthening ranging from structural over functional to educational interventions [39]. Gradually the fact that all health interventions depend on effective health-systems based delivery strategies is becoming an accepted cornerstone in public health. The present study reveals the key areas for strengthening health systems when developing and validating new disease control strategies.

4.7 Competing interests

The authors declare that they have no competing interests.

4.8 Authors' contributions

The study was conceived & designed by JAS, MM, PA, HM, MT and DS. Substantial contributions to acquisition of the data were made by JAS, MM, FM, KS, CM, AM and DS. Initial analysis and interpretation of the data was done by JAS, MM, KS, SCK and DS. The manuscript was drafted by JAS and MM. All authors were involved in critical revision for important intellectual content and approved the final version of the manuscript.

4.9 Acknowledgements

This paper is published with the permission of the Dr Andrew Kitua, Director-General of the National Institute for Medical Research, for whose support we are grateful. The study was funded by the Bill and Melinda Gates Foundation through the IPTi consortium [15]. JAS was supported by the Bill and Melinda Gates Foundation through the Gates Malaria Partnership. The funding body had no role in study design, data collection, analysis or interpretation of the data, nor in writing the manuscript or in the decision to submit the manuscript for publication.

4.10 References

1. Black RE, Morris SS, Bryce J: **Where and why are 10 million children dying every year?** *Lancet* 2003, **361**:2226-34.
2. Claeson M, Gillespie D, Mshinda H, Troedsson H, Victora CG & the Bellagio Study Group on Child Survival. **Knowledge into action for child survival.** *Lancet* 2003, **362**:323-7.
3. Countdown to 2015: Child Survival [www.childsurvivalcountdown.com/]
4. The Millennium Development Goals Report 2006 [http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2006/MDGReport2006.pdf]
5. Bryce J, el Arifeen S, Pariyo G, Lanata C, Gwatkin D, Habicht JP & the Multi-Country Evaluation of IMCI Study Group. **Reducing child mortality: can public health deliver?** *Lancet* 2003, **362**:159-64.
6. Victora CG, Wagstaff A, Schellenberg JA, Gwatkin D, Claeson M, Habicht JP. **Applying an equity lens to child health and mortality: more of the same is not enough.** *Lancet* 2003, **362**:233-41.
7. Travis P, Bennett S, Haines A, Pang T, Bhutta Z, Hyder AA, Pielemeier NR, Mills A, Evans T. **Overcoming health-systems constraints to achieve the Millennium Development Goals.** *Lancet* 2004, **364**: 900-6.
8. Leroy JL, Habicht J-P, Pelto G, Bertozzi SM. **Current priorities in health research funding and lack of impact on the number of child deaths per year.** *Am J Public Health.* 2007, **97**:219-23
9. Victora CG, Vaughan JP, Barros FC, Silva AC, Tomasi E. **Explaining trends in inequities: evidence from Brazilian child health studies.** *Lancet* 2000, **356**:1093-8.
10. Wagstaff A, Bustreo F, Bryce J, Claeson M & the WHO-World Bank Child Health and Poverty Working Group. Child health: reaching the poor. *Am J Public Health* 2004, **94**:726-36.
11. Theobald S, Tolhurst R, Squire SB. **Gender, equity: new approaches for effective management of communicable diseases.** *Trans R Soc Trop Med Hyg* 2006, **100**:299-304.
12. **Tanzania National Census, 2002** [http://www.tanzania.go.tz/census/].
13. National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. 2005. **Tanzania Demographic and Health Survey 2004-05.** Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro. DHS 2004-5.
14. **Tanzania National Health Accounts.** [http://www.who.int/nha/docs/en/Tanzania_NHA_report_english.pdf].
15. Brundtland GH. Message from the Director-General. In: **World Health Report 1999 – Making a difference.** Geneva: World Health Organization, 1999.
16. Victora CG, Vaughan JP, Barros FC, Silva ACS, Tomasi E. **How can we explain trends in inequities? Evidence from Brazilian child health studies.** *Lancet* 2000;356:1093-98
17. **The IPTi Consortium** [http://www.ipti-malaria.org].
18. **WHO Multi-Country Evaluation of IMCI** [http://www.who.int/imci-mce].

19. Shirima K, Mukasa O, Armstrong Schellenberg J, Manzi F, John D, Mushi A, Mrisho M, Tanner M, Mshinda H and Schellenberg D. **The use of Personal Digital Assistants for Data Entry at the Point of Collection in a Large Household Survey In Southern Tanzania.** *Emerging Themes in Epidemiology*, 2007 4:5 (1 June).
20. Filmer, D. & Pritchett, L. 2001, **Estimating wealth effects without expenditure data - or tears: An application to educational enrollments in states of India,** *Demography* 38 115-132.
21. Tanner M, Lengeler C, Lorenz N. **Case studies from the biomedical and health systems research activities of the Swiss Tropical Institute in Africa.** *Trans R Soc Trop Med Hyg.* 1993 87 518-23.
22. Tugwell P, de Savigny D, Hawker G, Robinson V. **Applying clinical epidemiological methods to health equity: the equity effectiveness loop.** *BMJ* 2006, 332:358-61.
23. Vlassoff C & Tanner M. **The relevance of rapid assessment to health research & interventions.** *Health Policy Plan* 1992, 7:1-9.
24. Desai S, Alva S. **Maternal education and child health: is there a strong causal relationship?** *Demography* 35:71-81.
25. Feachem R, Jamieson DT (eds). **Disease and Mortality in sub-Saharan Africa.** Oxford University Press, Oxford. 1991.
26. Katz J, West KP Jr, Khatry SK, LeClerq SC, Christian P, Pradhan EK, Shrestha SR. **Twinning rates and survival of twins in rural Nepal.** *Int J Epidemiol* 2001, 30:802-7.
27. Mercer A, Haseen F, Huq NL, Uddin N, Hossain Khan M, Larson CP. **Risk factors for neonatal mortality in rural areas of Bangladesh served by a large NGO programme.** *Health Policy Plan* 2006, 21:432-43.
28. Gwatkin DR, Rutstein S, Johnson K, Pande RP, Wagstaff A. **Socio-economic Differences in Health, Nutrition, and Population.** Washington: The World Bank 2000.
29. Nathan R, Masanja H, Mshinda H, Armstrong Schellenberg JRM, de Savigny D, Lengeler C, Tanner M, Victora CG. **Mosquito nets and the poor: Can social marketing redress inequities in access?** *Trop Med Int Health* 2004, 9:1121-1126.
30. Mwageni E, Masanja H, Juma Z, Momburi D, Mkilindi Y, Mbuya C. **Socio-economic status and health inequalities in rural Tanzania: Evidence from the Rufiji demographic surveillance system.** In: INDEPTH Network, eds. *Measuring health equity in small areas.* Aldershot: Ashgate, 2005:39-52.
31. Nathan R, Armstrong-Schellenberg J, Masanja H, Sosthenes C, Mukasa O, Mshinda H. **Child health equity in Rural Tanzania: Can national millennium development goals include the poorest?** In: INDEPTH Network, eds. *Measuring health equity in small areas: findings from demographic surveillance systems.* Aldershot: Ashgate, 2005.
32. King MH (Editor). *Medical Care in Developing Countries.* Oxford: Oxford University Press: 1967.

33. Stock R. **Distance and the utilization of health facilities in rural Nigeria.** *Soc Sci Med* 1983, **17**:563-70.
34. Muller I, Smith T, Mellor S, Rare L, Genton B. **The effect of distance from home on attendance at a small rural health centre in Papua New Guinea.** *Int J Epidemiol*, 1998 **27**:878-84.
35. Weber MW, Milligan P, Sanneh M, Awemoyi A, Dakour R, Schneider G, Palmer A, Jallow M, Oparaogu A, Whittle H, Mulholland EK, Greenwood BM. **An epidemiological study of RSV infection in the Gambia.** *Bull World Health Organ* 2002, **80**:562-8.
36. NoorAli R, Luby S, Rahbar MH. **Does use of a government service depend on distance from the health facility?** *Health Policy Plan* 1999, **14**:191-7.
37. Bryce J, Victora CG, Habicht JP, Black RE, Scherpbier RW & the MCE-IMCI Technical Advisors. **Programmatic pathways to child survival: results of a multi-country evaluation of Integrated Management of Childhood Illness.** *Health Policy Plan* 2005, **20** Suppl 1:i5-i17.
38. Ministry of Health (MoH) [Uganda], ORC Macro, and John Snow, Inc./DELIVER. **Uganda Health Facilities Survey 2002.** Calverton, Maryland and Arlington, Virginia, USA: ORC Macro and John Snow, Inc./DELIVER, 2003.
39. de Savigny D, Kasale H, Mbuya C, Reid G. **In_focus: Fixing Health Systems.** Ottawa: IDRC, 2004.

CHAPTER 5

Factors affecting home delivery in rural Tanzania



Fieldwork

Chapter 5: Factors affecting home delivery in rural Tanzania

Mwifadhi Mrisho,^{1,4§} Joanna Armstrong Schellenberg,^{1,3} Adiel K. Mushi,^{2,3} Brigit Obrist,⁴ Hassan Mshinda,¹ Marcel Tanner⁴ and David Schellenberg^{1 3}

1. Ifakara Health Research and Development Centre, P.O. Box 78373, Dar es Salaam, Tanzania
2. National Institute for Medical Research- Amani Centre, P.O. Box 81, Muheza Tanzania
3. London School of Hygiene and Tropical Medicine, London, UK.
4. Swiss Tropical Institute, Basel, Switzerland

§Corresponding author

This paper has been published in the *Tropical Medicine and International Health*,

2008, 12:862-872

5.1 Abstract

Background

Studies of factors affecting place of delivery have rarely considered the influence of gender roles and relations within the household. This study combines an understanding of gender issues relating to health and help-seeking behaviour with epidemiological knowledge concerning place of delivery.

Methods

Qualitative and quantitative methods were employed. In-depth interviews, focus group discussions and participant observation were used to explore determinants of home delivery in southern Tanzania. Quantitative data were collected in a cross-sectional survey of 21,600 randomly-chosen households.

Results

Issues of risk and vulnerability such as lack of money, lack of transport, sudden onset of labour, short labour, staff attitudes, lack of privacy, tradition and cultures and the pattern of decision-making power within the household were perceived as key determinants of the place of delivery. Over 9,000 women were interviewed about their most recent delivery in the quantitative survey. There were substantial variations between ethnic groups with respect to place of delivery ($p < 0.0001$). Women who lived in male-headed households were less likely to deliver in a health facility than those in female-headed households [RR 0.86, 95% CI 0.80-0.91]. Mothers with primary and higher education were more

likely to deliver at a health facility [RR 1.30, 95% CI 1.23-1.38]. Younger mothers and the least poor women were also more likely to deliver in a health facility compared to the older and the poorest women respectively.

Conclusions

To address neonatal mortality, special attention should be paid to neonatal health in both maternal and child health programmes. The findings emphasise the need for a systematic approach to overcome health-system constraints, community based programmes and scale up effective low-cost interventions which are already available.

5.2 Introduction

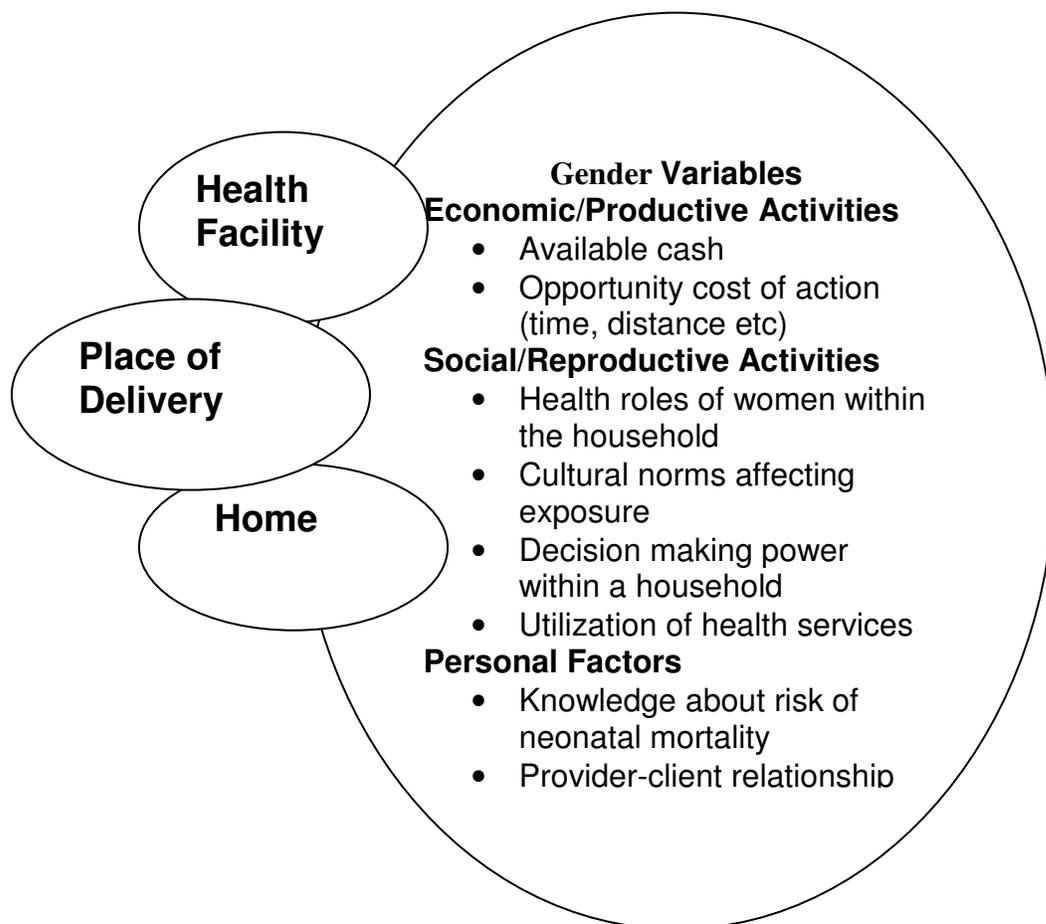
Although the debate about safety and women's right to choose between home or hospital delivery continues in the developed world, an undesirable outcome of home delivery has been documented in developing countries (Wagle *et al.* 2004; Ackermann-Liebrich *et al.* 1996; Sorensen *et al.* 2000 & Walraven *et al.* 1995). DHS data from 40 countries collected between 1995 and 2003 document that more than 50% of neonatal deaths occur after home birth with no skilled care attendance (Lawn *et al.* 2005). Walraven *et al.* (1995) documented that home births without a trained attendant had three times higher perinatal mortality than those in a health facility with trained attendants in rural Tanzania. In addition Ganer *et al.* (1994) reported a high rate of obstetric complications amongst apparently normal pregnancies delivering at home in Papua New Guinea.

The Tanzanian health system comprises a well-established network of health facilities throughout the country, and the government encourages all pregnant women deliver at health facilities (Mosha *et al.* 2005). The government has also mandated that maternal and child health services, including deliveries, be exempted from fees at any government facility (MOH 2005). The reality however is that women are asked to bring delivery kits such as razor blade, gloves and cotton wool. In Tanzania, although health facilities are closer to rural households than in many African countries, more than half of births are delivered at home despite a high coverage (94%) of antenatal care (National Bureau of Statistics & Macro International Inc. 2005). Most previous studies in Tanzania and elsewhere have shown that a majority of mothers attend antenatal clinics at least once during pregnancy, but that only a small proportion of them deliver in health facilities (National Bureau of Statistics & Macro International Inc. 2005; Amooti-Kaguna & Nuwaha 2000; Otim-Adoi 1981; Munaaba 1995; Hitimana-Lukanika 1988; & Lugina *et al.* 2004).

The place of delivery and its determinants has long been on the research agenda (Campbell & Graham 2006; Campbell & MacFarlane 1986 & Hodgkin 1996). Socioeconomic variables and physical distance from a health facility have been reported to influence the place of delivery (Yanagisawa *et al.* 2006; Bolam *et al.* 1998; Nwakoby 1994; & Elo 1992). In rural Tanzania for instance, 84% of women who gave birth at home intended to deliver at health facility but did not due to distance and transportation difficulties (Biego *et al.* 1995). Such studies

show the importance of socioeconomic determinants (among others) on the place of delivery; however, there is little literature that takes into account the possible influence of gender factors and relations. (Fig. 5.1).

Figure 5.1 Gender framework (after Rathgeber, E. & Vlassoff, C. (1993) & Tanner & Vlassoff (1998))



Based on the gender framework (Fig 5.1) (Rathgeber & Vlassoff 1993, Tanner & Vlassof 1998), this study combines an understanding of gender issues relating to health and help-seeking behaviour with epidemiological knowledge concerning the place of delivery. The framework consists of three components: first, economic and productive activities which determine the place of delivery, such as available cash and opportunity cost of action (e.g. time and distance). Secondly, social and reproductive activities which include health roles within the households, cultural norms affecting exposures to the place of delivery, decision power within the households, utilization of health services. Lastly personal factors which can influence the place of delivery that are mentioned in the framework include knowledge about the risk of neonatal mortality and the provider-client relationship.

A gender relations analysis reveals power relations between men and women. Women carry the major share of the responsibility for the well-being of the household in most societies. This responsibility is rarely matched by autonomy to make decisions or by access to the necessary resources (Tanner & Vlassof 1998). Using the example of place of delivery, we describe here a modified gender approach to examine knowledge concerning the risk of neonatal mortality, women's roles regarding health within the household, cultural norms affecting exposure, decision-making power within the household, utilization of health services, and factors influencing utilization, such as the provider-patient relationship. The study reported in this paper was designed to understand factors

influencing the choice of place of delivery and discuss their implications for neonatal survival.

5.3 Methodology

5.3.1 Study area

Nachingwea, Lindi Rural, Ruangwa, Tandahimba and Newala Districts are located in Southern Tanzania and have a total population of about 900,000 people (NBS 2004). A division is a local administrative area constituting a number of villages: there are between 3 and 10 divisions in each district and a total of 24 divisions in these five districts. Parts of Tandahimba and Newala are on the Makonde Plateau, up to 900m above sea level. Lindi Rural, Ruangwa and Nachingwea have mountainous areas as well as low lying plains. The major permanent rivers in the region are the Lukuledi, Matandu and Mavuji. There are two main rainy seasons, November-December and February to May. The area has a wide mix of ethnic groups, the most common being Yao, Makonde, Mwera, Matumbi, Ndonde, Ngindo, Nyasa, Ngoni and Makua. Although most people speak the language of their own ethnic group, Swahili is widely spoken. The most common occupations are subsistence farming, fishing and small-scale trading. Cashew nuts, sesame and groundnuts are the major cash crops while food crops are cassava, maize, sorghum and paddy. Most people live in mud-walled and thatched-roof houses, but some houses have corrugated roofs. Water is often available in hand-dug wells, communal boreholes, natural springs and river water. Most rural roads are unpaved and hence some are not passable during

rainy seasons while others are so steep that some villages are not accessible by car. The public health system comprises a network of dispensaries, health centres and hospitals offering a varying quality of care. In the study area there are also few private not-for-profit dispensaries and hospitals run by NGOs, generally Christian Mission organisations. With the exception of Lindi Rural, each district has a District hospital. Some villages have village health workers.

5.3.2 Methods

5.3.2.1 Qualitative Methods

Ethnographic approaches aiming at triangulation (in-depth interviews, focus group discussions (FGD) and participant observation) were used to explore and identify determinants for home delivery. It is usual for studies such as this to approach the issues qualitatively at first, but we did not do this because we needed the quantitative information rapidly for the Intermittent Preventive Treatment for infants (IPTi) study. The research tools were translated into Swahili, field-tested and subsequently applied in 8 villages of Lindi Rural and Tandahimba districts. Each of the study villages had a female project informant collecting and recording information on any health-related event in the village. Informed consent was sought from all individuals participating in interviews and focus group discussions. The interviews were designed to gather information on the choice of delivery place, merits and demerits of delivery places, who decided where to deliver, cash for emergency deliveries, preparation for delivery, barriers

for delivery place, and ANC. Data collection took place between March and October 2005.

A total of 32 in-depth interviews were conducted. Four in-depth interviews of key topics were done in each village with women who had recent delivered at home and health facility and a detailed follow-up of in-depth interviews and focus group discussions. A trained observer, the village female informant, recorded practices related to newborn survival in the village.

Two focus group discussions (FGD) based on the methodology described by (Dawson *et al.* 1993) were conducted in each of the study villages with 6-8 women who were pregnant or had experienced at least one delivery and had similar backgrounds and experiences. The FGD generally took place at the village based informant's home or sometimes at a school when there was rain. Before the FGD, the moderator introduced all participants, explained the general topic of discussions, and let participants know that everyone should contribute his/her ideas. An experienced moderator (a trained sociologist), along with a note-taker, led the discussions, each taking notes. The FGDs were recorded using an MP3 voice recorder. After the FGD, the note-taker and the moderator reviewed their hand written notes together while listening to the recording. After revisions of the notes, the transcripts were typed, saved and exported to the N-vivo program for analysis.

5.3.2.2 Quantitative methods

Quantitative data were collected in a cross-sectional survey carried out between July and August 2004. The survey was designed to give a reasonably precise estimate of the mortality rate in children aged 2-11 months in each division of the study area, as a baseline measure for a study of the community effectiveness of IPTi (www.ipti-malaria.org). In brief, thirty clusters of 30 households were sampled from each division, giving a total of 720 clusters and 21,600 households. The number of clusters selected from different wards (an administrative sub-unit of a division) was determined by probability proportional to the size of the ward, as estimated by the 2002 National Census population figures. The required number of clusters was then selected at random from a list of all sub-villages (*vitongoji*, singular *kitongoji*) supplied by each district council. Within each sub-village, 30 households were selected at random using a modified EPI-type sampling scheme that ensure an equal probability of each household being selected. For this purpose a household or *kaya* is “a group of people who eat from the same pot” (Schellenberg-Armstrong *et al.* 2008).

In consenting households, all women aged 15-49 years were asked about all children born in the three years prior to the survey. For the most recent pregnancy we asked whether their children were born at home or at a health facility, the use of Intermittent Preventive Treatment for malaria (IPTp) and Antenatal Care (ANC). Consequently, information on demographic and socioeconomic status of all women who gave birth at home and health facility

were collected. Demographic variables included ethnic group, gender, mothers' education, and mothers' age at child birth. A summary measure of socioeconomic status, the wealth quintile, was derived. Data were entered into a Personal Digital Assistant (PDA) at the point of collection (Kizito *et al.* 2007).

5.4 Ethical approval

The study received ethical approval from the institutional review boards of the Ifakara Health Research and Development Centre, the National Tanzania Medical Research Co-coordinating Committee, the Tanzania Commission for Science and Technology, and the London School of Hygiene and Tropical Medicine. During field work, information sheets about the study in Swahili were given out, explaining why it was carried out, by whom, and what it would involve. In the household survey, written consent of all household heads was sought. Confidentiality of all study participants was assured.

5.5 Statistical methods and analysis

The qualitative data were analyzed using Nvivo software (QSR 2002). We categorized and coded our nodes according to the themes of our interest. Quantitative data were analysed using Stata software, version 8 (Stata 2003). We adjusted for clustering using standard STATA commands such as svytab. Socio-economic status was assessed by constructing a household "wealth index" based on principal components analysis and household asset ownership of a radio, a bicycle, animals, poultry, whether the house had a corrugated iron roof,

whether the house was owner-occupied or rented, and whether it was connected to the mains electricity supply (Filmer & Pritchett 2001). Tables showing the proportion of women delivering in health facility by ethnic group, gender of the household head, mother's education, mother's age at child birth and wealth quintile were prepared. We calculated risk ratios to summarise the relative risk of delivering in health facility in different sub-groups. 95 % confidence intervals and p-values for testing hypotheses concerning home and health facility delivery by ethnic group, gender of household head, mother's education, mothers age at child birth and wealth quintile were from design-based F-tests, equivalent to ordinary chi-squared tests for variability adjusted for clustering. In multivariate analysis we used a generalised linear regression model with a log link (the Stata `binreg` command) adjusted for clustering and looked at the relationships between all variables simultaneously. We checked for any evidence of two-way interactions between all variables in the model by calculating stratum-specific risk ratios with confidence intervals, and checking whether these confidence intervals overlapped. For example, for ethnic group we calculated risk ratios with one stratum for each ethnic group, and checked whether the confidence intervals for each factor overlapped between the different strata. P-values for testing hypotheses concerning place of delivery by socio-economic status quintile were based on a test for linear trend. In multiple regression models, the term for socio-economic status quintile was included as a numeric score taking values 1 to 5. Both analyses (adjusted and unadjusted) were carried out on the same subsets.

