

NEPAL FURTHER ANALYSIS

Improvements in Maternal Health in Nepal

**Further Analysis of the 2006
Nepal Demographic and Health Survey**

SSMP (Support to the Safe Motherhood Programme) is a UK DfID funded programme which supports Government of Nepal's National Safe Motherhood Programme. This study is commissioned by SSMP. The opinions expressed herein are those of the authors and do not necessarily reflect the views of UK DfID.

This report presents findings from a further analysis study undertaken as part of the follow up to the 2006 Nepal Demographic and Health Survey (NDHS). Macro International Inc. provided technical assistance for the project. Funding was provided by the U.S. Agency for International Development (USAID) under the terms of Contract No. GPO-C-00-03-00002-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

This report is part of the MEASURE DHS program, which is designed to collect, analyze, and disseminate data on fertility, family planning, maternal and child health, nutrition, and HIV/AIDS.

Additional information about the 2006 NDHS may be obtained from Population Division, Ministry of Health and Population, Government of Nepal, Ramshahpath, Kathmandu, Nepal; Telephone: (977-1) 4262987; New ERA, P.O. Box 722, Kathmandu, Nepal; Telephone: (977-1) 4423176/4413603; Fax: (977-1) 4419562; E-mail: info@newera.wlink.com.np. Additional information about the DHS project may be obtained from Macro International Inc., 11785 Beltsville Drive, Calverton, MD 20705 USA; Telephone: 301-572-0200, Fax: 301-572-0999, E-mail: reports@macrointernational.com, Internet: <http://www.measuredhs.com>.

Recommended citation:

Pant, Prakash Dev, Bal Krishna Suvedi, Ajit Pradhan, Louise Hulton, Zoë Matthews, Mahesh Maskey. 2008. *Investigating Recent Improvements in Maternal Health in Nepal: Further Analysis of the 2006 Nepal Demographic and Health Survey*. Calverton, Maryland, USA: Macro International Inc.

Improvements in Maternal Health in Nepal

Further Analysis of the 2006 Nepal Demographic and Health Survey

Prakash Dev Pant
Bal Krishna Suvedi
Ajit Pradhan
Louise Hulton
Zoë Matthews
Mahesh Maskey

May 2008



Contents

1	Introduction	1
1.1	What does this study do?	1
1.2	Report structure	1
2	Maternal Mortality in Nepal	2
2.1	Maternal mortality in Nepal	2
2.2	Estimates of maternal mortality	2
2.2.1	DHS estimates	2
2.2.2	Health Management Information System (HMIS)	3
2.2.3	Infant and child mortality	3
3	Improvements in Maternal Care, the Nepali Health System and Socioeconomic Conditions 1995-2007	4
3.1	Socioeconomic context	4
3.1.1	Reproductive health care: Are the recent trends consistent with evidence of improvements in maternal mortality?	4
3.1.2	Contraceptive use and fertility	4
3.1.3	Safe abortion services	5
3.1.4	Uptake of antenatal care	6
3.1.5	Birth preparedness	8
3.1.6	Care at childbirth	9
3.1.7	Understanding care at childbirth from survey data	9
3.1.8	Understanding care at childbirth from facility data	11
3.1.9	Post-natal care	13
3.2	Maternity services and Nepal's health system	13
3.2.1	Strength of the health system: Human resources and infrastructure for maternal health	13
3.2.2	How is health care organised?	14
3.2.3	Infrastructure and procurement	14
3.2.4	Human resources	15
3.2.5	Financial access to health	16
3.3	Changes in the socioeconomic landscape of Nepal: Are there other factors that could have triggered a reduction in maternal deaths?	18
3.3.1	Socio-economic context	18
4	Recent Interventions in Nepal to Improve Safe Motherhood	20
5	Discussion and Conclusions	23
5.1	Discussion	23
5.1.1	What next? Can Nepal expect a further decline in maternal mortality up to 2015?	23
5.2	Conclusions	24
	References	29
	Appendix A Estimating Maternal Mortality from Alternative Sources	25
	Appendix B Distribution of Women Aged 15-49 by their Selected Maternal Health Utilization Characteristics, NDHS, 1996 and 2006, Nepal	28