5.6 Results

5.6.1 Qualitative findings

The following perceived reasons for home delivery, grouped by key topics, emerged from the qualitative data set.

Lack of Money

A majority of women, from nearly all villages, reported that they give birth at home due to lack of money to pay for delivery kits, fare and food. Home delivery cost was said not to exceed six hundred Tanzanian shillings (roughly \$ 0.5) for gloves and a razor blade. In some private hospitals they had to pay about five thousand Tanzanian shillings (equivalent to \$ 4). Some health facilities were thought not to discharge women with no money until their debts were paid. When cash was not available for delivery at the health facility, the options were to borrow money from relatives or friends, to sell land or produce, casual labour, and to offer a valuable object such as bicycles to someone in exchange for a temporary loan and reclaim it after returning the money. Availability of cash for transport was an important influence on whether health facility delivery was sought. This was substantiated by the quantitative data showing wealth quintiles as predictors of home births (see below). The following typical statements were recorded:

“There was no reason for me to pay for a bed at a health facility while I could give birth for free at home” (Indepth-interview, Chikonji).

“I heard from the radio that delivery services for the government health facilities are free of charge but when I went to the health facility for delivery I was asked to buy everything, even a Panadol, so what services are considered to be free of charge?” (A mother of a neonate, Maundo)

“Women who go to deliver at health facilities usually should have money to buy gloves, food and transport while those who deliver at home need thread and a razor only” (Indepth-interview with MT, Chikonji)

“I spent about four thousand shillings to buy gloves, food, and I had to pay for my transport. I used normal transport and I paid one thousand shillings, otherwise I could pay up to twenty thousand shillings for hiring a car. I couldn’t manage to eat good food at hospital, so I spent less money on food; one thousand and five hundred shillings.” (FGD-Chikonji)

Lack of Transport

Lack of transport was reported in all villages as a contributing factor for home delivery. In most rural areas, public transport is the only means available and services can be irregular. For example, it was reported in one of the in-depth interviews that public transport was only available at 5 am.

“If you don’t own a bicycle, you should prepare to give birth at home”. (FGD, Nahukahuka). Other FGD groups made the same comment.

“I decided to give birth at home because of the lack of reliable transport to the nearby health facility, two hours walking distance. It is so dangerous to cross the forest at night; there are wild animals such as lions” (A mother of a neonate from Nahukahuka village).

“Sometime, one can be referred to the big hospital during labour, but lack of transport can force the mother to deliver at home, lose a baby or die” (FGD-Mtakuja)

Sudden onset of labour or short labour

Another factor that influenced the choice of place of delivery was sudden onset of labour or short labour. This was mentioned in almost all of villages. Health facility delivery was perceived to be desirable for prolonged labour.

“When a woman experiences sudden onset of labour she usually gives birth at home. Those who have given birth before usually give birth at home” (A mother of a neonate from Maundo village).

Staff attitude

Health system factors such as staff attitudes also had an impact on the choice of place of delivery. Poor staff attitude was perceived to exist in most health facilities; including abusive language, denying women service, lacking compassion, and refusing to assist properly.

“During my last few days before I delivered, I went to the clinic, the midwife advised me to go to the district hospital because the child was too big. The midwife threatened me that I would die if I didn’t go to the hospital. Are these words good to tell someone who is pregnant like me?”

(An in-depth interview, Maundo village)

Another experience from an in-depth interview with a mother who had given birth recently, gave a clear picture of a provider-client relationship.

“When I went for ANC (mobile clinic in the village) in the 9th month of my pregnancy, the health worker (nurse) instructed us that she would start with those who came to report their pregnancy for the first time, followed by those who had just delivered, and then with those who are in their last months of pregnancies. She called my name three times, but I couldn’t hear because I was outside. She stopped other women who wanted to call me from outside, and instead, she decided to throw my card under a scrap milling machine which is in the same building where we get clinic services. I went inside after been told about this by other women, and she said I would either be the last to be attended, or be obliged to go to the health facility the next day. At the end of the day, she told me to come to the health facility next Tuesday. When I asked her what the reason was, she replied that she was tired. Imagine, I stayed hungry for the whole day, my children hadn’t eaten. I didn’t understand that it was a crime for not

hearing my name. I left with sorrow, and ended up crying at home. I walked to the health facility on Tuesday as instructed, but I was told there was preparation for laboratory day ceremony (special day in the health facility organised for emphasizing importance of clinic diagnostic), I went back and delivered at home the day after". (In-depth interview with mother of neonate, Nahukahuka village).

In general, woman's expectation of the choice of place of delivery was influenced by a positive attitude of staff at the health facility.

"When I went to the health facility (X) for delivery, I was impressed by the midwife who cared for me so much. She was so human, polite and sympathetic" (In-depth interview, Maundo)

Lack of privacy

Lack of privacy in some of the health facilities was also mentioned as a contributing factor for home delivery. Sometimes, older woman give birth at home to avoid contact with younger midwives at the health facility, who they think of as their children. Some young women also do not deliver at health facilities because of the presence of male health workers during delivery.

"Some health facilities have no special room for delivery; the room is small and all treatment for both men and women are taking place in the same

room; you can easily be seen while giving birth” (a mother of a neonate, Kilimahewa village).

Traditional beliefs and culture

A long labour was also mentioned as a contributing factor for home delivery. It is perceived that long labour may be caused by extramarital affairs during pregnancy (*nunumalila*). The only remedy is for the woman to confess and mention, while in labour, all the men she has slept with during her pregnancy. The woman would then drink some water, and wait and see if she can deliver safely. It is believed that traditional birth attendants, or others assisting the delivery, are compelled to hold the secret. It would not be possible to keep this secret at a health facility, although health facility delivery would be sought after failure of home delivery. Some participants mentioned that this tradition is one of the causes of misunderstanding between husband and wife, and has led to many marriage breakdowns. This tradition was reported from most of our study villages but in some places it was said to be disappearing.

“One of the reasons for home delivery is to keep the secret. If it is a woman’s time for delivery and the child doesn’t come out, a woman would be asked to mention all men who she has slept with apart from her husband; she would then be given some water to drink and then she mention that I have slept with so and so..., please my baby come out. She then drinks some water again; and if God wishes, she would deliver her

baby safely otherwise, she would be taken to the hospital for major operation. It is the responsibility for all who participated in that delivery process to keep the secret” (FGD, Hingawali)

Decision-making

The majority of women who delivered at health facilities did not do so because they wished to, but were persuaded by a nurse, spouse, parents, or grandmothers. The major reason given for why they were reluctant to make their own decision was lack of money.

“When I went to the clinic in the last month of my pregnancy, the nurse advised me to go to the district hospital because the child was so big. I went to inform my husband and he agreed. It is my husband who decides the place of delivery because he has money” (An in-depth interview, Maundo village).

“My last child was born at the health facility because my parents wanted me to deliver at health facility. I couldn’t decide on my own because I had no money” (FGD, Nahukahuka village).

The decision for place of delivery was also influenced by the availability of a caregiver, regardless of the distance involved.

“I was advised by nurse to go to the district hospital but decided to go to the regional hospital, because I had a relative who lives near the regional hospital” (FGD, Maundo village)

These findings corroborate the result of the quantitative work that women from female headed-households were more likely to deliver in health facilities (see below)

Quality of services

The choice of place of delivery was not only determined by income. Quality of services was perceived to play a major role in choice of place of delivery. Although some government health facilities were equally close to where a majority of women lived, and were free of charge, some women decided to go to more distant private health facilities, despite the user charges involved. In some FGDs, the participants said that they were asked to bring water to clean the labour ward after delivery. Quality of services provided directed most women's choices.

“I decided to deliver in that private health facility (X) because they provide good services. They are empathetic and can solve any problem; they have a car and can probably take you to the next level of services if need arises. In addition they don't ask you to bring water” (FGD, Mtakuja village).

Carelessness and lack of education

Carelessness and lack of education were also perceived to be factors for home delivery. These reasons were mentioned in some focus group discussion sessions.

“...Lack of education is another factor for home delivery. Some expectant mothers can just stick to their decision regardless of their condition”

(Indepth-interview, Mnolela).

Again, this ties in with quantitative findings as shown below.

What needs to be done?

Mothers were asked to make their own suggestion concerning improvements of delivery services. The following suggestions were put forward;

“Please, remind all health workers, especially nurses, that they deal with fellow women; we can’t respect them unless they treat us well too; if they love us we will respect them” (Indepth interview, Nahukahuka village).

Besides qualitative results as shown above, demographic and socio-economic status and place of delivery were also looked at quantitatively and results are presented below.

Table 5.1: Factors associated with place of delivery in Lindi and Mtwara

Group	Predictor	Category	Home	%	Health Facility	%	Unadjusted			Adjusted		
							RR	CI	P-value	RR	CI	P-value
Demographic	Ethnic group	Makonde	2353	62	1359	38	1		<0.001	1		<0.001
		Mwera	2197	57	1575	43	1.14	1.08-1.20		1.18	1.08-1.29	
		Yao	199	43	235	57	1.48	1.34- 1.63		1.54	1.38-1.72	
		Others	567	48	666	52	1.48	1.38-1.58		1.48	1.33-1.65	
				5316	58	3835	42					
	Gender of HH	Female	975	53	874	47	1		0.001	1		<0.001
		Male	4337	59	2959	41	0.86	0.81-0.91		0.8	0.75-0.85	
				5312	58	3833	42					
	Mothers' education	None	1730	64	937	36	1		<0.001	1		<0.001
		Some Education	811	59	555	41	1.16	1.06-1.26		1.13	1.03-1.24	
		Primary +	2773	55	2341	45	1.30	1.23-1.38		1.29	1.20-1.38	
				5314	58	3833	42					
	Mother's age at child birth	15-19	1151	54	1017	46	1		0.005	1		<0.001
		20-24	1431	57	1022	43	0.89	0.83-0.95		0.88	0.82-0.93	
		25-29	1149	61	740	39	0.84	0.78-0.89		0.81	0.75-0.87	
30-34		758	59	534	41	0.88	0.81-0.95		0.85	0.78-0.93		
35-49		828	60	522	40	0.82	0.76-0.89		0.81	0.74-0.88		
			5317	58	3835	42						
SES	Wealth Quintiles	Poorest	1012	63	634	37	1.07	1.05-1.10	<0.001*	1.08	1.06-1.10	<0.001*
		Very poor	1219	61	762	39						
		Poor	905	59	620	41						
		Less poor	1183	61	772	39						
		Least poor	940	49	992	51						
			5259	58	3780	42						

*X² test for linear trend

5.6.2 Quantitative findings

We visited 21,482 households representing 99% of the 21,600 households expected. Nearly all heads of household were present during the survey (20,985/21,482, 98%). Only 91/21,985 (0.004%) of the heads of household refused to take part. Out of 20,138 women of reproductive age (15-49) visited, 19,008 (94%) were interviewed. Data were available for 9,152 women who had delivered in the three years prior to survey. For their most recent births 5,317 (58%) delivered at home, and 3,835 (42%) at health facility.

Table 5.1 presents the predictors of place of delivery. In univariate analysis comparing home and health facility deliveries, differences between subgroups reached statistical significance ($p < 0.05$) for all variables considered (ethnicity, gender of the household head, mothers education, mothers age at the time of child birth, and wealth quintiles).

There was variation between ethnic groups with respect to place of delivery ($p < 0.0001$), with the Yao being more likely to deliver at health facility than the Makonde or Mwera [RR 1.48, 95% CI 1.34-1.63]. Women who lived in male headed household were less likely to deliver in a health facility [RR 0.86, 95% CI 0.8-0.91]. Mothers with primary and higher education were more likely to deliver at health facility than mothers with no education [RR 1.30, 95% CI 1.23-1.38]. Younger mothers were more likely to deliver at health facility compared to other age groups (RR 0.89, 95% CI 0.83-0.95). The least poor women were more

likely to deliver in health facility compared to the poorest with a 7% increase in the risk of delivering in health facility for every increase in wealth quintile [RR 1.07, 95% CI 1.03-1.43].

The results of the multivariate analysis are shown in table 1. Using a generalized linear regression model, all variables (ethnicity, gender of the household head, mother's education, mother's age at the time of child birth, wealth quintile) remained independently associated with place of delivery. There was no evidence of two-way interaction between the variables. Risk ratio coefficients were similar in adjusted and unadjusted models, and thus there was little evidence of confounding.

5.7 Discussion

We have quantitatively and qualitatively documented the delivery patterns and the characteristics of mothers having home or health facility deliveries in five districts of southern Tanzania. Moreover, by combining quantitative and qualitative methods, weight has been added to various issues related to health care utilization and place of delivery. The qualitative findings of this study provide important preliminary insights into the combination of factors shaping the choice of delivery place. Although Bolam *et al.* (1998) working in Nepal pointed out that economic factors were of little importance, we found that lack of money was a major factor for home delivery. Availability of cash for transport was noted as an important factor on whether health facility delivery is sought.

Other factors biasing decisions towards home deliveries included sudden onset of labour or short labour. Health facility delivery was perceived to be desirable for prolonged labour. This means that there is a need to ensure a high level of awareness amongst expectant women to address the importance of planned delivery. On the other hand, the use of abusive language and lack of income, as barriers to delivery at health facilities (Borghi *et al.* 2006; Koblinsky *et al.* 2006; National Bureau of Statistics & Macro International Inc. 2005; Amooti-Kaguna & Nuwaha 2000; Bolam *et al.* 1998; D'Ambruoso *et al.* 2005 & Brieger *et al.* 1994).

Other factors biasing decisions towards home deliveries included sudden onset of labour or short labour. Health facility delivery was perceived to be desirable for prolonged labour. Similar results are documented in a study conducted in rural Cambodia, where prolonged labour was one of the strongest determinants of birth attendant change, with those experiencing prolonged labour being 12 times likely to change birth attendants than those who did not (Yanagisawa *et al.* 2006). This means that there is a need to ensure a high level of awareness amongst expectant women to address the importance of planned delivery. On the other hand, the use of abusive language and lack of tolerance by the health workers were felt to be discouraging the use of health facilities for delivery. Similar experiences have been documented (D'Ambruoso *et al.* 2005), for instance, in Ghana where women had been shown to change their place of delivery, and recommend the same to others when they experience degrading and unacceptable behaviour. Staff attitudes was therefore one of the

components of care which appeared to be of great importance to women in deciding where to deliver. In addition, lack of privacy in some health facilities was also mentioned as a contributing factor for home delivery.

Hodnett *et al.* (2004) and Roosmalen *et al.* (2005) have shown that continuous supportive care during childbirth especially when the caregiver is not a member of the hospital staff has been shown to be evidence based strategy to improve the outcome of labour. Roosmalen *et al.* (2005) has shown that in many of the delivery rooms of health facilities in sub-Saharan Africa and Asia, pregnant woman in labour are generally not allowed to bring a relative with them into the labour ward to give continuous support. In his observation study in Tanzania, the author was dissatisfied with child birth experience as women in labor lay in bed in complete isolation in pain without a continuous support.

This study has also shown that there are other social-cultural factors and decision-making practices within the household that need to be addressed to improve maternal health services. Our study concurred with others. In Nigeria for instance, (Brieger *et al.* 1994) showed that despite adequate local provision of maternity services, 65% of women still delivered at home. The authors pointed out that this was mainly due to fees for delivery services, level of income, cultural beliefs and education. In Uganda, access to maternity services was one of the influencing factors in choosing the place of delivery (Amooti-Kaguna & Nuwaha 2000). The provision of relatively accessible services did not guarantee their use,

and that other social and cultural considerations governed the decision-making. Ensor & Cooper (2004) mentioned important barriers such as financials, geographical, cultural and, combined with inadequate quality of care within the formal health sector which affect demand for care-care seeking and serve to discourage service use.

Quality of services was perceived to play a major role in choice of place of delivery. For example, some women decided to go to private health facilities, where they had to pay, despite government health facilities with free delivery services being closer to their homes. This decision to pay for services was associated with perceived good quality of care, and the presence of relatives available for post-delivery assistance. The study also provides evidence that women's decisions about the place of delivery are not only determined by the risk associated with pregnancy but also with combination of factors such as household income and quality of service. This suggests that improving women's access to income might strengthen their bargaining power to influence place and timing of delivery. In addition, advice from the partner, nurse, and parents, emerged as important in influencing the place of delivery. Consequently, any measure aimed at encouraging women to deliver in health facilities will have to involve people who influence their decisions if they are to be successful. Although women carry the major share of the responsibility for the well-being of the household in most societies (Tanner & Vlassoff 1998), this responsibility is rarely matched by the autonomy to make decisions, or by access to the

necessary resources. Women may have to ask permission from others (husband, mothers-in-law, and senior household males) before being permitted to seek care. Urassa *et al.* (1997) showed that for the majority of women, the decision about the place of delivery was made by a nurse. However, when the woman developed complications, the decision on where to take her was made by the mother or husband.

We have also shown that ethnicity, gender of the household head, mother's education, mother's age at child birth, and socio-economic status were important independent factors in determining the choice of delivery place. Our results are in line with other studies conducted in Tanzania, and other parts of the world. For example, Tanzania's Demographic and Health Survey also indicated that a mother's education is strongly related to place of delivery. The proportion of births delivered at health facilities increased from 29% among mothers with no education to 79% among mothers with a secondary or higher education (National Bureau of Statistics & Macro International Inc. 2005). In Nepal, maternal education was among the important independent factors in determining the place of delivery (Bolam *et al.* 1998). Yanagisawa *et al.* (2006) also documented that woman who had at least seven years of school attendance being six times more likely to deliver babies at a health facility than those who did not attend.

Demographic features, wealth quintiles, and socio-cultural factors play a major role in the choice of place of delivery. Limited access in rural areas, mainly

caused by lack of money and long distances to health care facilities, is a particularly problem. Moreover, midwife-assisted home births could possibly improve the safety of the mother and the newborn. Finally, promoting female education, especially primary and higher education, as well as continued health education, will lead to sustainable safer motherhood practices.

Campbell & Graham (2006); Koblinsky *et al.* (2006) & Borghi *et al.* (2006) provides best practices for maternal health. In these series, authors assessed pros and cons of different interventions for maternal health and the newborns. Policy makers should therefore decide which approach best suits their local situation, especially on the most vulnerable groups, in the rural areas.

Although this study was carried out in five rural districts for the quantitative data and two districts for qualitative data, the findings may be generally applicable to other rural areas of Tanzania. Nevertheless, local variations must be considered when interpreting findings for areas outside these study districts. The study has advantage of combining both qualitative and quantitative methods, with corroborative findings on the influence of socio-economic status, the gender of the household head, and maternal education on the place of delivery. The gender framework model revealed interesting findings from the client's point of view. Further studies will need to look at the provider (health worker) perspective. The findings provide new information for policy-makers responsible for maternal care and child health in low-income settings.

Concluding, the present study has identified important factors influencing the choice of place of delivery in rural Tanzania. The information will assist in planning interventions focused on reducing neonatal mortality with short and long term perspectives. The key issues for sustainable effects are increasing information available for women at village level and in the long run trying to raise the level of women's education accompanied by the provision of a suitable and effective health care delivery system.

5.8 Competing interests

The authors declare no conflict of interest concerning the work reported in this paper.

5.9 Authors' contribution

MM, JAS, DS and MT devised the study design and objectives. MM, JAS, AKM and DS contributed to data collection, analysis and interpretation. MM drafted the paper, did the data analysis and wrote the draft manuscript. BO and HM provided technical support. All authors read, commented on and approved the final manuscript.

5.10 Acknowledgment

We thank our many local collaborators especially the Council Health Management teams of Newala, Tandahimba, Lindi Rural, Nachingwea and Ruangwa. We are grateful to the Ifakara Health Research and Development

Centre for their invaluable contribution in supporting data collection and processing. We would also like to express our grateful and thanks to Albert Majura and Ntaru Robert Wa-shija who were involved in qualitative data collection process. Special thanks also go to Fatuma Manzi, Kizito Shirima, Shekha Nasser and Adeline Herman for mutual support during the whole period of this study. Lastly but not least we would also like to thanks Daniel Anderegg for editing the manuscript. We also thank all mothers and children of Lindi and Mtwara for their participation in the study. The work reported here received financial support from the Bill and Melinda Gates Foundation.

5.11 References

- Ackermann-Liebrich U. Vogeli T. Gunter-Witt K. Kunz I. Zullig M. Schindler C. & Maurer, M. (1996). "Zurich study team: Home versus hospital deliveries: Follow-up study of matched pairs for procedures and outcomes." *BMJ* **313**: 1313-1318.
- Amooti-Kaguna B. & Nuwaha, F. (2000). "Factors influencing choice of delivery sites in Rakai district of Uganda." *Social Science & Medicine* **50**: 203-213.
- Bicego G. et al. (1995). Survey on adult and Childhood Mortality, Tanzania, Macro International, Calverton, MD.
- Bolam A. Manandhar DS. Shrestha P. Elis M. Malla K. & Costello, A. (1998). "Factors affecting home delivery in the Kathmandu Valley, Nepal." *Health Policy and Planning* **13** (2): 152-158.
- Borghi J. Ensor T. Somanathan A. Lissner C. Mills A. & The Lancet Maternal Survival Series steering group (2006). "Maternal Survival 4: Mobilising financial resources for maternal health." *Lancet* **368**: 1457-65.
- Brieger WR. Luchock KJ. Eng E. & Earp, J. (1994). "Use of maternity services by pregnant women in small Nigerian Community." *Health Care Women Int.* **15** (2): 101-10.
- Campbell OMR. Graham WJ. & The Lancet Maternal Survival Series steering group (2006). "Maternal survival 2: Strategies for reducing maternal mortality: getting on with what works." *Lancet* **368**: 1284-99.
- Campbell R. & MacFarlane, A. (1986). "Place of Delivery: A review. *BJOG*." **93**: 675-683.
- D'Ambruoso L. Abbey M. & Hussein, J. (2005). "Please understand when I cry out in pain: women's accounts of maternity services during labour and delivery in Ghana." *BMC Public Health* **5**: 140.
- Dawson S. Manderson L. & Tallo, V. (1993). "A manual for the use of focus groups, Boston."
- Elo IT (1992). "Utilization of Maternal Health-Care service in Peru: The Roles of women's education." *Health Transit. Rev.* **2**: 49-69.
- Ensor T. & Cooper S (2004). "Overcoming barriers to health service access: influencing the demand side." *Health Policy and Plan* **19**: 69-79.
- Filmer D. & Pritchett, L. (2001). "Estimating Wealth Effects Without Expenditure Data- Or Tears: An Application to Educational Enrollments in States of India." *Demography* **38**(1): 115-132.
- Ganer P. Lai D. Baea, M. (1994). "Childbirth in Rural areas: Maternal deaths, village deliveries and obstetric service use." *PNG Med J* **37**(3): 166-72.
- Hitimana-Lukanika (1988). Acceptability of immunization in a rural community of Kabaale district, Uganda. *A dissertation for a Diploma in Public Health*, Makerere University, Kampala, Uganda.
- Hodgkin D (1996). "Household characteristics affecting where mothers deliver in rural Kenya." *Health Econ* **5**: 333-340.