Tables and Figures

Table 2.1	DHS maternal mortality estimates for Nepal 1996-2001	2
Table 3.1	Trends in contraceptive use, unmet need for family planning, and total fertility rate in Nepal 1996-2006	4
Table 3.2	Number of safe abortion service clients by fiscal year	5
Table 3.3	Trend in direct obstetric complications in 13 EOC monitored districts: FY 2002/03-2005/06	13
Table 3.4	Sanctioned post of doctors and nurses in the public sector of Nepal, 1996/97-2005/06	16
Table 3.5	Differences in selected variables of interest between DHS 1996 and DHS 2006, Nepal	19
Figure 2.1	Trends in under-five, infant, perinatal and neonatal mortality rates in Nepal, from the 1996, 2001 and 2006 DHS surveys	3
Figure 3.1	Percentage of women 15-49 years who have had at least one antenatal care contact	6
Figure 3.2	Percentage of women 15-49 years who have had four or more antenatal care contacts	7
Figure 3.3	Distribution of women 15-49 years by timing of first antenatal care contact	7
Figure 3.4	Skill level of primary caregiver at childbirth in Nepal 1996-2006	9
Figure 3.5	Place of birth in Nepal 1996-2006	10
Figure 3.6	Caesarean section rates	11
Figure 3.7	Trend in EOC service utilisation in 13 districts FY 1997/98 to 2005/06	12
Figure 3.8	Antenatal and delivery service utilisation by wealth quintile	17
Table A.1	Maternal mortality 1996-2003, Nepal	27

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
APH	Antepartum Haemorrhage
BEOC	Basic Emergency Obstetric Care
CAC	Comprehensive Abortion Care
CEOC	Comprehensive Emergency Obstetric Care
CFR	Case Fatality Rate
CREHPA	Center for Research on Environment Health and Population Activities
CS	Caesarian Section
DfID	Department for International Development, UK Government
DHS	Demographic and Health Survey
DoHS	Department of Health Services, Government of Nepal
DUDBC	Department for Urban Development and Building Construction
EAP	Equity and Access Programme
EASO	Equity and Access Support Organisation
EOC	Emergency Obstetric Care
FA	Financial Aid
FCHV	Female Community Health Volunteer
FHD	Family Health Division, Government of Nepal
FIGO	International Federation of Gynaecology and Obstetrics
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GoN	Government of Nepal
GTZ	Gesellschaft für Technische Zusammenarbeit (GTZ)
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
IMR	Infant Mortality Rate
JAR	Joint Annual Review
LMD	Logistics Management Division
MCHW	Maternal and Child Health Worker
MDG	Millennium Development Goal
MIS	Maternity Incentive Scheme
MMR	Maternal Mortality Ratio
MNH	Maternal and Newborn Health
MoHP	Ministry of Health and Population
NDHS	Nepal Demographic and Health Survey
NFHS	Nepal Family Health Survey
NGO	Non-Governmental Organisation
NHTC	National Health Training Centre
NLSS	Nepal Living Standards Survey
NMR	Neonatal Mortality Rate
NRCS	Nepal Red Cross Society
NSMP	Nepal Safe Motherhood Project
ORC	Outreach Clinic

PHCC	Primary Health Care Centre
PMR	Perinatal Mortality Rate
PNC	Postnatal Care
PPH	Post-Partum Haemorrhage
SBA	Skilled Birth Attendant
SKATT	Skilled Attendant
SMNH	Safe Motherhood and Newborn Health
SSMP	Support to Safe Motherhood Programme
TBA	Traditional Birth Attendant
TT	Tetanus Toxoid
U5MR	Under-Five Mortality Rate
UN	United Nations
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
VDC	Village Development Committee
WHO	World Health Organisation

Executive Summary

Introduction

- In July 2007 the results of the 2006 Nepal Demographic and Health Survey (NDHS)¹ were published. The results suggested a halving of the maternal mortality ratio (MMR) from the 1996 NDHS². The new figures indicate that maternal mortality is now as low as 281 maternal deaths per 100,000 live births¹. In 1996, the NDHS found an MMR of 539 maternal deaths per 100,000 live births².
- Despite these measured improvements, 82 percent of women still give birth at home in Nepal without the presence of a skilled birth attendant (SBA).