- Hodnett ED, Gates S, Hofmeiyr GJ, & Sakala C (2004). "Continuous support for women during childbirth (Cochrane Review). In: the Cochrane Library, Issue 3 John Wiley & Sons, Ltd, Chichester, UK."
- Koblinsky, M., Matthews, Z, Hussein, J, Mavalankar, D, Mritha, M.K, Anwar, I, Achad, E, Adjei, S, Padmanabhan, P, Lerberghe, W.V. & The Lancet Maternal Survival Series steering group. (2006). "Maternal Survival 3: Going to scale with professional skilled care." *Lancet* **368**: 1377-86.
- Lawn J, Cousens S, & Zupan, J. (2005). "4 million neonatal deaths: When? Where? Why?" *Lancet* **365**: 891-900.
- Lugina H, Mlay R, & Smith, H. (2004). "Mobility and Maternal position during childbirth in Tanzania: an exploratory study at four government hospitals." *BMC, Pregnancy and Childbirth* **4**: 3.
- Ministry of Health. (MOH) (2005). Fact Sheet on Cost Sharing in Tanzania. Fact Sheet number 1.
- Mosha F, Winani S, Wood S, Changulacha J, & Ngasala B (2005). "Evaluation of the effectiveness of a clean delivery kit intervention in preventing cord infection and puerperal sepsis in Mwanza, Tanzania." *Tanzania Health Res Bull.* **7**(3): 185-8.
- Munaaba E (1995). Factors which influence mother's choice of location of child birth in Pallisa District, Uganda. *A dissertation for Master Degree in Public Health*, Makerere University, Kampala, Uganda.
- National Bureau of Statistics & Macro International Inc. (2005). Tanzania Demographic and Health Survey; Key findings. National Bureau of Statistics Dar es Salaam, Tanzania, United Republic of Tanzania, ORC Macro Calverton, Maryland, USA.
- NBS (2004). 2002 Population and Housing Census: Regional Profiles, Dar es Salaam: Government of Tanzania. Available at: <http://www.tanzania.go.tz/census>.
- Nwakoby BN (1994). "Use of obstetric services in rural Nigeria." *J R Soc Health* **114**: 132-136.
- Otim-Adoi JP (1981). Knowledge, Attitude and Practices of mothers in Lira District toward institution delivery. *A dissertation for a Diploma in Public Health*, Makerere University, Kampala, Uganda.
- QSR (2002). Introducing NVivo: A workshop handbook. QSR international Property Ltd.
- Rathgeber E, & Vlassoff, C. (1993). "Gender and Tropical diseases: a new research focus." *Social Science & Medicine* **37**: 473.
- Roosmalen JV, Walraven G, Stekelenburg J, & Massawe, S. (2005). "Editorial: Intergrating continuous support of the traditional birth attendant into obstetric care by skilled midwives and doctors: cost-effective strategy to reduce perinatal mortality and unnecessary obstetric interventions." *Tropical Medicine and International Health* **10**(5): 393-394.
- Shirima K, Mukasa O, Armstrong Schellenberg J, Manzi F, John D, Mushi A, Mrisho M, Tanner M, Mshinda H and Schellenberg D. The use of Personal Digital Assistants for Data Entry at the Point of Collection in a Large

- Household Survey In Southern Tanzania. *Emerging Themes in Epidemiology*, 2007 **4**:5 (1 June).
- Sorensen HT. Steffensen FH. Rothman KJ. Gillman MW. Fisher P. Sabroe S. & Olsen, J. (2000). "Effect of home and hospital delivery on Long term cognitive function." *Epidemiology* **11**: 706-708.
- Stata (2003). Stata 8. Stata Statistical Software: Release 8. Collage Station, TX: Stata Corporation.
- Tanner M. & Vlassof, C. (1998). "Treatment-Seeking Behaviour for Malaria: A Typology Based on Endemicity and Gender." *Social Science & Medicine* **46**(4-5): 523-532.
- Urassa E. Massawe S. Lindmark G. & Nyström, L. (1997). "Operational factors affecting maternal mortality in Tanzania." *Health Policy and Planning* **12** (1): 50-57.
- Wagle, R. R., Sabroe, S. & Nielsen, B.B. (2004). "Socioeconomic and physical distance to the maternity hospital as predictors for place of delivery: an observation study from Nepal." *BMC Pregnancy and Childbirth* **4**: 8.
- Walraven GE. Mkanje RJ. Roosmalen J, van Dongen PW, Dolmans WM. (1995). "Perinatal mortality in home births in rural Tanzania." *Eur J Obstet Gynecol Reprod Biol.* **58**(2): 131-4.
- Yanagisawa S. Oum S. & Wakai S (2006). "Determinants of skilled birth attendance in rural Cambodia." *Tropical Medicine and International Health* **11**(2): 238-251.

CHAPTER 6

The use of antenatal and postnatal care: perspectives and experiences of women and health care providers in rural southern Tanzania



Fieldwork

Chapter 6: The use of antenatal and postnatal care: perspectives and experiences of women and health care providers in rural southern Tanzania

Mwifadhi Mrisho^{1,4§}, Brigit Obrist,⁴ Joanna Armstrong Schellenberg,^{1,3} Rachel A. Haws⁵, Adiel K. Mushi^{2,3}, Hassan Mshinda,¹ Marcel Tanner⁴ and David Schellenberg^{1, 3}

1. Ifakara Health Institute [IHI] (formerly, Ifakara Health Research and Development Centre), P.O. Box 78373, Dar es Salaam, Tanzania
2. National Institute for Medical Research - Amani Centre, P.O. Box 81, Muheza Tanzania
3. London School of Hygiene and Tropical Medicine, London, UK
4. Swiss Tropical Institute, Basel, Switzerland
5. Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

§Corresponding author:

6.1 Abstract:

Background

Although antenatal care coverage in Tanzania is high, worrying gaps exist in terms of its quality and ability to prevent, diagnose or treat complications. Moreover, much less is known about the utilisation of postnatal care, by which we mean the care of mother and baby that begins one hour after the delivery until six weeks after childbirth. We describe the perspectives and experiences of women and health care providers on the use of antenatal and postnatal services.

Methods:

From March 2007 to January 2008, we conducted in-depth interviews with health care providers and village based informants in 8 villages of Lindi Rural and Tandahimba districts in southern Tanzania. Eight focus group discussions were also conducted with women who had babies younger than one year and pregnant women. The discussion guide included information about timing of antenatal and postnatal services, perceptions of the rationale and importance of antenatal and postnatal care, barriers to utilisation and suggestions for improvement.

Results:

Women were generally positive about both antenatal and postnatal care. Among common reasons mentioned for late initiation of antenatal care was to avoid having to make several visits to the clinic. Other concerns included fear of

encountering wild animals on the way to the clinic as well as lack of money. Fear of caesarean section was reported as a factor hindering intrapartum care-seeking from hospitals. Despite the perceived benefits of postnatal care for children, there was a total lack of postnatal care for the mothers. Shortages of staff, equipment and supplies were common complaints in the community.

Conclusion:

Efforts to improve antenatal and postnatal care should focus on addressing geographical and economic access while striving to make services more culturally sensitive. Antenatal and postnatal care can offer important opportunities for linking the health system and the community by encouraging women to deliver with a skilled attendant. Addressing staff shortages through expanding training opportunities and incentives to health care providers and developing postnatal care guidelines are key steps to improve maternal and newborn health.

6.2 Background

Improving maternal and newborn health requires strengthening existing interventions such as antenatal care (ANC) and postnatal care (PNC) (Table 1), which deliver packages of evidence-based interventions including tetanus toxoid immunization, syphilis screening and treatment, and malaria prophylaxis. In developed countries, 97% of women make at least one antenatal visit; 99% deliver with a skilled attendant; and 90% make at least one postnatal visit [1]. In

developing countries coverage of at least one ANC visit is relatively high at 69% in Sub-Saharan Africa, compared to 54% in Asia [2]. According to Demographic and Health Survey (DHS) data from 23 African countries, two-thirds of women in Sub-Saharan Africa give birth at home, but only 13% of all patients receive a postnatal visit within two days [3]. Although attendance at ANC is encouraging, worrying gaps exist in provision, and coverage statistics are usually based on women who have only one ANC visit, whereas four visits are recommended, and ANC quality varies ([4], [5], [6]). Much less is known about the utilisation of PNC, the importance of which has recently been emphasized [4].

Most maternal deaths occur during labour, delivery or the first 24 hours postpartum, and most intrapartum complications cannot be reliably predicted or prevented, though most can be successfully treated with prompt and appropriate diagnosis and care ([7], [8]). The neonatal period is only 28 days but accounts for 38% of all deaths in children younger than 5 years [9]. ANC and PNC have the potential to contribute to reducing maternal and child morbidity and mortality ([10], [11], [12], [13]). The World Health Organisation (WHO) has been strongly advocating improvements of maternal health services as part of its Safe Motherhood Initiative (SMI). Regular antenatal care has long been viewed as important for identifying women at increased risk of adverse pregnancy outcomes and for establishing good relations between the women and their health care providers [14]. The study conducted in India reported that women who had received a high level of antenatal care were about four times as likely to use

skilled assistance at delivery compared to women who received low levels of antenatal care [15].

However, poor quality of routine ANC has been documented in terms of its ability to prevent, diagnose or treat complications [10]. Recent studies have challenged the potential of ANC to reduce maternal mortality ([7], [16]). Both quality and coverage are essential to maximise impact. Impediments to the effective delivery of ANC and PNC include geographical, financial and cultural barriers ([17], [18], [19], [20]). An estimated seven out of every ten women who do not give birth in a facility are not currently receiving PNC [4]. Policies and programs have largely overlooked this critical period, hindering efforts to meet the Millennium Development Goals (MDGs) for maternal and child survival [21].

In Tanzania, where this study was conducted, 94% of women make at least one antenatal visit, but less than half give birth with a skilled attendant [22]. Since 2002 the Tanzania Ministry of Health and Social Welfare (TMoHSW) has promoted the four-visit focused ANC approach ([23], [24]). Although pregnant women are advised to start attending ANC before the 16th week of gestation, and services are free, more than eight in ten women initiate ANC late [22].

Table 6.1: Components of antenatal and postnatal care

Routine Antenatal Care

- Focused ANC Visits and referral: 1st visit: before 16 weeks of gestation, 2nd visit: from 20 to 24 weeks of gestation, 3rd visit: from 28 to 32 weeks of gestation & 4th visit: from 36 to 40 weeks of gestation, referral and follow-up should be given to pregnant women with complications.
- Early detection and diagnosis of disease/abnormality i.e. quick check, history taking, physical examination, laboratory investigation & decision making.
- At least 2 doses of tetanus toxoid vaccination
- Screening and management of pre-eclampsia
- Counseling on health promotion: Intermittent preventive treatment for malaria in pregnancy, insecticide treated bed nets, personal hygiene, diet and nutrition, danger signs
- Prevention of mother-to-child transmission (PMTCT) of Human Immunodeficiency Virus (HIV)
- Birth and emergency preparedness: Identify place of birth, preparing essential items, identify at least two blood donors, prepare fund for transport, identify decision maker family members

Routine postnatal care

- For the mother: Promotion of healthy behaviours, danger sign recognition and family planning
- For the baby: Promotion of healthy behaviours – hygiene, warmth, breastfeeding, danger sign recognition and provision of eye prophylaxis and immunisations according to local policy
- Extra care for low birth weight babies or babies born to HIV-positive mothers and babies with other special needs.

Adapted from Lawn, J., Kerber, K., 2006. Opportunity for Africa's Newborns: Practical data, policy and programmatic support for newborn care in Africa. Eds. PMNCH. Cape Town and Focused antenatal care malaria and syphilis in pregnancy: Learner's Guide for ANC Service Providers and Supervisors. Tanzania Ministry of Health and Social Welfare (TMOHSW) & ACCESS-JHPIEGO/USAID (Draft - April 2008).

The postnatal period (or called postpartum, if in reference to the mother only) is defined by the WHO as the period beginning one hour after the delivery of the placenta and continuing until six weeks (42 days) after the birth of an infant [25]. Care during this period is critical for the health and survival of both the mother and the newborn [3]. The 2004-5 Tanzania Demographic and Health Survey (TDHS) data reports that only 13% of women have one or more postpartum care

visit within two days of delivery as recommended, with rates as low as 2% in some regions [22]. Currently, there are no guidelines for postnatal care. The Reproductive and Child Health Section (RCHS) of the Ministry of Health and Social Welfare [Tanzania] is in the process of developing new PNC guidelines to be used country-wide [personal communication with Dr Georgina Msemo, the focal point for neonates, 5th May 2008].

ANC and PNC services are key health interventions for reducing maternal and newborn morbidity and mortality. Although the current rate of ANC uptake is encouraging, detailed information about the actual quality and effectiveness of ANC in practice is scant ([10], [26]). This is largely because the packages vary so much from place to place in terms of components, timing, frequency of visits, and provider [27]. Similarly, little evidence is available for the packaging of interventions for routine PNC for mother and newborn ([4], [27], [28]). Improvement in ANC and PNC can potentially reduce maternal and newborn mortality, which remain relatively high in the study area ([22], [29]) Here we describe the perspectives and experiences of women and health care providers with regard to use of ANC and PNC in order to identify opportunities for improving maternal and newborn health services.

6.3 Methodology

6.3.1 Study area

The study was conducted in Lindi Rural and Tandahimba Districts in southern Tanzania, a study area that has been described in detail elsewhere ([30], [31]). In brief, these areas have a total population of about 300,000 people [32]. Lindi Rural has highland areas as well as low-lying plains with major permanent rivers (Lukuledi, Matandu and Mavuji). There are two main rainy seasons, November to December and February to May. The area has a wide mix of ethnic groups, most common being Yao, Makonde, Mwera and Matumbi. These groups frequently intermarry and are predominantly Muslim. Health services are delivered by the public health system consist of a network of dispensaries, health centers and hospitals offering varying quality of care. There are also a few private not-for-profit dispensaries and hospitals run by Christian mission organisations. Routine immunisation is the basis of the EPI activities. On a regular basis vaccines for measles, diphtheria, pertussis, tetanus, polio and tuberculosis, are provided in health facilities all over the country. Vaccinations are given in static, out-reach, and mobile health facilities. The immunisation schedule including the above vaccines stretches over the child's first year and tetanus vaccination is given to women of childbearing age [33]. In Lindi and Mtwara regions, the proportion of heads of household and women of reproductive age (15-49 years) with no education was 35% and 27% respectively. Thirty-eight percent of a representative sample of 19,007 women aged 15-49 years interviewed in July and August 2004 had experienced the loss of at least one child [34].

6.3.2 Methods

Data was collected within a framework of ethnographic fieldwork for a larger project assessing community acceptability of intermittent preventive treatment for malaria in infants during March and April 2007. Follow-up data collection was carried out during January 2008. Using a network of female village based informants (VBI) in 8 villages of Lindi Rural and Tandahimba districts ([30], [31]), we conducted a series of in-depth interviews (N=16; N=8 with VBI, N=8 with health care providers (HCP)) and focus group discussions (FGD; N=8).

Each FGD was conducted in groups of 6 to 8 women with babies aged less than one year of age as well as pregnant women with similar backgrounds and experiences [35]. Both in-depth interviews and FGD were intended to gather information about the timing and perceived reasons for ANC and PNC; services available in ANC and PNC; perceptions about the importance of ANC and PNC; home births and barriers to ANC and PNC; and lastly, suggestions on how to improve ANC and PNC (see Table 6.2). The FGD generally took place at the VBI's home. Before the FGD, the moderator introduced all participants, explained the general topics of discussion and encouraged all participants to contribute their ideas. An experienced moderator led the discussions with support from a note-taker, with both taking notes. The FGDs were recorded using an MP3 voice recorder. After the FGD, the note-taker and the moderator reviewed their handwritten notes. After revision of notes, the transcripts were typed and exported to NVivo 2 [36] qualitative data analysis software for analysis. Our

major key themes emerged as a result of the interview guide (shown in Table 6.2 below) and the coded transcripts from the FGDs and in-depth interview.

We obtained informed consent verbally at the start of each interview or FGD. Most health care providers were not willing to be recorded, but gave their consent to be interviewed. In these cases, only written notes were analysed. Confidentiality of all study participants was assured and village names have been encoded in this manuscript. Almost all women who participated in FGD and in-depth interviews were aged between 15-42 years old and had completed at least primary school education.

Table 6.2: Questions included in the topic guide used during FGDs and in-depth interviews with women and health care providers in Lindi rural and Tandahimba districts.

ANC

1. How early do women go for ANC? Why do they go at that time? (In what month of pregnancy? Why earlier or later?)
2. How often do they go to ANC? Why do they go at that time?
3. What kinds of services do they receive in ANC?
4. Do women think ANC helps their pregnancy?
5. How important do women seem to think ANC is?
6. If women do not go for ANC, what are their reasons?
7. What are the merits and demerits of ANC? What are barriers to accessing ANC?
8. Why do women go to the clinic for ANC, yet mostly deliver at home?
9. Are all mothers abiding to their clinic dates?
10. What in your opinion should be improved?

PNC

1. How early do women go for PNC? (In what day/month after delivery?)
 2. How often do they go for PNC?
 3. What kinds of services do they receive in PNC? Are they satisfied?
 4. What do women think PNC does to help their babies and themselves?
-

-
5. How important do women seem to think PNC is?
 6. If women don't go for post-natal care, what are their reasons?
 7. What are the merits and demerits of PNC; what are barriers to accessing PNC?
 8. What in your opinion should be improved?
-

6.4 Results

From the analysis, five major themes emerged (i) Timing and reasons for attending ANC and PNC; (ii) Perceived services available at ANC and PNC; (iii) Perceptions about the importance of ANC and PNC; (iv) Home births and barriers to ANC and PNC; and lastly, (v) Suggestions to improve ANC and PNC. Each theme will be examined separately below.

Timing and reasons for attending ANC and PNC

Although women are advised to initiate ANC by 16 weeks of pregnancy, and some women had initiated ANC early, the majority began to attend the clinic at or after 17 weeks. Some women were reported to initiate ANC at the 18th or 19th week of pregnancy. Reasons women mentioned for initiating ANC either early or late are shown in Table 6.3.

Table 6.3: Perceived reasons for ANC by time of attendance

Perceived reasons for early antenatal care	Perceived reasons for late antenatal care
To confirm early pregnancy	To avoid coming to the clinic many times
To prevent miscarriage	Lack of money
To diagnose and treat illness associated with early pregnancy	Fear of encountering wild animals on the way to the clinic that could cause physical or spiritual harm
To check or monitor the development of the baby	Unsure of being pregnant
To get a clinic card in order to guarantee being attended in case of emergencies	Apathy or laziness (<i>Uzembe</i>)
To get advice from the nurses	Being away from one's village or living in a remote place
To avoid being reprimanded by clinic staff for late initiation of ANC	Shyness or embarrassment, particularly among older women and school-age girls

Participants in FGDs and in-depth interviews who understood the importance of early ANC often cited recommendations that care start early:

"I started going to the clinic when I was three months pregnant. They [health workers] do not allow you to start ANC when you are 6 or 7 months pregnant. They recommend going in the early stages of pregnancy. Up to

this moment, I have gone three times” (FGD, woman, in 9th month of pregnancy, Village T).

“Women normally attend the ANC four times, I instruct them and educate them on that. The Ministry [of health] has recommended that way so as to avoid problems [in pregnancy]. If they come this month, they do not come next month. This recommendation is now different as women were previously supposed to come every month” (In-depth interview, HCP Village K).

Despite the widespread availability of free ANC services, most women attend their first antenatal clinic late (after 16 weeks). One of the reasons for a late first visit is to avoid coming many times; that is, if a woman starts early, she will have to attend the clinic many times. Lack of money to start or continue ANC clinic visits was also mentioned by most participants. Women are charged a small amount of money (between 20/- to 50/- Tanzanian Shillings) generally agreed by the community members to support health workers to bring EPI outreach services closer to the women in a specified period. Money was also needed to pay for transport especially for the places where the health facility was a lengthy walk from a woman's village. Other concerns included fear of encountering wild animals on trips to the dispensary where ANC care is provided, and being unsure of pregnancy.

“I started going to the clinic when I was 5 months pregnant; I was not sure that I was pregnant and therefore decided to go and confirm it” (FGD, mother with a 1-month-old baby girl, Village R).

“We tell them to come to the clinic when they are three months pregnant. They normally come three times. For those who live far away, they say they are afraid of wild animals and sometimes they are blocked [from coming] by flooding caused by rains” (FDG, HCP, Village R).

Although in nearly all FGDs and in-depth interviews, respondents reported to have attended ANC services, the trend was not the same for PNC. The majority of those who gave birth at home did seek PNC services, but they reported attending three to seven days after childbirth. However, in several FGD sessions, women with babies as old as two or three weeks had not yet taken their baby for PNC. Their reasons for the delay were mainly due to waiting for the baby's cord stump to fall off, to allow the mother and baby to regain energy lost during childbirth, lack of money and distance to the health facility. The period before the umbilical cord stump falls off is understood to be a period when the baby is particularly vulnerable to harm by jealous or malevolent people and spirits, and the baby is usually secluded inside [31]. PNC was usually perceived as a service for children of all ages, lasting well beyond 42 days after delivery. Respondents in the communities did not make a distinction between the care in the first six weeks and the Expanded Programme on Immunisation (EPI) which is one component of PNC. This confusion may exist because EPI immunizations begin

shortly after birth and are first administered during the PNC period. Most respondents viewed postnatal care as very important, justifying taking the child out of the home even during the seclusion period; some respondents reported that a newborn would be taken to the health facility by relatives, and the mother would be left at home to regain her energy lost during childbirth. Even those women who give birth at health facilities are discharged very soon after birth. A baby is usually taken for follow-up well-baby care services provided through EPI once per month after the first visit.

Respondents had a variety of comments regarding attendance at PNC visits:

“There are women who give birth today and decide to take their babies to the health facility the day after. There are also those who give birth on the way to the health facility and decide to take the baby directly to the health facility. However, the majority are those who give birth at home and wait until the cord stump falls off to take their children for PNC services” (In-depth interview, VBI Village R).

“There are those who take three to four days and others take up to one week to take their newborn for their first PNC visit. Other women say that they don’t have enough energy to go for PNC while some mentioned other physical barriers as an obstacle. Those who live close to the health facility do come within one week while those who live far away may take up to two to three weeks” (In-depth interview, HCP, Village M)

Perceived services available at ANC and PNC

During the antenatal period, the most common services women perceived to be important and reported were routinely provided included: weight measurement, physical examination, provision of sulphadoxine-pyrimethamine (SP) for malaria, injection (presumably tetanus toxoid immunization), blood test for syphilis, counseling for birth preparedness, provision of discount vouchers for government-subsidised insecticide-treated bed nets to prevent malaria, mebendazole tablets for maternal deworming, and iron-folate supplements to prevent anemia. Despite health education in most health facilities, some of these services are poorly understood by pregnant women. The most problematic area was around medication as reflected in some common statements by mothers:

“I was given three big white tablets, and told to swallow on the spot. I was also given red tablets and a discount voucher, but I was not asked about birth preparedness” (FGD, woman in 8th month of pregnancy, Village H).

“We were given yellow and white tablets as well as an injection [presumably tetanus toxoid]” (FGD, mother with 11-month-old twins, Village M).

“We got drugs to prevent or treat anemia and we were examined and provided with a new clinic attendance card (FGD, mother with 9th-month-old baby girl, Village N).

“I started going to the clinic when I was five months pregnant. I went earlier (2 months) but they [health workers] said that they saw no pregnancy” (FGD, mother with 9 month-old baby girl, Village N).

“They [pregnant women] get tetanus toxoid injection, doses of SP (given at two visits) to prevent malaria; the VDRL test for syphilis, an HIV test, urinalysis, and they also get a discount voucher [for a bed net]” (In-depth-interview, HCP, Village K).

Postnatal services are perceived to be both important and routinely provided. However, unless there is a serious issue related to maternal complications, these services target the child, and little attention is paid to the mother. The most common services include: weight monitoring, tuberculosis immunisation (BCG), polio vaccination, DPT-1, 2 and 3; and measles vaccination. PNC is perceived by both mothers and HCPs as important for the baby.

“[...] PNC is just for the child. There is nothing for the mother. All other services that follow soon after birth are for the child” (In-depth interview, VBI, Village T).

“My last child was injected and given oral [polio] vaccine, and then I was provided with a card. He was also weighed after two weeks. I was asked to come back after a month” (FGD, woman, in 9th month of pregnancy, Village M).

“A newborn gets BCG and polio zero soon after birth (majority after day 7) and also gets DPT-HB one and polio one (at day 28) and weight measurement every month. After that a child continues being weighed once every month until he/she gets the measles vaccination and a discount voucher” (In-depth-interview, HCP, Village N).

Perceptions about the importance of ANC and PNC

The majority of the women interviewed attended ANC. Nearly all women perceive ANC services to be important and expressed complete trust in HCPs and the care they receive. However, a few women do not understand the importance of care provided. The most commonly mentioned assistance given to pregnant women included advice about care of their pregnancies; assessment of fetal vital status; ascertainment of fetal position; maternal vaccination; provision of vouchers for bed nets to prevent malaria; blood tests to diagnose disease and assess health status. As a routine part of ANC, women receive a clinic card which is crucial in case of an unforeseen complication that requires hospital attendance. The following excerpts describe women’s varied perceptions of the benefits of ANC:

“ANC services are quite helpful. For example, when I was pregnant my baby was lying in the wrong position and they helped her turn for a safe delivery” (FGD, mother with a 9th- month-old baby girl, Village K).

“I haven’t known any pregnant woman who is so careless as to miss ANC. But carelessness about seeking postnatal care is common, for example, not

taking a child for PNC services” (FGD, woman, in 8th month of pregnancy, Village H).

“I am just afraid of being denied services when I need them, so one must just go [to ANC] to get the [clinic] card. If you do not have a card, they will not accept you when there is a problem.... Otherwise, we could just rest at home” (FGD, woman, in 9th month of pregnancy, Village C).

“They [women] are happy about the services provided and they perceive them to be helpful. Those who get referral do say thanks to us for the prior advice given although there are some who still give birth at home” (In-depth-interview, HCP, Village M).

In most in-depth interviews and FGDs, women reported that PNC services were good for the child, and that this is why most children are taken for PNC. Women perceived these services to be effective: in almost all FGDs and in-depth interviews, women reported that PNC prevents children from getting fever, tuberculosis, measles, malaria, polio, whooping cough, tetanus and diphtheria. In addition, respondents reported that weight monitoring helps to understand if the child is growing in the right way. In some FGDs respondents said they believed that HCPs understand the benefits of PNC services, which is why mothers take children to HCPs for PNC. A few women reported not taking their children to the health facility for PNC because of a belief that an injection could harm their child, but these views seemed the exception rather than the rule. The following

excerpts describe the benefits women perceive PNC has for their children and their trust in HCPs:

“I go for postnatal care so that I can monitor the weight of my child. This helps us to feed the baby properly if her weight decreases” (FGD, mother with 2-week-old baby girl, Village N).

“These services [PNC] are helpful but we do not understand exactly what they help. It is the healthcare provider who knows.” (FGD, woman in 8th month of pregnancy, Village T).

“Some women can just refuse that their children be injected. For example, the people who live in remote areas do not want their children to be injected because they believe injections can cause convulsions. We have to educate them through health education sessions” (In-depth interview, HCP, Village R).

Home births and barriers to ANC and PNC services

Although the vast majority of women attend ANC services, more than half give birth at home. The major barriers reported for home as opposed to facility-based birth include lack of money, distance to the health facility, fear of caesarean section at the health facility and lack of privacy or a dedicated labor room at the health facility. Giving birth at the hospital is perceived to be associated with severe delivery complications.

“There are women who are frightened to go to the hospital when they are referred because they want to avoid a caesarean section: referral means a caesarean section at the hospital. The prolonged labour in our district hospital can lead to caesarean section. Formerly, I gave birth at home because other women in my neighborhood warned me this could happen [if I went to the hospital]” (FGD, woman in 9th month of pregnancy, Village T).

“There are women who think that when they are referred to hospital, it means they will need an operation [caesarean section]. It is believed that if a woman experience prolonged labour at the hospital, c-section can take place immediately. Most women are not happy because some of them have to work and maintain their household; who will do their work [while they recover]? If someone has surgical delivery then she must rest for about six to eight months” (In-depth interview, VBI, village R).

“If you see a danger sign and advise a woman to go to the district hospital for delivery she doesn’t go. She just gives birth at home” (In-depth interview, HCP, Village N).

“Although I usually advise women who come here [to the clinic] to give birth at the nearest health facility they still give birth at home because we have not moved to our new building. But when things go wrong at home, only then do they come to see us. We have an unfinished building, and

there is no special bed for delivery and no delivery kits” (In-depth interview, HCP, Village K).

Although there is a delay in starting PNC, nearly all women eventually attend the clinic for their child to receive services. Most mothers concur about the importance of PNC and encourage each other to attend the clinic. Most women said that they had not heard of anyone whose baby had not been taken for PNC. However, long distances and inaccessibility to a health facility (especially during the rainy season), negligence and unplanned pregnancy were important barriers to use of PNC. Some people who live on farms were reported to go to the health facility solely to get a clinic card to facilitate later care in case emergency care was needed at a later date. It was also reported that children are taken for PNC up to the age of one year.

“I haven’t heard of anyone missing postnatal clinic. But those who live in the farmland, they just go to show the baby so that they can get a clinic card [in case care is needed later]” (FGD, mother with a 3 month-old baby boy, Village H).

“Other women do not take their children for postnatal care. A child is taken for postnatal care up to the age of one year. After this, the child is seen as too old to be taken for postnatal care” (FGD, woman, in 8th-month of pregnancy, Village T).

“I haven’t heard anyone who hasn’t brought her child for PNC. They always come to the health facility to get a clinic card and they always encourage and urge each other about the importance of PNC” (In-depth interview, HCP Village H).

“Some women who live far away from the clinic are less likely to attend PNC, especially during the rainy season. Usually those who live in the village attend; they are not lazy at all. When they arrive I usually ask them about their reasons for not attending PNC on time” (In-depth interview, HCP, Village K).

Suggestions for improvement

Perspectives of mothers

Different suggestions were mentioned in the FGDs and in-depth interviews to improve ANC and PNC. Staff shortages, lack of equipment and supplies and wastage of time at the clinic were the complaints that dominated conversations in nearly all FGD and in-depth interviews. Most rural health facilities have a shortage of skilled health providers. Women perceived that because of this staff shortage, they spend a lot of time during each ANC or PNC visit. In addition, respondents suggested furnishing all health facilities with adequate and appropriate supplies and equipment, such as scales for weighing pregnant women and babies. Moreover, women suggested that health care providers should use more polite language while interacting with their clients, as verbal abuse and condescension were common complaints.

“Those who go for weight monitoring spend less time at the clinic than those who go for vaccination. This is because there is one health care provider; we suggest that there is a need to increase the number of health care providers” (FGD, mother with one-year-old baby boy, Village K).

“When we go late to the clinic for PNC, the health care providers complain that they are getting a meager salary and yet we keep bothering them” (FGD, mother with 9th -month-old baby boy, Village N).

“We request that health care providers behave more kindly so as to respond positively and politely to their clients” (FGD, woman, in 9th-month of pregnancy, Village T).

Perspectives of health care providers

In nearly all in-depth interviews with health care providers, respondents suggested that incentives such as refresher courses should be offered to improve job skills. They also complained about their workload, inadequate equipment and poor remuneration.

“We have no essential equipment such as a weighing scale or labour kits for childbirth. We have stopped providing DPT-Hb because we have no syringes”. (In-depth interview, HCP, Village H).

“We have been trained to offer rapid plasma regain but this service is not offered in this dispensary. We need radio call to communicate easily; there

is a lot of work so we need at least two nurse midwives and our salary is also not enough” (In-depth interview, HCP, Village M).

The majority of the respondents also suggested that all ANC services be provided in all health facilities: they complained that services such as Prevention of Mother-To-Child Transmission (PMTCT) for HIV infection and rapid plasma regain (RPR) tests for syphilis are not available in all health facilities.

6.5 Discussion

We found that many women had a positive attitude towards antenatal and postnatal care. However despite the perceived benefits of postnatal care, there was a total lack of postnatal care for the mothers. Women were not able to differentiate between the care in the first six weeks and the Expanded Programme on Immunisation which continues for the first year or more of a child’s life. Both mothers and HCPs mentioned shortages of staff, equipment and supplies at clinics as a major priority to improve ANC and PNC. Both mothers and health care providers recommended that all antenatal services be provided at all levels of care.

The study was based on a small and purposive sample and as a result may not be representative of the entire population seeking ANC and PNC in rural Southern Tanzania. Still this study provides important preliminary insights into many factors that shape community acceptance and utilisation of antenatal and

postnatal care services. Moreover, the use of qualitative techniques enabled us to gain a better understanding of community views and perceptions regarding ANC and PNC services than was previously available. This study identified important research gaps including the need to measure the prevalence of negative practices, such as women being turned away by the health care providers for initiating ANC too early or late.

As central strategies of the Safe Motherhood Initiative, ANC and PNC have the potential to improve maternal and child health, including neonatal care practices in the home ([37], [38]). Women in these communities are receptive to information about pregnancy and infant care through varied communication channels during the preconception, antenatal and postnatal periods ([39], [40]). Several barriers such as lack of money, distance to the health facility, lack of privacy to attending ANC and PNC that were mentioned are in line with the findings from other studies ([6], [18], [19], [20], [41], [42], [43], [30], [44]). Although knowledge regarding the importance of ANC and PNC was high, providing adequate healthcare alone does not guarantee the improvement of women's health [45]. Attention must be paid to the social and economic conditions that keep women from exercising their right to utilise existing services [46]. When women are knowledgeable about different modes of treatment they are more inclined to insist upon their rights and demand choices [47].

Although women are advised to initiate ANC early, the majority started to attend after the 16th week of pregnancy. The whole issue of reporting gestation period in weeks poses a methodological challenge. Normal women report their gestation period in months as it is easier for them to recall and not in weeks. In this study we used months rather than weeks. Late attendance, four months and above, did sometimes lead to being chastised by the health care providers or being denied ANC altogether for starting ANC too late. Our results support the findings of others ([10], [20], [43]) which point out that the majority of the interviewed women attend ANC to get antenatal attendance cards to facilitate prompt care in case of complications later in the pregnancy. Early ANC can, however, be used effectively to monitor the progress of the pregnancy. This can be done early through establishment of woman's baseline data such as blood pressure, syphilis/HIV screening and body mass index to detect and treat adverse pregnancy related outcomes [48]. Early booking can also help to provide other pregnancy-related services such as nutritional education, tetanus immunization, iron and folic acid tablets, insecticide treated bed nets and malaria prophylaxis on time. Low frequency of visits or late timing of the first antenatal visit are undesirable because they limit the amount and quality of care that a pregnant woman receives [18]. A study conducted in Mexico City found that an inadequate number of visits was associated with 63% higher risk of intrauterine growth retardation [49]. Frequent antenatal care attendance would have an impact on maternal mortality not only through early detection of obstetric

conditions but also by influencing women's decision to deliver babies at health facilities [50].

PNC coverage is limited by the cultural tradition of keeping the baby indoors, especially among women who gave birth at home. This tradition of seclusion has also been reported elsewhere, ([3], [17], [31]). Policymakers should therefore consider delivering PNC at both health facilities and at home to overcome financial, geographical and cultural barriers to care-seeking outside the home during the early postnatal period ([17], [51]). Although PNC was reported to be limited to neonates and infants, the reality however is, there was no effective PNC even for the newborns. The confusion about the duration and components of PNC among women in the study population with well-baby care was mainly due to the lack of comprehensive PNC services and could undermine prompt care-seeking for mother and the baby. Efforts are needed to speed up developing a new PNC guideline to help educate mothers that they are also vulnerable to infection during the immediate postpartum period and would benefit from postpartum care seeking ([25], [52]).

During the antenatal period, certain services such as routine weighing and vaccination are perceived to be important. Despite availability of information about the component services of ANC, some drugs and vaccinations provided during clinic visits are poorly understood by pregnant mothers, suggesting that health care providers' knowledge and strategies for detecting early pregnancy

and informing their clients about these drugs and services need to be improved. Although there were a few reports of women not taking their children to the health facility for PNC, most women trust that health care providers understand the purpose and benefits of the services, they are providing, a finding supported by other studies [53]. Through sharing of knowledge with women and mothers in health education session during ANC and PNC visits [54], health care providers can influence health-seeking behaviour of pregnant women in this rural setting. However, poorly motivated health workers seem unlikely to care too much about the quality of service they are providing [55]. Recent studies document that behaviour change communications during ANC can work to promote evidence-based neonatal care practices, care-seeking and demand for skilled intrapartum and postnatal care, particularly in developing countries ([56], [57]).

Potential opportunities exist to improve ANC and PNC services as suggested by both health care providers and clients. Client awareness of, demand for, and perceived benefits of ANC and PNC are high, but the quality of service needs to be strengthened. This will entail improving access to services; providing training opportunities for health care providers as well as behaviour change communication strategies to overcome cultural barriers. Health workers' negative attitudes have frequently been a complaint and a reason cited for lower utilization of health services ([58], [59], [60], [30]). Poor treatment, or poor quality of care during clinic visits, discourages care-seeking strategies and erodes trust in health care providers [6]. Approaches to improving quality of care should be

based on regular quality assessments and additional operational research activities [61].

To increase the availability and effectiveness of ANC and PNC services, staff shortages and skills gaps, lack of equipment and supplies, and the absence of proper PNC guidelines must be remedied. Suggestions from most respondents focused on increasing the number of staff at all levels of health facilities. The importance of strengthening human resources in healthcare is also increasingly acknowledged ([58] [62], [63]). Better living conditions for health care providers, as well as incentives for good job performance would improve delivery of health services ([64], [65], [66], [67]).

6.6 Conclusion

Despite some gaps in utilization, ANC and PNC are viewed positively. They offer important opportunities to encourage women to deliver with a skilled attendant in a health facility, and function as an entry point for care from birth through childhood and into adulthood. However, a number of findings suggest the need for additional research and program action. Some women reported their only reason for attending ANC was to get an antenatal attendance card, or PNC to get a growth monitoring card, in order to ensure curative health services would be provided in an emergency. Efforts need to be made to communicate the benefits of ANC and PNC more effectively. PNC services for mothers who recently delivered are either widely underutilised or unavailable. Efforts should be made

at a programmatic and policy level within the formal health care system to provide this care to women and their newborns. Innovative behaviour change and service delivery strategies must be designed and tested to provide postnatal care during the period immediately after birth when newborns are secluded in the home. Shortages of staff, equipment and supplies, difficulty accessing health facilities, and lack of clear guidelines on PNC need to be addressed in order for ANC and PNC to achieve their full potential for maternal and newborn health.

6.7 Competing interests

The authors declare that they have no competing interests.

6.8 Authors' contributions

MM, BO, JAS, DS, HM and MT devised the study design and objectives; MM, JAS, AKM, HM and DS contributed to data collection, analysis and interpretation; MM did the data collection, analysis and wrote the first draft of the manuscript; BO, RAH and HM provided technical support. All authors read, commented on and approved the final manuscript.

6.9 Acknowledgments

This study received funding from the Bill and Melinda Gates Foundation through the Intermittent Preventive Treatment of malaria in infants (IPTi) Consortium. We thank the many individuals living in Lindi Rural and Tandahimba districts of southern Tanzania, especially the mothers and health care providers who participated in our study. We are grateful to our local

collaborators, the Council Health Management teams of Tandahimba and Lindi Rural Districts. We appreciate the support from IHI during data collection and processing. The authors would like to thank the following IPTi staff working with IHI for their input at different points during the study period: Albert Majura, Adeline Herman, Shekha Nasser, Kizito Shirima, Stella Magambo, Yuna Hamis, Fatuma Manzi, Mwajuma Chemba, Peter Madokola, Werner Maokola and Evarist Nyanda (Baba Paroko). Last but not least, we would also like to thank Beverly Msambichaka of IHI and Constanze Pfeiffer, a post-doc at the Swiss Tropical Institute (STI), for their critical comments and edits to the manuscript. The funding source had no role in the study design, data collection, data analysis, data interpretation or writing this paper.

6.10 References

1. AbouZahr C: **Improve Access to Quality Maternal Health Services.** Presentation at Safe Motherhood Consultation in Sri Lanka, 18-23 October 1997. .
2. UNICEF: **State of the Worlds children 2006.** New York. United Nations Children's Fund. 2006.
3. Lawn J, Kerber K: **Opportunity for Africa Newborns: Practical data, policy and programmatic support for newborn care in Africa.** eds. PMNCH, Cape Town. 2006.
4. Koblinsky M, Matthews Z, Hussein J, Mavalankar D, Mritha MK, Anwar I, Achad E, Adjei S, Padmanabhan P, van Lerberghe W and The Lancet Maternal Survival Series steering group: **Maternal Survival 3: Going to scale with professional skilled care.** *Lancet*, 2006. **368**: p. 1377-1386.
5. AbouZahr C, Wardlaw T: **Maternal mortality at the end of a decade: signs of progress?** *Bull World Health Organ*, 2001. **79** (6): p. 561-568.
6. Urassa DP, Carlstedt A, Nystrom L, Massawe SN, Lindmark G: **Quality assessment of the antenatal program for anaemia in rural Tanzania.** *Int J Qual Health Care*, 2002. **14**: p. 441-448.
7. Campbell OMR, Graham WJ, and The Lancet Maternal Survival Series steering group: **Maternal survival 2: Strategies for reducing maternal mortality: getting on with what works.** *Lancet*, 2006. **368**: p. 1284-99.
8. Ronsmans C, Graham WJ, and the Lancet Maternal Survival Series Steering group: **Maternal mortality: who, when, where, and why.** *Lancet*, 2006. **368**: p. 1189-200.
9. Lawn JE, Cousens S, Zupan J: **4 million neonatal deaths: When? Where? Why?** *Lancet*, 2005. **365**: p. 891-900.
10. McDonagh M: **Is antenatal care effective in reducing maternal morbidity and mortality?** *Health Policy Plan*, 1996. **11**: p. 1-15.
11. Mattar CN, Chong YS, Chew A, Tan P, Chan YH, Rauff MH: **Simple antenatal preparation to improve breastfeeding practice: a randomized controlled trial.** *Obstet Gynecol*, 2007. **109**: p. 73-80.
12. Li XF, Fortney JA, Kotelchuck M, Clover LH: **The postpartum period: the key to maternal mortality.** *Int J Gynaecol Obstet*, 1996. **54**: p. 1-10.
13. Finger WR: **Better postpartum care saves lives.** *Network*, 1997. **17**: p. 18-21.
14. WHO: **Antenatal care: report of a Technical Working Group. Geneva, 31 October-4 November 1994.** WHO, Family and Reproductive Health, 1996. [3], 29 p. (WHO/FRH/MSM/96.8)
15. Bloom SS, Lippeveld T, Wypij D: **Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India.** *Health Policy Plan*, 1999. **14**: p. 38-48.
16. Carroli G, Rooney C, Villar J: **How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence.** *Paediatr Perinat Epidemiol*, 2001. **15**(Suppl 1): p. 1-42.

17. Winch PJ, Alam MA, Akther A, Afroz D, Ali NA, Ellis AA, Baqui AH, Darmstadt GL, Arifeen S, Seraji MHR and the Bangladesh PROJAHNMO study Group: **Local understandings of vulnerability and protection during the neonatal period in Sylhet district, Bangladesh: a qualitative study.** *Lancet*, 2005. **366** (9484): p. 427-520.
18. Magadi MA, Madise NJ, Rodrigues RN: **Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities.** *Soc. Sci. Med.*, 2000. **51**: p. 551-561.
19. van Eijk AM, Bles HM, Odhiambo F, Ayis JG, Blokland IE, Rosen DH, Adazu K, Slutsker L & Slutsker KA: **Use of antenatal services and delivery care among women in rural western Kenya: a community based survey.** *Reproductive Health*, 2006. **3**: p. 2 doi:10.1186/1742-4755-3-2.
20. Ndyomugenyi R, Neema S, Magnussen P: **The use of formal and informal services for antenatal care and malaria treatment in rural Uganda.** *Health Policy Plan*, 1998. **13** (1): p. 94-102.
21. United Nations: **Millennium Development Goals.** [Available at <http://www.un.org/millenniumgoals/background.html>]. Accessed 9th July 2008.
22. NBS [Tanzania] & ORC Macro: **Tanzania Demographic and Health Survey 2004-2005 - Key Findings.** Calverton, Maryland, USA: NBS-Tanzania and ORC Macro. 2005.
23. **Focused antenatal care malaria and syphilis in pregnancy: Learner's Guide for ANC Service Providers and Supervisors.** *Tanzania Ministry of Health and Social Welfare (TMOHSW) & ACCESS-JHPIEGO/USAID (Draft - April 2008).*
24. von Both C, Fleßa S, Makuwani A, Mpembeni R, Jahn A: **How much time do health services spend on antenatal care? Implications for the introduction of focused antenatal care model in Tanzania.** *BMC Pregnancy and Childbirth*. **6**: p. 22 doi:10.1186/1471-2393-6-22.
25. WHO: **Postpartum care of the mother and newborn: a practical guide WHO/RHT/MSM/983.** Geneva: WHO, 1998. 1998.
26. Rooney C: **Antenatal care and Maternal Health: How effective is it?** Geneva: WHO, 1992: [<http://who.int/dsa/cat98/mat8.htm#>] Antenatal%care. Accessed September 2007.
27. Haws RA, Thomas AL, Bhutta ZA, Darmstadt GL: **Impact of packaged interventions on neonatal health: a review of the evidence.** *Health Policy Plan*, 2007. **22**: p. 193-215.
28. Bale J, Stoll B, Mack A, Lucas A: **Improving birth outcomes: meeting the challenges in the developing world.** Washington, DC: National Academy of Sciences and institute of Medicine. [http://books.nap.edu/openbook.php?record_id=10841&page=163] (Accessed February 2008). 2003.
29. Armstrong-Schellenberg JRM, Mrisho M, Manzi F, Shirima K, Mbuya C, Mushi AK, Ketende SC, Alonso PL, Mshinda H, Tanner M, Schellenberg

- D: **Health and survival of young children in southern Tanzania.** *BMC Public Health* 2008, 2008. **8**: p. 194 doi:10.1186/1471-2458-8-194.
30. Mrisho M, Armstrong-Schellenberg J, Mushi AK, Obrist B, Mshinda H, Tanner M, Schellenberg D: **Factors affecting home delivery in rural Tanzania.** *Trop. Med. Int. Health*, 2007. **12**(7): p. 862-872.
31. Mrisho M, Armstrong Schellenberg J, Mushi AK, Obrist B, Mshinda H, Tanner M, Schellenberg D: **Understanding home-based neonatal care practice in rural southern Tanzania.** *Trans R Soc Trop Med Hyg*, 2008. **102**: p. 669-678.
32. NBS [Tanzania], **2002 Population and Housing Census: Regional Profiles**, Dar es Salaam: Government of Tanzania. Available at: [<http://www.tanzania.go.tz/census>]. 2004.
33. WHO: **Expanded program on immunization: Routine EPI activities: WHO.** Accessed on 20th June 2008 [<http://www.who.int/countries/eth/areas/immunization/routine/en/index.htm>].
34. Armstrong-Schellenberg JRM, Mrisho M, Manzi F, Shirima K, Mbuya C, Mushi AK, Ketende SC, Alonso PL, Mshinda H, Tanner M, Schellenberg D: **Health and survival of young children in southern Tanzania.** *BMC Public Health* 2008, 2008. **8**: p. 194 doi:10.1186/1471-2458-8-194.
35. Dawson S, Manderson L, Tallo V: **A manual for the use of focus groups.** International Nutrition Foundation, Boston. 1993.
36. QSR: **Introducing Nvivo: A workshop Handbook.** QSR International Property Ltd, Doncaster, Australia.[<Http://www.bath.ac.uk/bucs/software/nvwbk.pdf>]. 2002.
37. WHO: **The World health report 2005: Make every mother count.** WHO, Geneva 2005.
38. Population Reference Bureau: **Postnatal care: A critical opportunity to save mothers and newborn. Policy perspectives on newborn health.** 2007.
39. Bull M, Lawrence D: **Mother's use of knowledge during the first postpartum weeks.** *J. Obstet. Gynecol. Neonatal. Nurs.*, 1985. **14**: p. 15-20.
40. Renkert S, Nutbeam D: **Opportunities to improve maternal health literacy through antenatal education: an exploratory study.** *Health Promot. Int.*, 2001. **16**: p. 381-388.
41. Nabukera SK, Witte K, Muchunguzi C, Bajunirwe F, Batwala VK, Mulogo EM, Farr C, Barry S, Salihu HM: **Use of postpartum Health Services in Rural Uganda: Knowledge, Attitude and Barriers.** *Journal of Community Health*, 2006. **31** (2): p. DOI:10.1007/s10900-005-9003-3.
42. Chakraborty N, Islam MA, Chowdhury RS, Bari W: **Utilization of postnatal care in Bangladesh: evidence from a longitudinal Study.** *Health Soc Care Community*, 2002. **10**: p. 492-502.
43. Myer L, Harrison A: **Why do Women Seek Antenatal Care Late? Perspective from Rural South Africa.** *Journal of Midwifery & Women's Health*, 2003. **48**

- (4): p. DOI:10.1016/S1526-9523(02)00421-X.
44. Dhakal S, Chapman GN, Simkhada PP, van Teijlingen ER, Stephens J, Raja AE: **Utilisation of postnatal care among rural women in Nepal.** *BMC Pregnancy and Childbirth*, 2007. **7**: p. 19.
 45. WHO: **World report on knowledge for better health: Strengthening health systems.** Geneva: World Health Organization. 2004.
 46. Klisch SA, Mamary E, Olavarrieta CD, Garcia SG: **Patient-led partner notification for syphilis: Strategies used by women accessing antenatal care in urban Bolivia.** *Soc. Sci.Med*, 2007. **65**: p. 1124-1135.
 47. Kabakian-Khasholian T, Campbell O, Shediak-Rizkallah M, Ghorayeb F: **Women's experiences of maternity cares: satisfaction or passivity?** *Soc Sci Med* 2000, 2000. **51**: p. 103-113.
 48. Adekanle DA, Isawumi AI: **Late Antenatal Care Booking And Its Predictors Among Pregnant Women In South Western Nigeria.** *Online J Health Allied Scs.*, 2008. **7**(1.): p. 4.
 49. Coria-Soto IL, Bobadilla JL, Notzon F: **The effectiveness of antenatal care in preventing intrauterine growth retardation and low birth weight due to preterm delivery.** *International Journal for Quality in Health Care*, 1996. **8**: p. 13-20.
 50. Yanagisawa S, Oum S, Wakai S: **Determinants of skilled birth attendance in rural Cambodia.** *Trop. Med Int. Health*, 2006. **11**(2): p. 238-251.
 51. Charlotte Warren et al., **"Postnatal Care,"** in Opportunities for. Africa's Newborns, ed. Joy Lawn and Kate Kerber.
 52. Cunningham F; Garry, Eds. et al. Williams **Obstetric**. 21. New York: McGraw Hill; 2002.
 53. Moran AC, Winch PJ, Sultana N, Kalim N, Afzal KM, Koblinsky M, Arifeen SE, Seraji MHR, Mannan,I, Darmstadt GL, Baqui AH: **Patterns of maternal care seeking behaviours in rural Bangladesh.** *Trop. Med. Int. Health.*, 2007. **12** (7): p. 823-832.
 54. Senarath U, Fernando DN, Vimpani G, Rodrigo I: **Factors associated with maternal knowledge of newborn care among hospital-delivered mothers in Sri Lanka.** *Trans. R Soc. Trop. Med. Hyg.* 2007. **101**: p. 823-830.
 55. Ntoburi S, Wagai J, Irimu G, English M: **Debating the quality and performance of health systems at a global level is not enough, national debates are essential for progress.** *Trop. Med. Int. Health.*, 2008. **13** (4): p. 444-447.
 56. Bhutta ZA, Darmstadt GL, Hasan BS, Haws RA: **Community-Based Interventions for improving Perinatal and Neonatal Health Outcomes in Developing countries: A review of the evidence.** *Pediatrics*, 2005. **115**: p. 519-617.
 57. Darmstadt GL, Bhutta ZA, Cousins S, Adam T, Walker N, de Bernis L: **Evidence-based, cost-effective interventions: How many newborn babies can we save?** *Lancet*, 2005. **365** (9463): p. 977-88.