This study examines trends in maternal mortality, use of maternal health services, and socio-demographic changes in Nepal using the results of three successive DHS surveys from 1996 to 2006. It draws on supporting evidence from national health service statistics from the Nepal Health Management Information System (HMIS), and indicators from Nepali facilities on emergency obstetric care, which were collected in 13 of 75 districts over the period of interest. Additional sources of data for this study are derived from the records of the Ministry of Health as well as recent budget surveys that record information on household expenditure on health. Problems of under-reporting and inaccuracy are associated with all of these data sources, but by using the information in combination, it is possible to build up a reasonably good impression of the progress in maternal health in Nepal.

Improvements in maternal mortality – a significant decline

- The fifth MDG goal calls for a three-quarter reduction in maternal mortality by 2015. The maternal mortality trend derived from household surveys in 1996 and 2006 suggests that Nepal may be achieving this goal. However, only one in five women Nepal have a skilled birth attendant to help them at the riskiest moment in their reproductive lives. The MDG progress report 2005³ published by the National Planning Commission of Government of Nepal and UN Country team of Nepal has set a goal of increasing deliveries attended by SBAs to 60 percent by 2015 as a proxy indicator of three quarter reduction in maternal mortality. Given the recent endorsement of the importance of access to care to ensure reproductive health, Nepal still stands a long way from satisfying the fifth MDG goal.
- The review of supporting evidence points to a significant decline in maternal mortality. Against a background of stagnating maternal mortality ratios worldwide this is a considerable achievement for Nepal. Given the recent political conflict and rising numbers of births (despite the decline in fertility) this decline is particularly impressive.
- The evidence on child mortality decline from the same series of NDHS surveys is vivid but not so much in the neonatal mortality decline to support the position of a measurable drop in maternal deaths. Because of safe motherhood programme interventions maternal mortality can be reduced and to some extent the neonatal mortality too. The surveys do not, however, show a decline in early neonatal mortality, which we might expect to be commensurate with better care at birth and immediately after the birth (Figure 1).

Improvements in care – encouraging but still a long way to go

- It is well established that current use of contraception is one of the key determinants of fertility⁴ and that fertility is directly related to maternal mortality⁵. It is documented that existing demand for family planning services could reduce maternal deaths in developing countries by 20 percent or more⁶. The use of family planning methods in Nepal has increased steadily from 29 percent in 1996 to 39 percent in 2001 and to 48 percent in 2006. Fertility has dropped from 4.6 children per woman in 1996 to 3.1 in 2006. If the risk of maternal mortality is expressed in terms of lifetime

risk of maternal death, then the risk for Nepali women has declined significantly, simply because women have fewer births.