58. Conteh L, Stevens W, Wiseman V: **The role of communication between clients and health care providers: implications for adherence to malaria treatment in rural Gambia.** *Trop. Med.Int. Health.*, 2007. **12**(3): p. 382-391.
59. Jewkes R, Abrahams N, Mvo Z: **Why do nurses abuse patients? Reflections from South African obstetric services.** *Soc. Sci.Med.*, 1998. **47** (1781-95).
60. McPake B, Asiimwe D, Mwesigye F, Ofumbi M, Ortenblad L, Streefland P, Turinde A: **Informal economic activities of public health workers in Uganda: Implications for quality and accessibility of care.** *Soc.Sci.Med.*, 1999. **49** (849-865).
61. Boller C, Wyss K, Mtasiwa D, Tanner M: **Quality and comparison of antenatal care in public and private providers in the United Republic of Tanzania.** *Bull World Health Organ*, 2003. **81**: p. 116-122.
62. Chen L, Evans T, Anand S, Boufford JI, Brown H, Chowdhury M, Cueto M, Dare L, Dussault G, Elzinga G, Fee E, Habte D, Hanvoravongchai P, Jacobs M, Kurowski C, Michael S, Pablos-Mendez A, Sewankambo N, Solimano G, Stilwell B, de Waal A, Wibulpolprasert S: **Human resources for health: overcoming the crisis.** *Lancet*, 2004. **364** (1984-1990).
63. Kurowski C, Wyss K, Abdulla S, Mills A: **Scaling up priority health interventions in Tanzania: the human resources challenge.** *Health Policy Plan*, 2007. **22**: p. 113-127.
64. Franco LM, Bennett S, Kanfer R: **Health sector reform and public sector health worker motivation: a conceptual framework.** *Soc. Sci.Med.*, 2002. **54** (1255-1266.).
65. Franco LM, Bennett S, Kanfer R, Stubblebine P: **Determinants and consequences of health worker motivation in hospitals in Jordan and Georgia.** *Soc. Sci. Med.*, 2004. **58**: p. 343-355.
66. Rowe AK, De Savigny D, Lanata CF, Victora CG: **How can we achieve and maintain high-quality performance of health workers in low-resource settings?** *Lancet*, 2005. **366**: p. 1026-1035.
67. Wyss K: **An approach to classifying human resources constraints to attaining health-related Millennium Development Goals.** *Hum Resour Health*, 2004. **2**(11): p. doi:10.1186/1478-4491-2-11.

CHAPTER 7

Understanding home-based neonatal care practice in rural southern Tanzania



A child and her mother at a Health facility

Chapter 7: Understanding home-based neonatal care practice in rural southern Tanzania

Mwifadhi Mrisho ^{a,d,*}, Joanna Armstrong Schellenberg ^{a,c}, Adiel K. Mushi ^{b,c}, Brigit
Obrist ^d, Hassan Mshinda ^a, Marcel Tanner ^d, David Schellenberg ^{a,c}

^a Ifakara Health Research and Development Centre, P.O. Box 78373, Dar es
Salaam, Tanzania

^b National Institute for Medical Research, Amani Centre, P.O. Box 81, Muheza,
Tanzania

^c London School of Hygiene and Tropical Medicine, London, United Kingdom

^d Department of Public Health and Epidemiology, Swiss Tropical Institute, Basel,
Switzerland

*Corresponding author

This paper has been published in the Transactions of the Royal Society of
Tropical Medicine and Hygiene 2008, 102:669-678

7.1 Summary

In order to understand home-based neonatal care practices in rural Tanzania, with the aim of providing a basis for the development of strategies for improving neonatal survival, we conducted a qualitative study in southern Tanzania. In-depth interviews, focus group discussions and case studies were used through a network of female community-based informants in eight villages of Lindi Rural and Tandahimba districts. Data collection took place between March 2005 and April 2007. The results show that although women and families do make efforts to prepare for childbirth, most home births are assisted by unskilled attendants, which contributes to a lack of immediate appropriate care for both mother and baby. The umbilical cord is thought to make the baby vulnerable to witchcraft and great care is taken to shield both mother and baby from bad spirits until the cord stump falls off. Some neonates are denied colostrum, which is perceived as dirty. Behaviour-change communication efforts are needed to improve early newborn care practices.

7.2 Introduction

It is unlikely that the fourth Millennium Development Goal (MDG 4: reduce child mortality) will be achieved without substantial reductions in neonatal mortality (Lawn et al., 2005). About 4.0 million of the annual 10.8 million global deaths in children younger than 5 years occur in the first month of life (Black et al., 2003; Lawn et al., 2004). Worldwide, the average neonatal mortality is estimated to be 33 per 1000 live births (Zupan and Aahman, 2005). Nearly all neonatal deaths (99%) occur in low and middle income countries and about half occur at home (Black and Kelley, 1999; Lawn et al., 2004). Three quarters of neonatal deaths occur in the first week of life, suggesting the need for early care (Darmstadt et al., 2007).

Although there is substantial geographical variation, the neonatal mortality for Tanzania is 32 per 1000 live births (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, 2005). Based on data from the Demographic and Health Survey (DHS) 2004/5, Between 2000 and 2004 Tanzania reported a dramatic reduction in mortality in infants and under children under 5 years of age, with overall under five mortality dropping from 147 to 112 per 1000 live births and infant mortality dropping from 99 to 68 per 1000 live births. However, the reduction in the neonatal mortality rate was much smaller and not statistically significant, from 40 to 32 per 1000 live births (NBS [Tanzania] and Macro Inc., 1997; NBS [Tanzania] and ORC Macro, 2005; Lawn and Kerber, 2006)

Birth and emergency preparedness is a key component of globally accepted safe motherhood programmes (Moore, 2000) and is widely promoted by international agencies (WHO, 2003). Globally, about half of all births take place without skilled care; in the poorest quintile of many developing countries about 90% of mothers deliver babies at home without a skilled health professional present (Gwatkin et al., 2004). The first-line providers at birth are usually relatives or traditional birth attendants (TBAs) and the mother's confinement at home is often dictated by a combination of poverty and societal and cultural factors (Martines et al., 2005). An increasing body of evidence suggests the importance of reaching these poor families through a combination of approaches (Knippenberg et al., 2005).

Behaviour at household level has been one of the main targets for research programmes aimed at improving neonatal mortality (Bang et al., 1999; Bhuta et al., 2005; Darmstadt et al., 2006). In their model, Marsh (2002) identified a set of behaviours at household and community level that, if implemented well, would generally improve neonatal mortality: improved routine maternal and newborn care, including the use of antenatal care services; early seeking of care for maternal and newborn danger signs; rapid and appropriate response to non-breathing newborns and improved care for low birth weight babies.

Interventions designed to change neonatal care practices must take into account practices or actions that are locally believed to be beneficial or risky (Parlato et al., 2004). There is evidence that over the last two-to-three decades behaviour-

change communication approaches have contributed to substantial improvements in the health status of the newborn in the developing world (Seidel, 2005). Many significant gains were made in the 1980s and 1990s in home use of oral rehydration therapy; completion of childhood immunisations; breastfeeding and other nutrition-related practices; timely care-seeking for acute respiratory infections and malaria; and various home hygiene and sanitation measures (Seidel, 2005). In rural India, a programme was implemented to encourage evidence-based essential newborn care including skin-to-skin care (skin contact in order to improve the bonding between mother and infant); birth preparedness; immediate and exclusive breastfeeding; and hygienic skin and cord care. Community-based workers used interpersonal communication to deliver these messages to pregnant women, their families and influential community members. This intervention was well accepted and was perceived to prevent newborn hypothermia, improve the mother's capability to protect her baby from evil spirits and make the baby more relaxed (Darmstadt, et al. 2006). Successful key behaviour change entails a thorough understanding of the target community members and the key factors influencing the behaviours in question. Qualitative research provides vital information about what could motivate this audience to improve its newborn care practices at household and community level (Parlato et al., 2004).

In order to understand childbirth and neonatal care practices which can provide a basis for development of strategies for improving neonatal survival in rural

Tanzania, we conducted a qualitative study at the household and community levels with a focus on preparation for childbirth and newborn care practices.

7.3 Methods

7.3.1 Study area

The study was conducted in Lindi Rural and Tandahimba districts in Lindi and Mtwara regions, which have a total population of about 300 000 people (NBS [Tanzania], 2004). The study area is well described elsewhere (Mrisho et al., 2007). In brief, the area has a wide mix of ethnic groups, the most common being Yao, Makonde, Mwera and Matumbi. Most people use the vernacular language in daily life but Swahili is also widely spoken. The majority of people are poor rural subsistence farmers. The public health system comprises dispensaries in the periphery, health centres and hospitals, offering varying levels of care, and over 90% government owned.

Lindi and Mtwara regions are reported to have the highest neonatal and infant mortality rates in the country (NBS [Tanzania] and ORC Macro, 2005). More than half (58%) of births are at home (Mrisho et al., 2007). Trained and untrained traditional birth attendants assist 16% and 40% of births in Lindi and Mtwara, respectively. Relatives or other unskilled attendants assist 35% and 20% of births in Lindi and Mtwara. Two percent of births are delivered without assistance (NBS [Tanzania] and ORC Macro, 2005).

7.3.2 Field methods

The study was carried out in Lindi Rural and Tandahimba districts within the framework of a community effectiveness study of intermittent preventive treatment for malaria in infants (IPTi) (IPTi Consortium, 2008). The eight study villages were deliberately selected to represent areas with specific characteristics, including close proximity to a divisional boundary, varied vaccine coverage levels and close proximity to a main road and to the border with Mozambique. Data collection took place between March 2005 and April 2007.

A total of 40 in-depth interviews and 16 focus group discussions (FGD) were conducted (Dawson et al., 1993). Five in-depth interviews on key topics were done in each village: two in-depth interviews with women who had recently delivered at home or in a health facility, two in-depth interviews with pregnant women and one in-depth interview with a TBA. Two FGDs were conducted in each village and brought together 6–8 women who had given birth at least once and had similar backgrounds and experiences. The discussions generally took place at the key informant's home or at a school. At the beginning, the moderator introduced the note-taker and all participants, explained the general topic of discussion and encouraged each participant to express her ideas.

The work was facilitated by a network of female village-based informants (VBI). These women were recruited from among the pregnant women and mothers of young infants based in the study areas. The selection criteria included being late

in pregnancy or having a baby under 2 months old; having at least primary education; good handwriting and oral communication skills; being a permanent resident with a good reputation and being accepted by women of all age groups. The VBI were trained to carry out informal interviews in their community and to keep notebooks in which to record observations and discussions that they had with mothers and other community members about maternal and child health issues. They were debriefed and interviewed quarterly by members of the social science team.

The discussion guide, which was similar for in-depth interviews and focus group discussions, was prepared by one of us (MM) and translated into Swahili. The main topics in the discussion guide were place of childbirth; birth preparedness at the household and community level; intrapartum and immediate newborn care; newborn care-seeking; cord care; feeding practices and overcoming barriers. As well as in-depth interviews and focus group discussions we also included case studies of four women who had recently given birth, each from a different village. These were noted by the VBI and followed up with interviews by the study team. Two of their babies died and two survived. These methods enabled us to collect information from a relatively wide range of participants and three different sources in order to increase validity and the reliability of the outcomes.

We obtained oral informed consent at the start of each interview or FGD. Confidentiality of all study participants was assured and village names have been

coded in this manuscript. The discussions were recorded using an MP3 voice recorder. After each interview or FGD, handwritten notes were reviewed and revised while listening to the recording. The transcripts were typed and imported to NVivo version 2.0 (QSR International, Doncaster, Australia) for analysis. We applied qualitative content analysis, identifying major key themes from the coded transcripts (Hsieh and Sarah, 2005; Pope et al., 2000; Ritchie and Spencer, 1993).

7.4 Results

The results are broadly categorized into three areas: birth preparedness at the household and community level, intrapartum and immediate newborn care and newborn care seeking.

7.4.1 Birth preparedness at the household and community level

Reported preparations for birth included rest and preparing cash for emergencies. Some women decide to move to their mother's household 2 weeks or 1 month before the expected date of childbirth because they believe that parents provide the best care.

“Quite often pregnant mothers move to their parents to seek help when they are 9 months into their pregnancy.” (In-depth interview with a TBA, Village K)

“There are some women who move to their parents to deliver but other husbands prefer their wives to deliver at home so that if need to go to a health facility arises, husbands can act immediately.” (FGD with a mother of a neonate, Village N)

During this period (8–9 months of pregnancy), pregnant woman were reported to need to rest and to avoid heavy work such as fetching water, collecting firewood and farm work.

“A pregnant woman should avoid heavy labour as it may lead to miscarriage.” (In-depth interview with VBI, Village M)

Women also make sure that there is money for emergencies, in case they need to deliver at a health facility. Lengths of cotton cloth are also prepared for wrapping the newborn. For home birth, money needed is for razor blades, thread and gloves.

“At home you are obliged to prepare clothes, razor blades, thread and gloves but in the hospital you need more than that, new or clean clothes and money.” (In-depth interview with VBI, Village C)

“A household with poor income can risk the lives of mother and the newborn because of lack of money. Even if you are advised to go to the

health facility and you have no means, you just take the risk of home birth.” (In-depth interview with a pregnant woman, Village H)

7.4.2. Intrapartum and immediate newborn care, including hygiene

7.4.2.1 Birth attendant

For childbirth at home, a close relative is usually expected to assist. If there is no close relative, any adult woman who is familiar with childbirth is allowed to assist. Grandmothers, mothers, sisters and aunts were frequently reported as having assisted at deliveries. Neighbours were also mentioned to assist birth at home.

“...any person who is courageous can help during childbirth. Even a non-relative can help if there is no relative.” (In-depth interview, Village R)

“My neighbour came to support me during childbirth as there was no-one else to help.” (FGD with mothers who gave birth at home, Village K)

It was also reported from most FGDs and in-depth interviews that TBAs commonly assist at childbirth. TBAs were usually paid between 2000 and 3000 Tanzanian shillings (equivalent to US\$1.5–2.5) or were given a piece of cloth as compensation.

“We have been asked to stop helping women to give birth at home but still we get complaints from our clients when we refuse to help them. It is

relatively cheap to give birth at home.” (In-depth interview with a TBA, Village R)

In rare cases, women who had delivered three or more times were reported to be confident to deliver at home without any assistance at all. Such women often give birth onto a bed covered with cotton sheets, a woven grass mat or cloths, and sometimes onto the ground, ignoring hygiene care during childbirth.

“In the morning, of 7th April 2005 I gave birth alone at home. The baby fell on the ground. My other children who were playing around the house heard a small baby crying and went to inform my sister who assisted me to deliver the placenta and care for the baby.” (In-depth interview with VBI, Village N)

7.4.2.2 Place of birth

Childbirth at a health facility was also reported in nearly all FGDs and in-depth interviews. For those who delivered at health facilities, the procedures were perceived to be different from those at home. It was reported that the umbilical cord is usually cut using scissors or a razor and then tied with a special thread. In addition, the baby is weighed and the mother advised by a nurse or midwives to breastfeed the baby immediately. The following case was typical for immediate newborn care in a health facility:

“I went to the dispensary around 11pm. I gave birth the next day, at 8pm. The nurse took the baby, cut the cord with a razor and tied it with a special knot and moved the baby up and down which made him cry. The child was taken care of by a nurse, wiped with a damp cloth and then the nurse told me to breastfeed the baby. I was discharged at 10 am on the following day. At home, my aunt took the baby and bathed him with warm water.”

(In-depth interview with a mother of neonate, Village R)

“There is a difference between home and hospital delivery. In a health facility, a woman is injected with some medicines to prevent loss of blood while nothing is applied at home and beds are also different.” (In-depth interview with a TBA, Village K)

In most FGD and in-depth interviews, it was reported that the nurses at antenatal clinics advise mothers to go to the health facility to give birth.

“I was advised to go to Mtwara or Lindi hospitals, but ended up delivering a baby boy at the local dispensary because I had little financial support. The nurse cut the baby’s cord, cleaned the baby using cotton wool and bathed him afterwards.” (In-depth interview with VBI, Village H)

7.4.2.3 Breathing and resuscitation

The neonate's nose or mouth is normally inspected and cleaned with a piece of cloth. Sometimes fluids in the nose are removed by the mother or any other person close to the family by sucking the baby's nose. The baby is often also held upside down to encourage him or her to cry.

“If the baby doesn't cry it is an indication that there is a problem. He or she might be forced to cry by being held upside down or immersed in cold water up to the neck.” (In-depth interview with VBI, Village C)

“When babies are born either at home or in hospital, they are held upside down to make them cry [which is] a sign of good health; the cord is cut and the baby is put on the bed to allow the mother to care of him or her. A baby is bathed the next day.” (FGD with mothers of neonates, Village H)

Occasionally, the baby is made to inhale the scent of tobacco powder (ground tobacco leaves) to make the baby sneeze. This was reported to be a good sign, indicating that the baby is mature and healthy.

7.4.2.4 Cord cutting and care

For home births, the cord is usually cut with a razor blade and tied with thread. Sometimes a part of the millet stem is used for cutting. Razor blades are often not new. Traditional herbs mixed with either cooking oil or water that has been

used to wash an adult woman's genitals (*numbati*) is applied to heal the cord. Other healing materials mentioned were ash, breast milk, fluid from pumpkin flowers and a powder ground from a local tree. A person with "a good hand" and who can make the cord fall off quickly is usually chosen to cut the cord.

"Force should not be applied to make the cord fall off, even if it is about to fall off, better wait for it to fall off itself." (In-depth interview with a mother of a neonate, Village C)

"If the cord doesn't heal we apply modern medicine but other people use cow dung, ash or mgongo-tree powder." (In-depth interview, a follow up with MT, Village C)

"Many children are taken to the health facilities but breast milk and fluids from pumpkin flowers are also locally used to heal the cord." (In-depth interview with a TBA, Village K)

In an in-depth interview, a mother who had lost her newborn reported the details of the circumstances of the child's death.

"I had a sudden onset of labour and decided to give birth at home. I delivered a baby boy on 23rd April 2005. My mother and my neighbours assisted me. Five days later, my baby stopped breastfeeding and I

realized that he was not feeling well. We decided to take him to the dispensary and were referred to the hospital, half an hour drive from my village. He was examined and the result showed that he had tetanus. He died on the same day, just before the treatment.” (In-depth interview with a mother of a newborn baby, Village K)

Apparently, an old razor blade that had not been cleaned was used to cut the cord of the child. The doctor concluded that the child was infected with tetanus through the use of the old razor blade.

7.4.2.5 Bathing and provision of warmth

At home, the baby’s body may be wiped with a piece of cloth and sometimes washed with warm or even cold water on the day of delivery. After childbirth in a health facility the baby is not bathed but wiped with cotton wool. Although the majority of neonates were reported to be bathed on their first day of life to clean the baby, in a few areas it was reported that they were not bathed until after the cord fell off.

“We normally clean the baby after birth with cloth and with water on the following day. But in [the TBA’s] absence, [relatives and other birth assistants] wash the baby with water soon after childbirth. We used to get cotton wool from the health facility but now we don’t get it anymore.” (In-depth interview with a TBA, Village L)

After birth, sesame or other cooking oil is applied on the body to soften the skin and warm the baby. Thick pieces of cotton cloth are also used to wrap the newborn to keep the baby warm.

7.4.2.6 Feeding practices

Although most newborns are breastfed during the first day of birth, we learnt that some neonates are denied colostrum, which is perceived as dirty. In addition, mothers often feel they do not have enough milk for the first few days so the majority of neonates are given sweetened warm water at this time.

“First milk is not suitable for the newborn. The child is given sweetened water so as to wait for at least two or three days for the [dirty milk] to get finished.” (In-depth interview with a TBA, Village T)

“During the first day, I had no milk in my breasts; it was just unclean and water-like milk. The baby had to clean the breast.” (In-depth interview with a mother, Village C)

“After delivery I could not feed my child because there was nothing in my breasts. I just mixed some sugar with warm water to feed it.” (In-depth interview with a mother, Village H)

“I started breastfeeding my child on the second day after her birth. In the meantime, I gave her sweetened warm water.” (In-depth interview with a mother, Village K)

A neonate was considered to be vulnerable to breastfeeding problems. In some FGDs women reported deaths as a result of these problems. The average period of breastfeeding was 18-24 months. Another pregnancy (conceived while breastfeeding) and illness were the main reason for ending breastfeeding before this time.

7.4.2.7 Recognition of low birth weight

Although it is believed that a premature baby cannot survive, sometimes it was reported that a baby born 2 months early can survive. A premature baby was perceived by the community as a baby born before 9 months' gestation.

“A baby of less than 9 months gestation is regarded as premature.” (In-depth interview with MT, Village H)

“If a baby is born premature, I usually instruct a mother to send that child to the hospital. This happens when a mother has malaria. A child born at 6 or 7 months gestation can survive while a child born at 8 months' gestation can hardly survive.” (In-depth interview with a TBA, Village K)

It is generally understood by the community that a baby born at 8 months is more likely to die than one born earlier, because the baby is thought to be turning at this time. It is thought that baby is facing sideways during the 8th month and thus more likely to become stuck.

7.4.2.8 Seclusion and protection at home

Typically, the baby is strictly kept indoors with his or her mother and close relatives until the cord falls off, which is usually between 3 and 7 days after birth. During these days it is believed that the neonate is vulnerable to harm by people with malevolent intentions. In order to make sure that the cord does not fall on the ground, the child is well protected with clothes. It is believed that if the cord falls on the ground without the mother's knowledge it may be picked by "bad people". Although respondents expected that the mother of a newborn should be visited to congratulate her and her baby, it was acknowledged that not all people come with good intentions.

"Some people can just bring nyambu [a form of witchcraft] to the child. It is important for the mother of the neonate to watch out because bad people can be tempted to steal the cord and harm the child." (In-depth interview with a mother, Village R)

"Bad people are enemies of children; they can harm a mother and child through witchcraft." (In-depth interview with VBI, Village R)

Mothers stay at home in order to protect the neonates against witchcraft. This is important since a bad person might sneak into the home and steal the umbilical cord as a means to harm the child. The cord falling off is considered a very important event. This occasion often marks the first time baby is taken out of the room to be named and shaved. The hair and cord are kept in a safe place to avoid their appropriation by “bad people”. Fear of the umbilical cord being stolen justifies seclusion until it drops off. The cord and hair might be buried covered by a piece of broken pot on top, or more simply buried under a big tree. It seems that every family has a sacred place in the forest where they bury such things. This location is very secret to protect the things that are buried and to protect the family. Sometimes the cord is hidden after being neutralized by ash, so that if taken by witchcraft a child cannot be harmed.

Special ceremonies are held for the first-born child after the cord falls off. Those invited include grandmothers, close relatives and neighbours. In these ceremonies the mother of the neonate is taught how to care for the newborn. The child’s grandmother, who may be a TBA, is assigned to teach the baby’s mother some important lessons about child rearing. For example, mothers of neonates are told not to have sex, even with their husbands, unless their babies are protected with amulets or herbal powders applied into incisions on the baby’s head. This is seen as an essential measure to protect the child from poor health. Breaking this taboo leads to sunken fontanelle, frequent illness and delay in walking (*kumtimbangila mwana*).

“Interviewer: So what is the protection for kumtimbangila mwana?”

Respondent: Abandon sex.

Interviewer: For how long?

Respondent: For maybe two years, until the baby has stopped breastfeeding and has been sent to her grandmother.” (In-depth interview with MT, Village L)

“Just after giving birth for the first time I was told [by adult women] to abstain from sex for 2 years while breastfeeding, otherwise the baby could die. For this reason, I was very frightened and decided to abide by that custom.” (FGD with mothers, Village H)

The mother and the neonate are commonly secluded indoors for forty days. In addition to the protection against witchcraft, the seclusion allows mothers to regain energy lost during delivery, and more importantly, to become purified after the perceived pollution of pregnancy (*luhuli*). During the forty-day period, *luhuli* will gradually diminish.

“In these forty days I had to rest to get back the energy lost during childbirth and to protect my child and myself against pollution.” (In-depth interview with MT, Village H)

“[but] for us, it is when you finish these 40 days that one can bathe and start praying. For those who do not pray, they cannot even recall how many days have passed.” (In-depth interview with MT, Village C)

However, this rule of seclusion does not apply to sick neonates; they can be brought to a health facility or traditional healer if the need arises. It is believed that non-adherence to being secluded at home can cause swelling in the mother’s body.

7.4.3 Newborn care seeking

When looking at the formal health system, the majority of mothers reported that they knew what action to take when the baby became sick, but accessibility, lack of money, lack of drugs and abusive language by health personnel were mentioned as barriers to neonatal care seeking:

“For most of us who give birth at home, when we present ourselves to the health facility we are made to pay between 500 and 1000 Tanzanian Shillings. For most of us this is a barrier to seek care from the health facilities as we have no money.” (In-depth interview with a mother, Village R)

“At health facilities we are being treated like little children. Some health personnel use abusive language even if someone has done nothing. With

that kind of environment you can hardly tell a doctor all about your newborn health-related problems.” (In-depth Interview with a mother, Village N)

“Sometimes when a young pregnant girl goes to the clinic, it can be shameful for her as some health workers can lament about how it is wonderful to see a little child like her running after adult women’s business.” (FGD with a mother of a neonate, Village T)

With regard to the local and traditional treatments, there are some illnesses which are treated with local medicine at home, while other medicines are sought from traditional healers. In some areas the child is protected against convulsions by grinding the detached umbilical stump into a powder, which is rubbed into an incision made on the baby’s head. Traditional healers use this type of scarring to protect young children from harm and to protect the baby against convulsions. In addition, neonates are occasionally given crocodile oil to relieve perceived stomach pain. However, this practice is diminishing and not very common nowadays. The most common practice to relieve perceived neonatal stomach pain is the use of seed oil from a local tree. This usually happens in the early stages after childbirth. Stomach pain is diagnosed if the baby is crying all the time, or is constipated.

Breast milk is also believed to be a cure for eye infections and newborn genital pains. Eye illnesses are treated by drops of mother's breast milk. Breast milk can be applied to the child's genitals as a cure for a newborn experiencing pain from urinating. Breast milk from a mother of twins can also be used to heal eyes and wounds. Babies with an eye problem or a wound in the mouth are treated with spittle from a mother or father of twins. Babies with pneumonia, convulsions and any illness associated with spirits and witchcraft are usually taken to traditional healers. Evil spirits were reported as a source of childhood illness in nearly all FGD and in-depth interviews.

“I delivered a premature [8 months] baby boy at home. He was weak and couldn't suck properly. The grandmother went to inform his father about the child's situation and decided to take him to the traditional healer for treatment. It was learned that the child had a devil. The healer gave us some herbs and advised us to give them to the baby at home, but the child died on our way back.” (In-depth interview with a mother of a neonate, Village H)

Traditional healers are widely believed to be able to heal sick neonates and are therefore often consulted. Unlike most health facilities they treat on credit and accept payment in kind (exchange of goods for services). Reported signs of neonatal illness include problems with breastfeeding, a hot body and crying.

Mothers discuss issues related to childcare with their female friends, husbands, aunts and other close female relatives.

7.5 Discussion

We have described both favourable and risky cultural practices related to newborn care in rural Tanzania. Babies are especially vulnerable during their first days and weeks and while favourable cultural practices such as warming and prolonged breastfeeding should be encouraged, those that impact negatively on neonatal and maternal health should be discouraged. The newborn takes time to adapt to the environment outside the mothers' womb. Establishment of normal respiration, maintenance of warmth and protection from infection are particularly important at this time (Ebrahim et al., 1998). Immediate immersion of the baby in cold water can lead to an increased risk of hypothermia. There is much evidence to suggest that neonates who are not thermally regulated have a significantly higher risk of morbidity and mortality (Beck et al., 2004; Johanson et al., 1992; Lyon, 2004; Sinclair, 1992). Preterm, low birth weight or distressed neonates are more susceptible to hypothermia (McCall et al., 2005; WHO, 1997). The results from this study also indicate that the mode of cord cutting in rural areas might contribute to neonatal deaths through infection. Umbilical cord infection contributes significantly to newborn infection and subsequent neonatal death (WHO, 1998a). There is a need to encourage the use of new razor blades and sterilized instruments for cord cutting. Home medication to heal the cord stump should be avoided as this might lead to serious infections. Early use of 4.0%

chlorhexidine for topical cord antisepsis represents an important intervention to reduce neonatal infections and mortality (Mullany et al., 2006).

Common barriers discouraging seeking care for the newborn from formal health facilities include lack of money and lack of reliable transport to the facility (Borghini et al., 2006; Ensor and Cooper, 2004; Koblinsky, 2006). Delivery at health facilities needs to be more easily accessible (Campbell and Graham, 2006; Koblinsky, 2006; Ronsmans and Graham, 2006), although it should be noted that there is a major shortage of skilled birth attendants at peripheral health facilities in our study area. Our observations suggest that even mothers who are aware of the health risks in childbirth have problems in accessing good care at health facilities due to lack of money, poor transport, abusive language and drug shortages (Mrisho et al., 2007). Moreover, health staff gives more emphasis to advising primigravidae to give birth in a facility than to multigravid mothers. It is not entirely clear why this is the case, although it is likely that it stems from a general perception that first births are at a higher risk of complications than subsequent births. Families and healthcare providers should collaborate in protecting the health of mothers and neonates through improved delivery practices.

The majority of newborns are denied colostrum and are fed sweetened warm water before breastfeeding or as a supplemental feed. This can, however, increase their risk of illnesses, particularly if the water is contaminated or the

feeds reduce demand on maternal milk supply. Breast milk is a sole and sufficient source of nutrients during the first 6 months of life (WHO, 1998b; WHO, 2006) and has an impact on mortality and morbidity (Bhandari et al., 2003; Haider et al., 2000; Morrow et al., 1999). A recent study in Ghana has also shown an association between breastfeeding within an hour of birth and neonatal survival (Edmond et al., 2006; WHO, 2006). Our data suggest that newborns from the study areas are not always breastfed immediately after birth, and that exclusive breastfeeding is far from universal. The same phenomenon was reported from other parts of Tanzania (Armstrong-Schellenberg et al., 2002; Shirima et al., 2001). In this study, as in other reports, delay in initiation of breastfeeding and discarding of colostrum were common in rural areas (Davies-Adetugbo, 1997; Nath and Goswami, 1997; Okollo et al., 1999; Shirima et al., 2001). Lack of knowledge about the benefits of early and exclusive breastfeeding is widespread. Messages disseminated through health education at antenatal visits are unlikely to be sufficient to change behaviour, which is likely to require consistent messages delivered from multiple sources. In rural Uttar Pradesh, India, community mobilization and behaviour-change communications to promote simple essential practices for newborn care at home and in the community, were reported to lead to a 50% reduction in neonatal mortality (Darmstadt, unpublished.).

Healthcare-seeking behaviour for the newborn is influenced by many factors (Ahmed et al., 2001; Barnes-Josiah et al., 1998; de Zoysa et al., 1998; Lawn and

Kerber, 2006; Marsh et al., 2002; Winch et al., 2005). Very few facilities in Tanzania have equipment and supplies to manage complications of labour and delivery or provide emergency support for the newborn (NBS [Tanzania] and ORC Macro, 2007). The restriction of the movement of mother and newborn outside the home is potentially risky and a potentially limiting factor for care seeking (Mesko et al., 2003; Winch et al., 2005). In our study areas, seclusion of both mother and baby was reported to be 40 days, which is similar to that reported in other parts of the world (Blanchet, 1984; Gideon, 1962; Jeffery et al., 1989; Winch et al., 2005). Families often perceive this as way to protect the child against witchcraft. Traditional healers are contacted frequently, which is mainly due to this fact that, as in Uganda (Amooti-Kaguna and Nuwaha, 2000), they accept payment in kind, that is, services are provided in return for goods, and payment rates can be negotiated. However, some rituals such as feeding of neonates with crocodile oil and incisions made on the baby's head by traditional healers may risk infection. Encouraging traditional healers to refer sick newborns to the formal health system may help to save lives.

In recent years, opinions about the use of TBAs have varied widely. TBAs are reported to be key providers of support and opinion and have great potential, if well trained, to promote appropriate newborn care and practices in the community (Barnett et al., 2005). In a meta-analysis of 60 studies, training TBAs was associated with significant improvements in performance and perinatal mortality (Sibley and Sipe, 2004). However, the training of TBAs without the

support of skilled backup services does not reduce the maternal mortality rate (Alisjahbana et al., 1995; Greenwood et al., 1987). It has been recommended that this strategy be replaced by training of professional midwives (De Brouwere et al., 1998).

The health facility continuum-of-care approach promotes care for mothers and their children from pregnancy and childbirth, through the immediate postnatal period and childhood, recognizing that safe childbirth is critical to the health of both the woman and the newborn baby and that a healthy start in life is an essential step towards a sound childhood and a productive adulthood (Tinker et al., 2005). Another dimension of continuum-of-care is required to link households to health facilities by improving home-based practices, mobilizing families to seek the care they need and increasing access to the care at health facilities (Tinker et al., 2005; WHO, 2004). Another possible lesson from these findings is for the programmes to integrate community- and facility-based care. In a small-scale research setting, home-based neonatal care has been shown to work in Asian countries (Bang et al., 1999; Darmstadt et al., 2005) and might be appropriate in some African settings. Outreach and health education of families and communities to promote the adoption of evidence-based home-care practices and create demand for skilled care can bring early success in averting neonatal deaths (Darmstadt et al., 2005). Investing in scientific and technical advancement is a necessary step to improve neonatal and maternal health, but social changes

empowered by a strong political will should not be ignored (de Brouwere et al., 1998).

Quantitative studies are needed to assess the prevalence of these practices in different settings. For example, it is important to establish how frequently mothers delay initiation of breastfeeding and how commonly a mother would leave her house with a sick neonate to seek care. In addition, operational research is needed to improve links between communities and different levels of health facilities.

Our study has limitations and strengths that should be borne in mind. The study reveals cultural variations in newborn home-based care practices, which means that the results may not be generalisable to all women in Lindi and Mtwara regions or to other parts of the country. Furthermore, the study was based on retrospective reports of childcare practices and may be subject to recall bias. However, FGDs were used with individual follow-up interviews to explore specific opinions and experiences in depth as well as to produce narratives that address the continuity of personal experience over time (Duncan and Morgan, 1994). Our attempts to triangulate findings from different data sources were intended to maximize the reliability of the results and reduce potential biases (Patton, 2002). Thus, despite these potential concerns, our findings can inform the development of intervention strategies aimed at saving the lives of newborn babies.

7.6 Conclusions

We have demonstrated the existence of household and community birth preparedness efforts in southern Tanzania. However, access to effective, appropriate and skilled assistance for delivery poses a great challenge. Reliance on a wide range of unskilled birth assistants contributes to a lack of immediate appropriate care for both the mother and the newborn. Behaviour-change efforts to foster appropriate early newborn care practices are crucial to the success of neonatal survival programmes. A strong emphasis should be put on making simple and affordable interventions easily available through the health system and at the community level. Advice needs to be widely available on warming of the newborn soon after childbirth, proper hygiene and care at childbirth, and early and exclusive breastfeeding. These findings will contribute to the development of a programme for improving maternal and newborn care in rural Tanzania.

7.7 Authors' contributions:

MM, JAS, DS, HM and MT devised the study design and objectives; MM, JAS, AKM, HM and DS contributed to data collection, analysis and interpretation; MM did the data analysis and wrote the first draft of the manuscript; BO and HM provided technical support. All authors read, commented on and approved the final manuscript. MM and JAS are the guarantors of the paper.

7.8 Acknowledgements:

We thank all mothers and children of the study villages in Lindi Rural and Tandahimba districts for their participation in the study. We also would like to express our sincere thanks to our local collaborators, especially the Council Health Management teams of Tandahimba and Lindi Rural. We are also grateful to the Ifakara Health Research and Development Centre (IHRDC) for their invaluable contributions to supporting data collection and processing. We would also like to express our gratitude and thanks to Albert Majura and Ntaru Robert Wa-shija, who were involved in the data collection process. Special thanks also go to the IHRDC, IPTi staff: Kizito Shirima, Fatuma Manzi, Adeline Herman, Stella Magambo, Shekha Nasser, Yuna Hamis, Mwajuma Chemba and Werner Maokola for their mutual support during the whole period of this study. Last but not least we would also like to thank Beverly Msambichaka for editing the manuscript and Rachel A. Haws for her critical comments on the manuscript.

7.9 Funding

The work reported here received financial support from the Bill and Melinda Gates Foundation through the IPTi consortium. The funder of the study had no role in the study design, data collection, data analysis, data interpretation or writing the report.

7.10 Conflicts of interest

None declared.

7.11 Ethical approval

The study was conducted within the framework of the IPTi consortium (www.ipti-malaria.org) and received ethical approval from the local and national institutional review boards of Ifakara Health Research and Development Centre, the National Tanzania Medical Research Co-coordinating Committee, the Tanzania Commission for Science and Technology, the London School of Hygiene and Tropical Medicine, UK and the Swiss Tropical Institute in Switzerland.

7.12 References

- Ahmed, S., Sobhan, F., Islam, A., Barkat-e-Khuda., 2001. Neonatal morbidity and care-seeking behaviour in rural Bangladesh. *J. Trop. Pediatr.* 47, 98–105.
- Alisjahbana, A., Williams, C., Dharmayanti, R., Hermawan, D., Kwast, BE., Koblinsky, M., 1995. An integrated village maternity service to improve referral patterns in a rural area in West-Java. *Int. J. Gynaecol. Obstet.* 48, S83–94.
- Amooti-Kaguna, B., Nuwaha, F., 2000. Factors influencing choice of delivery sites in Rakai district of Uganda. *Soc. Sci. Med.* 50, 203–213.
- Armstrong-Schellenberg, J.R.M., Nathan, R., Abdulla, S. Mukasa, O., Marchant, T.J., Tanner, M., Lengeler, C., 2002. Risk factors for child mortality in rural Tanzania. *Trop. Med. Int. Health* 7, 506–511.
- Bang, A.T., Bang, R.A., Baitule, S.E., Reddy, M.H., Deshmukh, M.D., 1999. Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. *Lancet* 354, 1955–1961.
- Barnes-Josiah, D., Myntti, C., Augustin, A., 1998. The "three delays" as a framework for examining maternal mortality in Haiti. *Soc. Sci. Med.* 46, 981–993.
- Barnett, S., Nair, N., Lewycka, S., Costello, A., 2005. Community interventions for maternal and perinatal health. *Int. J. Obstet. Gynaecol.* 112, 1170–1173.
- Beck, D., Ganges, F., Goldman, S., Long, P., 2004. *Care of the Newborn Reference Manual*. Save the Children Federation, Washington, DC.
- Bhandari, N., Bahl, R., Mazumber, S., Martines, J., Black, R.E., Bhan, M.K., 2003. Effect of community-based promotion of exclusive breastfeeding on diarrhoeal illness and growth: a cluster randomized controlled trial. *Lancet* 361, 1418–1423.
- Bhuta, Z.A., Darmstadt, G.L., Hasan, B.S., Haws, R.A., 2005. Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of the evidence. *Pediatrics* 115, 519–617.
- Black, R., Kelley, L., 1999. *Reducing Perinatal and Neonatal Mortality*. Child Health Research Project Special Report: Report of a meeting, Vol. 3, No. 1. Baltimore, MD, May 10-12 1999, Johns Hopkins University, Baltimore, MD.
- Black, R.E., Morris, S.S., Bryce, J., 2003. Where and why are 10 million children dying every year? *Lancet* 361, 2226–2234.
- Blanchet, T., 1984. *Women, pollution and marginality: meanings and rituals of birth in rural Bangladesh*. University Press, Dhaka.
- Borghi, J., Ensor, T., Somanathan, A., Lissner, C., Mills, A., 2006. Maternal survival 4: Mobilising financial resources for maternal health. *Lancet* 368, 1457–1465.
- Campbell, O.M., Graham, W.J., 2006. Strategies for reducing maternal mortality: getting on with what works. *Lancet* 368, 1284–1299.

- Darmstadt, G.L., Bhutta, Z.A., Cousins, S., Adam, T., Walker, N., De Bernis L., 2005. Evidence-based, cost-effective interventions: how many newborn babies can we save? *Lancet* 365, 977–988.
- Darmstadt, G., Kumar, V., Yadav, R., Singh, V., Singh, P., Mohanty, S., Baqui, A.H., Bhart, N., Gupta, S., Misra, R.P., Awasthy, S., Singh, J.V., Santosham, M., 2006. Introduction of community-based skin-to-skin care in rural Uttar Pradesh, India. *J. Perinatol.* 26, 597–604.
- Darmstadt, G.L., Hussein, M.H., Winch, P.J., Haws, R.A., Lamia, M., El-Said, M.A., Gipson, R.F., Santosham, M., 2007. Neonatal home care practices in rural Egypt during the first week of life. *Trop. Med. Int. Health* 12, 783–797.
- Davies-Adetugbo, A.A., 1997. Social-cultural factors and the promotion of exclusive breastfeeding in rural Yoruba communities of Osun state, Nigeria. *Soc. Sci. Med.* 45, 113–125.
- Dawson, S., Manderson, L., Tallo, V., 1993. A manual for the use of focus groups. International Nutrition Foundation, Boston.
- De Brouwere, V., Tonglet, R., Van Lerberghe, W., 1998. Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized west? *Trop. Med. Int. Health* 3, 771–782.
- De Zoysa, I., Bhandari, N., Akhtari, N., Bhan, M.K., 1998. Careseeking for illness in young infants in an urban slum in India. *Soc. Sci. Med.* 47, 2101–2111.
- Duncan, M.T., Morgan, D.L., 1994. Sharing the caring: family caregivers' views of their relationships with nursing home staff. *Gerontologist* 34, 255–244.
- Ebrahim, C.J., Ahmed, A.M., Khan, A.A., 1998. *Maternal and Child Health in Practice: Training Modules for Middle Level Workers*. World Health Organisation/EMRO, Geneva.
- Edmond, K.M., Zandoh, C., Quigley, M.A., Amenga-Etego, S., Owusu-Agyei, S., Kirkwood, B.R., 2006. Delayed breastfeeding initiation increases risk of neonatal mortality. *Pediatrics* 117, 380–386.
- Ensor, T., Cooper, S., 2004. Overcoming barriers to health service access: influencing the demand side. *Health Policy Plan.* 19, 69–79.
- Gideon, H.A., 1962. A baby is born in the Punjab. *Am. Anthropol.* 64, 1220–1234.
- Greenwood, A.M., Greenwood, B.M., Bradley, A.K., Williams, K., Shenton, F.C., Tulloch, S., Bypass, P., Oldfield, F.S., 1987. A prospective survey of the outcome of pregnancy in a rural area of the Gambia. *Bull. World Health Organ.* 65, 635–643.
- Gwatkin, D.R., Bhuiya, A., Victora, C.G., 2004. Making health systems more equitable. *Lancet* 364, 1273–1280.
- Haider, R., Arshworth, A., Kabir, I., Huttly, S.R.A., 2000. Effect of community-based peer counsellors on exclusive breastfeeding practices in Dhaka, Bangladesh: a randomized controlled trial. *Lancet* 356, 1643–1647.
- Hsieh, H-F., Sarah, E.S., 2005. Three approaches to qualitative content analysis. *Qual. Health Res.* 15, 1277–1288.
- IPTi Consortium, 2008. <http://www.ipti-malaria.org/> [8 April 2008]
- Jeffery, P.M., Jeffery, R., Lyon, A., 1989. *Labour pains and labour power: women and childbearing in India*. Zed Books, London.

- Johanson, R.B., Spencer, S.A., Rolfe, P., Jones, P., Malla, D.S., 1992. Effect of post-delivery care on neonatal body temperature. *Acta Paediatr.* 81, 859–863.
- Knippenberg, R., Lawn, J.E., Darmstadt, G.L., Begkoyian, G., Fogstad, H., Walelign, N., Paul, V.K., 2005. Systematic scaling up of neonatal care in countries. *Lancet* 365, 1087–1098.
- Koblinsky, M., Matthews, Z., Hussein, J., Mavalankar, D., Mritha, M.K., Anwar, I., Achad, E., Adjei, S., Padmanabhan, P., Marchal, B., De Brouwere, V., Van Lerberghe, W., 2006. Maternal survival 3: Going to scale with professional skilled care. *Lancet* 368, 1377–1386.
- Lawn, J., Kerber, K., 2006. Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa. Partnership for Maternal, Newborn and Child Health, Cape Town.
- Lawn, J.E., Cousens, S., Bhutta, Z.A., Darmstadt, G.L., Martines, J., 2004. Why are 4 million newborn babies dying each year? *Lancet* 364, 399–401.
- Lawn, J.E., Cousens, S.N., Zupan, J., 2005. Neonatal survival 1. 4 million neonatal deaths: When? Where? Why? *Lancet* 365, 891–900.
- Lyon, A., 2004. Applied physiology: temperature control in the newborn infant. *Curr. Pediatr.* 14, 137–144.
- Marsh, D.R., Darmstadt, G.L., Moore, J., Daly, P., Oot, D., Tinker, A., 2002. Advancing newborn health and survival in developing countries: a conceptual framework. *J. Perinatol.* 22, 572–576.
- Martines, J., Paul, V.K., Bhutta, Z.A., Koblinsky, M., Soucat, A., Walker, N., Rajiv, B., Fogstad, H., Costello, A., 2005. Neonatal survival: a call for action. *Lancet*, 365, 1189–1197.
- McCall, E.M., Alderdice, F.A., Halliday, H.L., Jenkins, J.G., Vohra, S., 2005. Interventions to prevent hypothermia at birth in preterm and/or low birth weight babies. *Cochrane Database of Systematic Reviews*, Issue 1. DOI: 10.1002/14651858. <http://www.cochrane.org/reviews/en/ab004210.html> [7 April 2008]
- Mesko, N., Osrin, D., Tamang, S., Shrestha, B., Manandhar, D., Manandhar, M., Standing, H., Costello, A., 2003. Care for perinatal illness in rural Nepal: a descriptive study with cross-sectional and qualitative components. *BMC Int. Health Hum. Rights* 3, 3.
- Moore, K.M., 2000. Safer Motherhood 2000: Toward a Framework for Behaviour Change to Reduce Maternal Deaths. The Communication Initiative Network. <http://www.comminit.com/en/node/212302> [accessed 24 April 2008]
- Morrow, A.L., Guerrero, M.L., Shults, J., Calva, J.J., Lutter, C., Bravo, J., Ruiz-Palacios, G., Morrow, R.C., Butterfoss, F.D., 1999. Efficacy of home-based peer counselling to promote breastfeeding: a randomized controlled trial. *Lancet* 353, 1226–1231.
- Mrisho, M., Armstrong-Schellenberg, J., Mushi, A.K., Obrist, B., Mshinda, H., Tanner, M., Schellenberg, D., 2007. Factors affecting home delivery in rural Tanzania. *Trop. Med. Int. Health* 12, 862–872.

- Mullany, L.C., Darmstadt, G.L., Khatry, S.K., Katz, J., CleClera, S., Shrestha, S., Athikari, R., Tielsch, J.M., 2006. Topical applications of chlorhexidine to the umbilical cord for prevention of omphalitis and neonatal mortality in southern Nepal: a community-based, cluster-randomised trial. *Lancet* 367, 910–918.
- Nath, D.C., Goswami, G., 1997. Determinants of breastfeeding patterns in an urban society of India. *Hum. Biol.* 69, 557–573.
- NBS [Tanzania] and Macro International Inc., 1997. Tanzania Demographic and Health Survey 1996. National Bureau of Statistics, Dar es Salaam and Macro International Inc., Calverton, MD.
- NBS [Tanzania], 2004. 2002 Population and Housing Census: Regional Profiles. Government of Tanzania, Dar es Salaam.
<http://www.tanzania.go.tz/census/> [accessed 7 April 2008].
- NBS [Tanzania] and ORC Macro, 2005. Tanzania Demographic and Health Survey 2004-2005 - Key Findings.
<http://www.nbs.go.tz/publications/index.htm> [9 April 2008]. National Bureau of Statistics, Dar es Salaam and ORC Macro, Calverton, MD.
- NBS [Tanzania] and ORC Macro, 2007. Tanzania Service Provision Assessment Survey 2006 - Preliminary Report. National Bureau of Statistics, Dar es Salaam and ORC Macro, Calverton, MD.
- Okollo, S.N., Adewunmi, C.O., Okonji, M.C., 1999. Current breastfeeding knowledge, attitude and practices of mothers in five rural communities in the savannah region of Nigeria. *J. Trop. Pediatr.* 45, 323–326.
- Parlato, R.P., Darmstadt, G.L., Tinker, A., 2004. Saving Newborn Lives – Tools for Newborn Health. Qualitative Research Tool to Improve Newborn Care Practices, Save The Children, Washington, DC.
- Patton, M.Q., 2002. *Qualitative Research and Evaluation Methods* (3rd Ed.). Sage, Thousand Oaks, CA.
- Pope, C., Ziebland, S., Mays, N., 2000. Qualitative research in health care: analysing qualitative data. *Br. Med. J.* 320, 114–116.
- Ritchie, J., Spencer, L., 1993. Qualitative data analysis for applied policy research, in: Bryman, A., Burgess, R., (Eds), *Analysing qualitative data*. Sage, London, pp 155–171.
- Ronsmans, C., Graham, W.J., 2006. Maternal mortality: who, when, where, and why. *Lancet* 368, 1189–1200.
- Seidel, R., 2005. Behaviour Change Perspectives and Communication Guidelines on Six Child Survival Interventions. Academy for Educational Development/Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs with support from United Nation Children's Fund. <http://www.globalhealthcommunication.org/tools/76> [accessed 7 April 2008]
- Shirima, R., Greiner, T., Kylberg, E., Gebre-Medhin, M., 2001. Exclusive breastfeeding is rarely practised in rural and urban Morogoro, Tanzania. *Public Health Nutr.* 4, 147–154.
- Sibley, L., Sipe, T., 2004. What can a meta-analysis tell us about traditional birth attendant training and pregnancy outcomes? *Midwifery* 20, 51–60.

- Sinclair, J.C., 1992. Management of the thermal environment, in: Sinclair, J.C., Bracken, M.B. (Eds), *Effective Care of the Newborn Infant*. Oxford University Press, Oxford, pp 40–58.
- Tinker, A., Hooper-Beender, P.T., Azfar, S., Bustreo, F., Bell, R., 2005. A continuum of care to save newborn lives. *Lancet* 365, 822–825.
- WHO, 1997. Thermal protection of the newborn: a practical guide. http://www.who.int/reproductive-health/publications/MSM_97_2_Thermal_protection_of_the_newborn/thermal_protection_newborn2.pdf [7 April 2008].
- WHO, 1998a. Care of the umbilical cord: a review of the evidence WHO/RHTMSM/98.4. World Health Organisation, Geneva.
- WHO, 1998b. Protecting, promoting and supporting breastfeeding: a review of current scientific knowledge. World Health Organisation, Geneva, p1548.
- WHO, 2003. Working with individuals, families and communities to improve maternal and newborn health. Making pregnancy safer initiative: reproductive health and research. http://www.who.int/reproductive-health/publications/ifc/rhr_03_11_annex3.en.html [April 15 2008]. World Health Organisation, Geneva.
- WHO, 2004. Making pregnancy safer: The critical role of the skilled attendant. A joint statement by WHO, ICM and FIGO. World Health Organisation, Geneva. http://www.who.int/reproductive-health/publications/2004/skilled_attendant.pdf [8 April 2008].
- WHO, 2006. Integrated Management of Pregnancy and Childbirth. Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential care practice. World Health Organization, Geneva. <http://www.who.int/reproductive-health/publications/pcpnc/pcpnc.pdf> [8 April 2008].
- Winch, P.J., Alam, M.A., Akther, A., Afroz, D., Ali, N.A., Ellis, A.A., Baqui, A.H., Darmstadt, G.L., El-Arifeen, S., Seraji, M.H.R., 2005. Local understandings of vulnerability and protection during the neonatal period in Sylhet district, Bangladesh: a qualitative study. *Lancet* 366, 478–85.
- Zupan, J., Aahman, E., 2005. Perinatal mortality for the year 2000: estimates developed by WHO, World Health Organization, Geneva. Cited in Lawn, J. et al. 4 Million Neonatal Deaths: When? Where? Why? *Lancet* 2005, 365, 891–900.

CHAPTER 8

GENERAL DISCUSSIONS AND CONCLUSIONS



A new road linking Lindi and Mtwara Regions

Chapter 8: General Discussions and Conclusions

This thesis reports research examining various issues related to maternal and newborn health relevant for interventions to reduce maternal and newborn morbidity and mortality. The thesis specifies determinants of neonatal mortality, home deliveries, and subsequent help and health seeking behaviour for the newborns by mothers.

This chapter presents the overall discussions and key messages of the thesis, though detailed discussions of the findings that are discussed in the individual papers presented (chapters 4 to 7). I start with selected results from each paper reported in chapters 4 to 7, followed by a general discussion and a synthesis of the key results and continue with key messages followed by a discussion of methodological issues and key messages for the research community.

8.1 Selected results from each paper in the thesis

8.1.1 Health and survival of young children

In this paper (chapter 4), we presented information on health in children under two years and on infant survival from both household and health facility perspectives, using information from a 21,000-household survey in five districts of southern Tanzania and a census of health facilities serving this population. We assessed evidence of inequalities by sex, ethnic group, socio-economic status and distance to health service providers. The 2004 health facility survey revealed particular problems with staff absence and drug stocks. Staff absences were

common, with only about two-thirds of all employed staff present on the day of the survey. A group of seven essential oral treatments was found in less than half of all facilities. Council Health Management Teams (CHMTs) are responsible both for supportive supervision visits and drug supplies, and it seems that these aspects are not their highest priority. Referral is commonly complicated by lack of transport, distances to referral centres, and lack of pre-referral drugs. Given the staff absences and drug shortfalls, and the fact that only about one-fifth of all facilities had a supply of clean water, it is not surprising to see less than half of women giving birth in health facilities. In contrast, both childhood vaccine coverage and antenatal clinic attendance are well over 50% which suggests that universal coverage of preventive interventions may be attained by investing in health system.

The fact that 38% of all women had personally experienced a child death shows how common child deaths are in this area as well as in much of sub-Saharan Africa, where when a child dies, it is not particularly unusual. The high levels of unskilled birth attendants in the study area are likely to be a contributory factor to the level of neonatal mortality. Infant and neonatal mortality rates were consistent with findings from other sources [1], [2]. The reduction of neonatal mortality over the past 20 years has been inadequate, especially for deaths during the first week of life and particularly in the poorest countries [3].

In keeping with previous studies our results show that infants born to teenage mothers are at particularly high risk. The same applies for twins, and infants born to mothers with no formal education [4], [5]. More surprisingly, perhaps, we found little evidence that neonatal mortality rates were associated with maternal education, in contrast to the post-neonatal period, when mortality rates were 50% higher for mothers with no formal education compared with those who had had at least one year of schooling. From the qualitative findings, our results show that newborns are kept indoors for several days after delivery in order to wait for the umbilical cord to fall off [6]. This behaviour can limit care seeking for newborn. Distance to health facilities has long been described as a barrier to their use [7], [8], [9], [10], [11]. In our study, children living over 5km from a health facility had lower vaccine coverage, fewer nets, more anaemia, poorer care-seeking and higher infant mortality than those living closer. This suggests a need to bring health services closer to the people, in spite of the fact that Tanzania has an advantage in comparison to its neighbors: three-quarters of the population live within about 5km of their nearest facility. To reduce neonatal mortality, a more holistic approach is needed that combines technical interventions with community involvement. Improving basic infrastructure in health facilities, including clean water, soap, beds, curtains for privacy and equipment for EmOC can help to save the lives of newborns. There is also a need to improve supervision of health facility staff to improve quality of care including sensitivity toward patients as well as addressing health workers' complaints and stresses on the job.

8.1.2 Factors affecting home delivery

This paper (chapter 5) was designed to understand factors influencing the choice of place of delivery and discuss their implications for neonatal survival. This study combined both quantitative and qualitative data to document the delivery patterns and the characteristics of mothers having home or health facility deliveries in five districts of southern Tanzania. The study identified important factors which prevent more than half of the women from delivering in peripheral health facilities including the district hospitals. Out of 20,138 women of reproductive age (15-49) visited, 19,008 (94%) were interviewed. Data were available for 9,152 women who had delivered in the three years prior to survey. For their most recent birth 5,317 (58%) delivered at home, and 3,835 (42%) at the health facility. In univariate analysis comparing home and health facility deliveries, differences between subgroups reached statistical significance ($p < 0.05$) for all variables considered (ethnicity, gender of the household head, mothers education, mothers age at the time of child birth, and wealth quintiles). There was variation between ethnic groups with respect to place of delivery ($p < 0.0001$), with the Yao being more likely to deliver at a health facility than the Makonde or Mwera [RR 1.48, 95% CI 1.34-1.63]. Women who lived in male headed household were less likely to deliver in a health facility [RR 0.86, 95% CI 0.8-0.91]. Mothers with primary and higher education were more likely to deliver at health facility than mothers with no education [RR 1.30, 95% CI 1.23-1.38]. Younger mothers were more likely to deliver at a health facility compared to other age groups (RR 0.89, 95% CI 0.83-0.95). The least poor women were more likely to deliver in health

facilities compared to the poorest with a 7% increase in the risk of delivering in health facility for every increase in wealth quintile [RR 1.07, 95% CI 1.03-1.43]. Using a generalized linear regression model, all variables (ethnicity, gender of the household head, mother's education, mother's age at the time of child birth, wealth quintile) remained independently associated with place of delivery.

Additionally, the quantitative findings corroborated with qualitative findings. The qualitative findings suggest that lack of money to pay for delivery kits, fare and food while in the health facility was the main reason for home birth reported in different focus group discussions and in-depth interviews. The majority of women also mentioned that it was more inexpensive to deliver at home than in a health facility. Other factors that were associated with home birth included lack of transport, poor staff attitude, and poor quality of services. In some areas women preferred going to a private health facility, where they had to pay for services offered, rather than attending a free government health facility that was closer to their homes. This implies a perceived better quality of services offered by private health facilities in our rural research setting. In addition, prolonged labour is normally attributed to sexual misbehaviour of the father or the mother-to-be, triggering socially sanctioned confessions to hasten childbirth. In such cases desire for privacy may prevent or delay use of a health facility. The study also provides evidence that women's decisions about the place of delivery are not only determined by women's perceptions of risk associated with pregnancy but also by a combination of other factors such as household income and quality of

service. Decisions about women's mobility and expenditure on health care are controlled by men who may limit women's search for health care. This suggests that improving women's access to income might strengthen their bargaining power to influence place and timing of delivery. Our findings highlighted determinants to be addressed in order to promote skilled attendant use among women.

8.1.3. The use of antenatal and postnatal care: perspectives and experiences of women and health care providers

The objective of formal ANC is not optimised to its full potential (chapter 6). Many women reported that the reason for going to ANC was to confirm early pregnancy, to prevent miscarriage, to check or monitor the development of the baby and to get advice from the nurses. Women also reported that they went to get a clinic card in order to guarantee being attended in case of emergencies and to avoid being reprimanded by clinic staff for late initiation of ANC. This suggests a need for sensitization of communities with clear messages on the importance of early ANC. Generally, women attending ANC were expected to use the same clinic throughout their pregnancy unless they were away from their villages. This helps to ensure follow up and record keeping, including delivery outcome, provided the women deliver in a health facility. In urban settings there are often many facilities to choose from, it might be more difficult for women to attend the same clinic.

In all study areas many women were late in starting ANC and PNC. Some women first attend ANC in their 9th month of pregnancy. The few who reported going at 2nd or 3rd months often complained that nurses would question them why they attended so early, and even tell them to come back later. Generally, most women said they were supposed to go to start ANC clinic with 3 months, but most start around the 5th and 6th months. The majority of those who gave birth at home did seek PNC services, but they reported attending three to seven days after childbirth. Their reasons for the delay were mainly due to waiting for the baby's cord stump to fall off, to allow the mother and baby to regain energy lost during childbirth, lack of money and distance to the health facility. Overall, the perception of ANC and PNC among mothers who used the services was positive. However, to increase the availability and effectiveness of ANC and PNC services, staff shortages and a skills gap, the lack of equipment supplies and proper PNC guideline must be addressed. This should be associated with better living conditions for health care providers, as well as incentives for good job performance and consequently, would improve delivery of health services [12], [13], [14], [15].

8.1.4 Understanding home-based neonatal care practice

In general, the nature of birth preparedness (chapter 7) was similar across study sites although there was no evidence as to whether women and their families plan where childbirth would take place. Most home births were assisted by unskilled attendants, mainly close relatives, TBAs or sometimes neighbors. This

contributes to a lack of immediate appropriate care for both mother and baby. Grandmothers, mothers, sisters and aunts were frequently reported as having assisted during deliveries. Women who had delivered three or more times were reported to deliver at home without any support. Hygiene during home births is often poor, because of poor awareness, particularly by untrained attendants. Gloves are not always used during childbirth and hands may not be washed either. Babies are born onto various surfaces, ranging from health facilities beds to dusty floors. The delivery place at home is usually on a bed covered with cotton sheets, a woven grass mat or cloths, and sometimes on the ground, disregarding hygiene care during childbirth. When a baby is born at home, the attention is on the life of the mother and the child, and little is thought about hygiene.

Practices associated with cord cutting and application of cord healing materials varied from place to place. Clean cord cutting was common for births in formal health facilities where appropriate instruments such as razor blades, umbilical clamps or scissors were used. TBAs or relatives reported using razor blades or even a sharp millet stem for cutting the cord. Traditional herbs such as ash, breast milk, fluid from pumpkin flowers and a powder ground from a local tree were applied to heal the cord. It is common practice to clamp the umbilical cord immediately after childbirth. Studies have recently shown that delay in cutting of the umbilical cord is beneficial to the infants. Delayed Cord Clamp (DCC) can offer a sustainable strategy to reduce early infant anaemia risk when other

interventions are not yet feasible [16]. This strategy can potentially be tested to see its relevance in our local situation.

There was generally a strong awareness that newborns should be properly cleaned, dried and warmed. Both those who delivered at home and those who delivered in health facilities reported the use of thick clothes traditionally known as *khanga* or *vitenge* for warming them. Mothers of the newborn, TBAs and health workers are well aware of the need to keep a baby warm and carefully make sure that the newborns don't get cold. After birth, sesame or other cooking oil is applied on the body to soften the skin and warm the baby.

Although it is not clear whether the majority of newborns are breastfed within an hour, most of the interviewees reported breastfeeding immediately after birth. In addition, some newborns are denied colostrum, which is perceived as dirty and sometimes mothers feel they do not have enough milk for the first few days and fed the newborn with sweetened warm water. Breast milk is a sole and sufficient source of nutrients during the first 6 months of life [17], [18] and has an impact on mortality and morbidity decline [19, 20], [21]. A recent study in Ghana has also shown an association between breastfeeding within an hour of birth and neonatal survival [22], [18]. Behaviour change communication strategies to reinforce appropriate care for the mother and the newborn are highly needed in this rural setting.

Care seeking varied with perceived cause of the newborn illnesses. Generally, for most caretakers, the perceived cause of the illness influenced choice of health care provider and patterns of care seeking. Very few would take a baby with convulsions to a formal health facility, as convulsions were almost universally recognized to be of spiritual origin and thus requiring spiritual healing. Most of the care seeking patterns that were reported indicated delays in making the decision to seek care soon after suspecting newborn illness. As noted by others, we also found a multifaceted pattern of health care seeking behaviour including self medication with both traditional and modern medicines, use of traditional healers and formal health care providers. The restriction of the movement of mother and newborn outside the home is potentially risky and a potentially limiting factor for care seeking [23], [24]. In our study areas, seclusion of both mother and baby was reported to be 40 days, which is similar to that reported in other parts of the world [25, 26], [27], [24].

8.2 General discussion of the synthesis of the key results

The present study revealed key areas for strengthening both the health system and the community. Relatively short distances to health facilities, high antenatal and vaccine coverage show that peripheral health facilities have huge potential to make a difference to health and survival at household level. Nevertheless, drug shortages, staff absenteeism, poor staff attitude, lack of privacy and water supply problems show that there is a long way to go before facilities are able to optimise the quality of care they provide.

Women are forced by the circumstances to prepare some materials such as razor blades, gloves and cotton for childbirth. Some also set aside money for emergencies. Home deliveries are caused in part by transport cost, poor quality of care in health facilities and lack of privacy. Despite many good essential newborn care practices, we also found risky behaviour for the newborn in relation to resuscitation, drying and warming, breastfeeding, cord care, skin care and eye care. A positive attitude towards antenatal and postnatal care can offer an opportunity for integrating the health system and the community. Efforts to improve antenatal and postnatal care should therefore focus on increasing geographical and economic access while observing cultural sensitivity. Antenatal care can offer important opportunities for linking the health system and the community and can be used to promote women to use skilled attendants at delivery. Women's access to income must be addressed strongly, as it might strengthen their bargaining power to influence place and timing of delivery. This could be done by providing affordable credit to rural women groups through self help groups [28]. Promoting female education, especially primary and higher education, as well as continued health education, accompanied by a suitable and effective health care delivery system will lead to sustainable safer motherhood practices. Consequently, any measure aimed at encouraging women to deliver in health facilities will have to involve people who influence their decisions if they are to be successful. Midwife-assisted home births could possibly improve the safety of the mother and the newborn. The problem of the client-health provider relationship, however, needs to be addressed in these rural settings as well as in

other parts of Tanzania [29]. Most literature has also shown that abuse and neglect of patients by health care providers lies in structural issues, including salaries, conditions of services [30] and shortage of staff and equipment [31], [32], [33]. Findings of this and other studies [31] provide an important venue which might help to strengthen the client-health care provider relationship. Behaviour-change efforts to foster appropriate early newborn care practices are crucial to the success of neonatal survival programmes. Change to a society's own health culture has a good chance of persisting for generations even without relatively high tech clinics which could save even more newborn babies [34]. A strong emphasis should therefore be put on making simple and affordable interventions easily available through the health system and at the community level.

8.3 Key messages

8.3.1 Key messages for health system

The evidence of this thesis has shown that there is an urgent need for improving the infrastructure of basic health facilities in the research area. For example most rural health facilities need to be equipped with clean water, beds, and curtains for privacy and basic equipments for emergency obstetric care (EmOC) such as forceps and vacuum extractors for assisted delivery as well as vacuum aspirators and D&C kits for removal of retained products. Basic emergency obstetric care (EmOC) refers to medical interventions that can be provided in a health centre and small maternity home by a nurse, a midwife or a doctor [36].

This involves administration of antibiotics, oxytocics, or anticonvulsants; manual removal of the placenta; removal of retained products following miscarriage or abortion; assisted vaginal delivery with forceps or vacuum extractor typically delivered in hospital [36]. Comprehensive emergency obstetric care includes all basic functions and caesarean section, anaesthesia and safe blood transfusion. These require trained staff, an operating theatre and are usually performed at hospital [36]. Pregnant women must have access to EmOC at the onset of every obstetric emergency. Basic EmOC must be available and provided in appropriate health facilities, in our case at the health centres while comprehensive EmOC are provided at the district or regional hospitals. For EmOC to be effective it must be linked to community care, that is the community members must be able to understand dangers signs that must be linked to EmOC services and there should be an efficient referral system for EmOC to be effectively implemented. A health care provider with midwifery skills should therefore be present at every delivery.

Addressing staff shortages through expanding training opportunities and incentives to health care providers is a key step to improve maternal and newborn health. The Ministry of Health, through the local governments, can play a vital role to ensure that health workers are recruited, motivated, maintained, trained and regularly supervised so as to provide friendly and competent services.

A sound periodical review of the supervision of health facility staff is needed to improve the overall quality of care. Health workers' complaints and stresses on the job need to be taken into account in order to improve their performance.

There is also a need to test for payment based-output schemes to see if they can motivate and enhance health care providers to offer more friendly and supportive care to their clients.

Antenatal care can offer important opportunities for linking the health system and the community and can be used to promote women to use skilled delivery. If health interventions are to be effectively implemented, incentive development schemes are needed to be tested to maximise utilisation of health facilities for earlier antenatal care enrolment and childbirth.

Development of postnatal care guidelines for mother and the newborn is crucial to identify maternal complications and LBW newborns that need extra care. Most newborn deaths can be avoided through implementing and promoting simple and evidence-based interventions such as promoting skin to skin warmth, early breastfeeding as well as helping to feed those unable to breastfeed. Those who are unable to breastfeed should be referred to the nearest health facility.

8.3.2 Key messages for the community

Behaviour change communication strategies are needed that capitalize on common and positive themes in local beliefs about pregnancy and newborn care. These should include early antenatal care, birth plans and preparedness, use of skilled attendants during delivery, cleanliness and purity in newborn care, care of the umbilical cord, promotion of immediate and exclusive breastfeeding, information on danger signs and action needed for sick newborns; and on recognition of and action needed for low birth weight babies.

There is a need to test different mechanisms of community mobilization funds to provide affordable emergency transport for women with complications and their newborns.

Encouraging traditional healers and Traditional Birth Attendants (TBA) to refer sick newborns to the formal health system may help to save newborn lives.

Women's access to income must be addressed strongly, as it might strengthen their bargaining power to influence place and timing of the delivery.

Any measure aimed at encouraging women to deliver in health facilities will have to involve people who influence their decisions if they are to be successful. This includes health care providers, their husbands, their mothers, relatives, traditional birth attendants, traditional healers, mother in laws and grandmothers.

Midwife-assisted home births could possibly improve the safety of the mother and the newborn.

Promoting female education, especially primary and higher education, as well as continued health education, will lead to sustainable safer motherhood practices accompanied by suitable and effective health care delivery system.

8.4 Methodological issues

In Tanzania, as in many developing countries, vital registration and routine health information are incomplete. Cross-sectional household surveys are often used to estimate levels and trends in mortality, morbidity and intervention coverage. More rarely, cross-sectional health facility surveys are applied to assess aspects of the structure and functioning of the health system, including quality of care. Large-scale linked data from both, household and health facility perspectives (chapter 4) provide an opportunity to study the health delivery system in parallel with health and social issues at community level. The gender framework model (chapters 1 and 5) revealed interesting findings from clients as well as health care providers. It provided information on functional and structural aspects of the health system as well as household and community issues that might be supportive for affordable, deliverable and sustainable child survival interventions. The use of Personal Digital Assistants (PDAs) for data entry at the point of collection (chapters 4 and 5) enabled us to save time and enhanced the quality of

data in a survey of over 21,000 scattered rural households in southern Tanzania [35]. Although data security is intermittently raised as a main concern in PDA data collection, we however didn't lose any data during the survey. We minimized these risks by closing records on completion of the household module, just before leaving the house and making it impossible to view records on the PDA afterwards [35]. During the survey, data quality was also ensured throughout by several quality assurance steps. Firstly, for every interviewer at least one interview was accompanied by a supervisor each day. In addition, key questions from the survey were included in a separate, repeat interview completed by supervisors on randomly-selected households that had been interviewed the same day [35]. The qualitative findings (chapters 5, 6 and 7) provided important preliminary insights into the combination of factors shaping the choice of delivery place and highlighted various issues related to home-based neonatal care practices. The qualitative research team comprised experienced male researchers including a demographer, a sociologist, a note taker and a transcriber. Moreover, the team had a good rapport with the community members. This helped to ensure validity and reliability of the data collected. The use of qualitative techniques enabled us to gain a better understanding of community views and perceptions regarding antenatal, childbirth practices and postnatal care services than was previously available. These findings provide new information for policy-makers responsible for maternal care and child health in low-income settings. However, local differences must be considered when interpreting findings for areas outside these study districts and beyond the

borders. Our efforts to triangulate findings from varied data sources were deliberate to maximise the reliability of the results and minimise potential biases (Patton, 2002).

8.5 Key messages for the research community

Building on the results of this study several follow-up studies would be highly advisable. Firstly, further qualitative and quantitative studies are needed to assess the prevalence of the mentioned practices in different settings. It would be particularly interesting to further analyse the extent to which key practices during pregnancy, childbirth and postpartum reported in this thesis (chapters 5, 6 and 7) are of importance also at household level in other settings. In this context it is crucial to learn for example, how frequently mothers delay the initiation of breastfeeding and whether a mother would leave her house with a sick neonate to seek care. Secondly, there is also a need for more in-depth research to investigate why children born in households headed by Makonde are at lower risk of anaemia, malnutrition and infant death than those in households headed by other common ethnic groups. Thirdly, the gender framework model revealed interesting findings from the client's point of view. Further studies will be needed to look more on the provider's perspective. Fourthly, in a similar way, cause-specific neonatal mortality data are essential to supplement this study. Fifthly, there is an urgent need to explore community-based financing schemes to help alleviating transport problems for women experiencing obstetric emergencies or for sick newborns. Sixthly, it is important to explore other hidden factors in

relation to health facility staff, in order to improve communication with women who seek care from health facilities. Additional research on the role of contextual factors such as distance, perceived type of illness, costs, social relationships and status that determine the choice of providers for care during pregnancy, childbirth and the neonatal period are crucial. Lastly but not least there is a need to explore strategies for providing postnatal care for mothers and newborns, particularly to reach mothers and their babies after home birth.

8.6 References:

1. NBS [Tanzania], *2002 Population and Housing Census: Regional Profiles, Dar es Salaam: Government of Tanzania. Available at: [http://www.tanzania.go.tz/census].* 2004.
2. NBS [Tanzania] & ORC Macro, *Tanzania Demographic and Health Survey 2004-2005 - Key Findings.* Calverton, Maryland, USA: NBS and ORC Macro. 2005.
3. Lawn JE; Cousens S & Zupan J, *4 million neonatal deaths: When? Where? Why?* Lancet, 2005. **365**: p. 891-900.
4. Desai S & Alva S, *Maternal education and child health: is there a strong causal relationship?* Demography, 1991. **35**: p. 71-81.
5. Feachem R & Jamieson DT, (eds): *Disease and Mortality in sub-Saharan Africa.* Oxford University Press, Oxford. 1991.
6. Mrisho M; Armstrong Schellenberg J; Mushi AK; Obrist B; Mshinda H; Tanner M; Schellenberg D, *Understanding home-based neonatal care practice in rural southern Tanzania.* Trans R Soc Trop Med Hyg, 2008. **102**: p. 669-678.
7. King MH, (Editor): *Medical Care in Developing Countries.* Oxford: Oxford University Press. 1967.
8. Muller I; Smith T; Mellor S; Rare L; Genton B, *The effect of distance from home on attendance at a small rural health centre in Papua New Guinea.* Int J Epidemiol, 1998. **27**: p. 878-84.
9. NoorAli R; Luby S; Rahbar MH, *Does use of a government service depend on distance from the health facility?* Health Policy Plan, 1999. **14**: p. 191-7.
10. Stock R, *Distance and the utilization of health facilities in rural Nigeria.* Soc Sci Med, 1983. **17**: p. 563-70.
11. Weber MW; Milligan P; Sanneh M; Awemoyi A; Dakour R; Schneider G; Palmer A; Jallow M; Oparaogu A; Whittle H; Mulholland EK; Greenwood BM, *An epidemiological study of RSV infection in the Gambia.* Bull World Health Organ, 2002. **80**: p. 562-8.
12. Franco LM; Bennett S & Kanfer R, *Health sector reform and public sector health worker motivation: a conceptual framework.* Social Science and Medicine, 2002. **54** (1255-1266.).
13. Franco LM; Bennett S; Kanfer R & Stubblebine P, *Determinants and consequences of health worker motivation in hospitals in Jordan and Georgia.* Social Science and Medicine, 2004. **58**: p. 343-355.
14. Rowe AK; De Savigny D; Lanata CF & Victora CG, *How can we achieve and maintain high-quality performance of health workers in low-resource settings?* Lancet, 2005. **366**: p. 1026-1035.
15. Wyss K, *An approach to classifying human resources constraints to attaining health-related Millennium Development Goals.* Hum Resour Health, 2004. **2**(11): p. doi:10.1186/1478-4491-2-11.

16. Van Rheezen P; De Moor L; Eschbach S; De Grooth H & Brabin B, *Delayed cord clamping and haemoglobin levels in infancy: a randomised controlled trial in term babies*. Tropical Medicine and International Health volume, 2007. **12** (5): p. 603-616.
17. WHO, *Protecting, Promoting and supporting breastfeeding. A review of current scientific knowledge*. 1998, World Health Organisation, Geneva: WHO, 1998: 1548.
18. WHO, *Intergrated Management of Pregnancy & Childbirth. Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential care practice*. (accessed on 22nd March 2007 at <http://www.who.int/reproductive-health/publications/pcpnc/pcpnc.pdf>). 2006, Geneva: WHO.
19. Morrow AL; Guerrero ML; Shults J et. al, *Efficacy of home-based peer counseling to promote breastfeeding: a randomized controlled trial*. Lancet, 1999. **353**: p. 1226-31.
20. Haider, R., Arshworth, A. Kabir I, & Huttly SRA., *Effect of Community-based peer counselors on exclusive breastfeeding practices in Dhaka, Bangladesh: A randomized controlled trial*. Lancet, 2000. **356**: p. 1643-47.
21. Bhandari N; Bahl R; Mazumber S; Martines J; Black RE; Bhan MK; & the Infant Feeding Study Group., *Effect of Community-Based promotion of exclusive breastfeeding on diarrhoeal illness and growth: a cluster randomized controlled trial*. Lancet, 2003. **361**: p. 1418-23.
22. Edmond KM; Zandoh C; Quigley MA et al., *Delayed breastfeeding initiation increases risk of neonatal mortality*. Pediatrics, 2006. **117**: p. e380-86.
23. Mesko N; Osrin D; Tamang S; Shrestha B; Manandhar DS; Manandhar M; Standing H; & Costello AM de L, *Care for Perinatal illness in rural Nepal: A descriptive study with cross-sectional & qualitative components*. BMC International Health & Human Rights 2003, 2003. **3**: p. 3.
24. Winch P, A.M., Akther A, Afroz D, Ali NA, Ellis AA, Baqui AH, Darmstadt GL, Arifeen S, Seraji MHR, & the Bangladesh PROJAHNMO study Group., *Local understandings of vulnerability and protection during the neonatal period in Sylhet district, Bangladesh: a qualitative study*. Lancet, 2005. **366**(9484): p. 427-520.
25. Gideon HA, *A baby is born in the Punjab*. 1962. **64**: p. 1220-34.
26. Blanchet T, *Women, pollution and marginality: meanings and rituals of birth in rural Bangladesh*. 1984, Dhaka: University press.
27. Jeffery PM; Jeffery R & Lyon A, *Labour pains and labour power: Women and childbearing in India*. 1989, London: Zed Press.
28. Ghadoliya MK, *Empowering Women Through Self -Help Groups: Role Of Distance Education*. [available at http://www.col.org/pcf3/Papers/PDFs/Ghadoliya_MK.pdf] accessed on 20th August 2008.
29. Mwangi R; Chandler C; Nasuwa F; Mbakilwa H; Poulsen A; Bygbjerg IC; Reyburn H, *Perceptions of mothers and hospital staff of paediatric care in*

- 13 public hospitals in northern Tanzania*. Transactions of the Royal Society of Tropical Medicine and Hygiene, 2008. **102**: p. 805-810.
30. Gilson L; Alilio M & Heggenhougen K, *Community satisfaction with primary health care services: an evaluation undertaken in the Morogoro region of Tanzania*. Social Science and Medicine, 1994. **39**: p. 767-780.
 31. Jewkes R; Abrahams N; Mvo Z, *Why do nurses abuse patients? Reflections from South African Obstetric services*. Soc. Sci. Med. **47**(11): p. 1781-1795.
 32. Sargent C, *1989 Maternity, medicine and power. Reproductive decisions in urban Benin*. University of California Press, Berkeley.
 33. Sargent C and Bascope G, *Ways of knowing about birth in three cultures*. Medical Anthropology Quarterly, 1996. **10**: p. 213-237.
 34. Kohn D, *Community involvement saves newborn infants in India*. Lancet, 2008. **371** (9620): p. 1235-1236.
 35. Shirima K; Mukasa O; Armstrong Schellenberg J; Manzi F; John D; Mushi A; Mrisho M; Tanner M; Mshinda H; Schellenberg D, *The use of Personal Digital Assistants for Data Entry at the Point of Collection in a Large Household Survey In Southern Tanzania*. Emerging Themes in Epidemiology, 2007. **4**: p. 5 (1 June).
 36. UNFPA, No woman should die giving life. FACTS and FIGURES 4. Available at: http://www.unfpa.org/safemotherhood/mediakit/documents/fs/factsheet4_eng.pdf

Appendices

Appendix 1: Discussion guide 1

Appendix 2: Discussion guide 2

Appendix 1: Discussion guide 1

In-depth interview/FGD

General knowledge on newborn care

- What is common perception of “clean” delivery (eg hands wash before, during and after delivery, of instruments used, during delivery or the surface on which the woman give birth)
- The common definition of clean/dirty environment
- The perceptions of link between cleanliness and infections if any
- Importance of hands wash before, during and after delivery; immediately drying and warming of the newborn
- What are the importance of clean cord care
- The degree to which poor facility is influenced by perceived low quality of services and attention
- What are benefits of early breastfeeding
- What are the merit and demerits of Antenatal care; barriers for ANC
- Multiple responsibilities and care seeking for the newborn (eg care of children, collecting water or fuel, cooking, cleaning, growing food, and trade or other employment)

Place of delivery

1Q: *Ulijifungulia wapi mtoto wako wa mwisho kuzaliwa?kwa nini? Ulihudhuria*

clinic mara ngapi?na kwa nini?

Where did you give birth to your most recent birth?Why? how frequency did you visited ANC in your last pregnancy?why?

2Q: *Kwa nini akina mama hujifungulia nyumbani?*

Why do mothers give birth at home?

3Q: *Sababu gani zinawafanya akina mama wajifungulie hospitali?*

Why do mothers give birth at health facilities?

4Q: *Je ni maandalizi gani ya mama kujifungulia nyumbani/hospitalini? Kuna tofauti?**

What are preparations for health facility/home delivery? Any difference?

Newborn care at home

5Q: *Nini kinachofuatia pindi mtoto wako alipozaliwa? Je alisafishwa pua na mdomo mara baada ya kuzaliwa?unafanya nini kumkinga na baridi?*

What happened to your child after birth? Were the nose and mouth cleared immediately after births?(was it before or after delivery of placenta?) What do you do to keep newborn warm?

6Q: *Nani alifanya mambo hayo?Alitumia nini? Anaogeshwa kipindi gani (maji moto/baridi/vuguvugu?*

Who did these things? What did they use? When do the newborn get baths? (Is it acceptable to delay bathing until the second day?)

7Q: *Je ni namna gani mtoto anachunguzwa?*

How is the baby examined; what parts of the body are examined? What is done for none breathing/crying baby? [Especially appropriate to ask TBAs, other providers or people attending a birth]

8Q: *Je ni nani anamwalia mtoto pindi tu azaliwapo?*

Which person/people take care of the baby immediately after it is born? (determine whether the newborn has skin-to-skin contact with the mother and how soon would it take)

9Q: *Je ni nani humwangalia mtoto pindi nyumba ya uzazi inapotolewa?*

Which person/people take care of the baby while the placenta is being delivered?.

Cord Care

10Q: Ni vifaa/kitu gani kinatumika kukata na kufunga kitovu?

What instruments/materials are used to cut and tie the cord? (what measures if any are taken to clean these instruments?) & what might facilitate the use of clean instruments?)

11Q: Ni dawa gani (kama ipo) inayotumika kupaka kitovu, na inatolewa na nani??(mara ngapi kwa siku?)

What substances, if any, are applied to the cord stump and by whom?

(duration of this treatment): would it be acceptable to simply keep cord stump clean and dry and apply nothing?

Feeding practices

12Q: *Je maziwa ya mwanzo ya mama yanaitwaje?Taja majina yote ya kilugha.*

What are the names/terms for colostrum or "first milk"? Get a full list of local terms

13Q: *Je mama anampa mototo maziwa ya mwanzo? Je yanatumika katika matumizi mengine? (Mfano kutia jichoni). Nini sababu za kufanya mambo haya?*

Do mothers give colostrum to the infant? Is it used for other purposes (e.g., put in eye)? What are the reasons for doing these things?

15Q: *Je ni mambo gani yanaaminika kimila kuhusiana na maziwa ya mwanzo?*

What are the beliefs about benefits/drawbacks of colostrum?

16Q: *Je ni muda gani baada ya kuzaliwa mototo anaanza kunyonyeshwa?*

At what point in time after baby is born is breastfeeding initiated?

17Q: Je ni wakati gani, na kiasi gani na mara ngapi mtoto ananyonyeshwa kwa siku? Je mtoto ananyonyeshwa anapotaka au au kuna ratiba/muda maalum? Usiku ananyonyeshwa?

What is the time, quantity, duration, and frequency of each breastfeed? Is feeding on-demand or scheduled? Are there night feeds?

18Q: Je ni muda gani mama humnyonyesha mwanae mchanga? (Katika kipindi cha mwaka mmoja). Ni muda/Kipindi gani mtoto hunyonyeshwa maziwa ya mama tu?

What is the duration of time women breastfeed their infants? For how long do women exclusively breastfeed their infants?

19Q: Je umeshapata tatizo lolote ukimnyonyesha mwanao? Je ni matatizo gani yanayojulikana? Nini kinayasababisha?

Have you had any problems breast feeding? What are common problems? What causes them?

20Q: Je ni vyakula gani mtoto hupewa mbali na maziwa ya mama?

What substances other than breastmilk are given to the newborn? What substances other than breastmilk are given to the newborn?

21Q: Je vyakula hivi huanza kupewa mtoto katika kipindi gani? (cha umri wake)

At what points in time are these substances given?

22Q: Ni sababu gani za kumpa mtoto vyakula hivyo?

What are the reasons for giving these substances?

23Q: Je mtoto hupewa kiasi gani cha chakula? Analishwa vipi?(kijiko, chupa nk?)

What quantity is given? How are these substances given?

24Q: Je vyakula hivi huitwa nini kwa kilugha?

What are the names/local terms for these substances?

Newborn Care from Traditional and Formal Health Providers & Influential

25Q: Je ni aina gani ya watoa huduma ya afya hufuatwa mara baada ya mtoto kuzaliwa? Na ni kwa sababu gani?

What types of providers are sought for immediate newborn care (when baby is born)? What are the reasons?

26Q: Je ni faida gani/hasara zinzopatikana kwa kichanga kwa kuwa na mtoa huduma aliyepewa mafunzo au wa kienyeji?

What are the benefits/disadvantages to the newborn of having a trained (formal) provider present when the baby is born? Of having a traditional provider?

27Q: Je ni mambo gani yanayopendelewa/yasiyopendelewa kimila kuhusiana na mtoto mchanga (mfano ktk kumnyonyesha, kumpa jina na sherehe)

What are the preferences/taboo regarding newborn/care of the newborn (e.g., breastfeeding, naming, ceremonies)?

28Q: Je unajuaje kama mtoto mchanga anaumwa? Ni matatizo gani ya kiafya yanawakabili watoto wachanga? Je ni njia gani unachukua kukabiliana na hali hizo?

How do you know if the baby is sick? What [health problems] do very young babies experience? What is the best thing to do for each of the conditions mentioned?

30Q: Je ni njia gani ya usafiri inatumika katika kufuatilia huduma ya mtoto?

What mode of transportation is used to get routine care for the newborn?

31Q: Je mama/familia anazungumza na nani hasa kuhusiana na huduma ya mtoto?

With whom do women/families talk about newborn care/issues?

Overcoming barriers

32Q: *Je nini mapendekezo ya wanajamii kuhusu namna ya kukabiliana na matatizo wakati wa kupata huduma za afya kwa ajili ya watoto wachanga?*

What suggestions do community members have about how to overcome problems in accessing newborn care?

33Q: *Je nini mapendekezo yako/yenu juu ya uboreshaji wa huduma ya afya kwa ajili ya watoto wachanga?*

What is your suggestion to improve newborn health care?

Follow up questions: Where do women give birth at home? Probe: uses of ash How often do women moves to their parents to give birth? When when do they stop working?

Pollution: who gets, when ends, how end, what happens

Appendix 2: Discussion guide 2

In-depth interview/FGD**ANC**

1. How early do women go for ANC? Why do they go at that time? (In what month of pregnancy? Why earlier or later?)

Je ni kipindi gani akina mama wanakwenda kliniki? Kwa nini wanakwenda katika kipindi hicho na sio mapema au baadae? (Katika mwezi wa ujauzito?)

2. How often do they go to ANC? Why do they go at that time?

Je akina mama huenda kliniki mara ngapi katika kipindi cha ujauzito? Kwa nini wanakwenda katika kipindi hicho na sio mapema au baadae?

3. What kinds of services do they receive in ANC? Je ni aina gani ya huduma wanapata wanapokwenda kliniki?

4. Do women think ANC helps their pregnancy? Je akina mama wana mawazo gani juu ya utumiaji wa kliniki kusaidia ujauzito?

5. How important do women seem to think ANC is? Je ni kwa namna gani akina mama wanaona umuhimu wa kwenda kliniki?

6. If women do not go for ANC, what are their reasons? Ni sababu gani zinawafanya akina mama wasihudhurie kliniki?

7. What are the merits and demerits of ANC? What are barriers to accessing ANC? Je ni nini faida na hasara za kwenda kliniki? Vikwazo vya kliniki?

8. Why do women go to the clinic for ANC, yet mostly deliver at home? Kwa nini akina mama walio wengi wanakwenda kliniki lakini hujifungulia nyumbani?

9. Are all mothers abiding to their clinic dates? Je akina mama wanafuatilia tarehe zao za kwenda kliniki?

10. What in your opinion should be improved? Kwa maoni yako, nini kifanyike ili kuboresha huduma?

PNC

1. How early do women go for PNC? (In what day/month after delivery?) Je ni kipindi gani akina mama wanakwenda kliniki/zahanati baada ya kujifungua? (Katika Siku/mwezi baada ya kujifungua?)
 2. How often do they go for PNC? Je akina mama huenda kliniki mara ngapi katika kipindi baada ya kujifungua?
 3. What kinds of services do they receive in PNC? Are they satisfied? Je ni aina gani ya huduma wanapata wanapokwenda kliniki mara baada ya kujifungua? Wanaridhika na huduma wanazopata?
 4. What do women think PNC does to help their babies and themselves? Je akina mama wana mawazo gani juu ya utumiaji wa kliniki mara baada ya kujifungua katika kuwasaidia wao wenyewe na watoto?
 5. How important do women seem to think PNC is? Je ni kwa namna gani akina mama wanaona umuhimu wa kliniki mara baada ya kujifungua?
 6. If women don't go for post-natal care, what are their reasons? Ni sababu gani zinawafanya akina mama wasimpeleke mtoto kliniki mara baada ya kuzaliwa?
 7. What are the merits and demerits of PNC; what are barriers to accessing PNC? Je ni nini faida na hasara za kumpeleka mtoto kliniki? Vikwazo vya kliniki?
 8. What in your opinion should be improved? Kwa maoni yako, nini kifanyike ili kuboresha huduma?
-

Curriculum Vitae

GENERAL INFORMATION

Mwifadhi Mrisho
Born 28th February 1971 in Moshi
Tanzanian, married

Address (office)

Ifakara Health Institute
PO BOX 78373
Dar es Salaam

Telephone: + 255 (22)2774714

Fax: + 255 (22)2771714

Cell: + 255 754 264086

E-mail: mmrisho@ihi.or.tz//mwifadhi.mrisho@gmail.com

Languages

Swahili (native)

English (read/write/speak: fluently)

EXPERTISE

Newborn health, Child health, Maternal health, Health impact analysis, HIV-AIDS, Malaria.

EMPLOYMENT

2001 To-date

Working as a Research Scientist at Ifakara Health Institute (IHI), formerly Ifakara Health Research & Development Centre (IHRDC) in MTIMBA Project (2001-2003) and IPTi Project (2004-2008)

EDUCATION

2006-2008

PhD in Epidemiology
Swiss Tropical Institute, University of Basel, Switzerland

1997 - 1999

University of Dar es Salaam
Master of Arts in Demography

1993-1996

Faculty of Arts, University of Dar es Salaam
Bachelor of Arts degree in Economics

PUBLICATIONS AND REPORTS

Mwifadhi Mrisho, Joanna Armstrong Schellenberg, Adiel K. Mushi, Brigit Obrist, Hassan Mshinda, Marcel Tanner and David Schellenberg (2008) Understanding home-based neonatal care practice in rural southern Tanzania, *Trans R Soc Med Hyg* 2008, 102:669-678

Joanna Armstrong Schellenberg, **Mwifadhi Mrisho**, Fatuma Manzi, Kizito Shirima, Conrad Mbuya, Adiel Mushi, Sosthenes Charles Ketende, Pedro Alonso, Hassan Mshinda, Marcel Tanner, David Schellenberg (2008) Health and survival of young children in southern Tanzania. *BMC Public Health*, 2008, 8:194

Mwifadhi Mrisho, Joanna Armstrong Schellenberg, Adiel K. Mushi, Brigit Obrist, Hassan Mshinda, Marcel Tanner and David Schellenberg (2007) Factors affecting home delivery in rural Tanzania, *Trop Med. & Int. Health*, 2007, 12:862-872

Mwifadhi Mrisho, Brigit Obrist, Joanna Armstrong Schellenberg, Rachel A. Haws, Adiel K. Mushi, Hassan Mshinda, Marcel Tanner and David Schellenberg (2008) The use of antenatal and postnatal care: perspectives and experiences of women and health care providers in rural southern Tanzania. Submitted to *BMC Pregnancy and Childbirth*

Shirima K, Mukasa O, Armstrong Schellenberg J, Manzi F, John D, Mushi A, **Mrisho M**, Tanner M, Mshinda H and Schellenberg D (2007) The use of Personal Digital Assistants for Data Entry at the Point of Collection in a Large Household Survey In Southern Tanzania. *Emerging Themes in Epidemiology*, 2007 4:5 (1 June).

Adiel K Mushi, Joanna Armstrong-Schellenberg, **Mwifadhi Mrisho**, Fatuma Manzi, Conrad Mbuya, Haji Mponda, Hassan Mshinda, Marcel Tanner, Pedro Alonso, Robert Pool and David Schellenberg (2008) Development of behaviour change communication strategy for a vaccination-linked malaria control tool in southern Tanzania. *Malaria Journal* (In Press)

Robert Pool, Adiel Mushi , Joanna Armstrong Schellenberg , **Mwifadhi Mrisho**, Pedro Alonso, Catherine Montgomery , Marcel Tanner, Hassan Mshinda, David Schellenberg (2008) The acceptability of intermittent preventive treatment of malaria in infants (IPTi) delivered through the expanded programme of immunization in southern Tanzania (Submitted to *Malaria Journal*).

Mrisho & Mkopi (2003) HIV Situation analysis in Ulanga district, Morogoro, Tanzania (unpublished report)

Mrisho M. (1995) The causes of youth unemployment in Tanzania: The case of Dar es Salaam City. MA Thesis. University of Dar es Salaam (Unpublished)

Qualitative analysis on Stronger Voices for Reproductive Health Project in Geita, Singida and Zanzibar. UNFPA funded project (unpublished report)