- The provision of antenatal care to increasing proportions of women, although not directly linked to improvements in maternal survival, is important to track because of the opportunity that it provides for interpersonal communication and relay health messages. Women who seek antenatal care also tend to seek a skilled professional at childbirth. Survey data show that the proportion of women reporting at least one antenatal care contact between 1996 and 2006 has increased considerably in Nepal, especially in rural areas where it has increased by more than 50 percent. Similarly, women reporting at least four antenatal care contacts have also increased by 20 percent throughout Nepal. The percentage of women who made their first antenatal care contact within the first three months of their pregnancy also increased by 20 percent during the 10 year period, with a pronounced increase in the rural as compared to urban areas.
- Care provided by trained providers, such as midwives or doctors at the time of birth, is the most important intervention in the continuum of care for pregnant women. Birth is when unexpected complications can occur and in these cases there should be trained staff, equipment, facilities and sometimes surgical resources available at very short notice. The percentage of births assisted by skilled birth attendants in Nepal has increased from under 10 percent in 1996 to above 20 percent by 2006. While this is a significant rise, the majority of women do not have professional care at birth. Modest increases in care at birth have mainly been achieved by the improvement in nurse-assisted childbirth in rural areas, which has more than tripled over the time period. Nevertheless, the percentage of births assisted by laypersons has not declined much (56 percent in 1996, 55 percent in 2001, and 51 percent in 2006). In addition, childbirth assistance by a skilled birth attendant changed little in urban areas over the past ten years, remaining at around 50 percent of births.
- Access to safe abortion services did not automatically improve following the legalisation of abortion in 2002, and safe services were comprehensively not rolled out until 2004. The introduction of safe abortion services occurred toward the latter end of the reference period used for the calculation of the 2006 DHS maternal mortality estimate (reference period 1999-2005). The ratio calculated as the 2006 estimate, therefore, is likely to have captured little if any of the impact of the introduction of safe abortion services. The post-legalisation improvements in safe abortion care, however, are expected to contribute substantially to further decreases in maternal deaths in the future, given that between 2003 and 2006 over one in four obstetric complications in 13 of Nepal's districts were abortion related.
- Women with severe complications at delivery may need to have a Caesarean section. If there are less than 5 percent of women receiving caesarean sections, then it is likely that women who need this intervention are not receiving it. In 2006, about 3 percent of births were delivered by caesarean section compared to 1 percent in 1996. Clearly it is a significant increase but the rates of Caesarean section in Nepal are still low. However, the rise in Caesarean section deliveries is significantly higher in the urban areas and anecdotal evidence suggests that elective Caesarean section is performed even when it is not medically indicated.
- Care for women with complications is still inadequate, but it has improved over the past decade. The met need for emergency care increased steadily from 7 percent in 1997-98 to 19 percent in 2005-06 in 13 districts. In the same districts, the met need for Caesarean section went up from 4 percent to 29 percent in 2005-06. The trend data for a nine-year period in these 13 districts indicate that the critical safe motherhood service utilisations are increasing steadily but are still low.

Conclusions

- The evidence that there has been a decline in maternal mortality in Nepal is strong. The subsequent review of key maternal health utilisation and socio-economic indicators demonstrates an improvement at every level, which contributes to the decline in maternal mortality.

- Part of this significant achievement in reducing maternal deaths was likely to have been influenced by substantial fertility decline and the success of family planning programmes in recent years. Given the recent onset of safe abortion services, this trend is likely to continue as abortion-related deaths are averted. However, the current low level of care at childbirth, including care for women with complications, will need to improve in order for the maternal mortality rate to decline further. Although we have seen modest improvements in care at this crucial time, there is still a large majority who remain excluded from care at delivery and many do not have access to the life-saving care they need.
- In this respect, the decline in maternal deaths is reminiscent of improvements seen in some parts of Bangladesh⁷ where family planning and menstrual regulation services have initiated improvements in the absence of expanded care for women during birth. Evidence from Pakistan show similarities. It is possible that we are seeing a new generation of Asian case studies in maternal mortality, which although not echoing the landslide examples of maternal mortality decline seen in the 1980s in Sri Lanka, Thailand, and Malaysia, may represent a modest but significant shift in maternal health. This new generation of countries experiencing maternal health transitions are not fully understood yet, but the contribution of family planning and/or safe abortion to maternal health is undeniable.
- In conclusion, Nepal has made a very palpable step towards lowering maternal mortality. Much more effort is required to scale up care in order to move further towards MDG5. Improved family planning and possible moves towards improved status for women have cut the death rate for pregnant women, and the recent legalisation of abortion looks set to reduce the deaths even more. This is an impressive achievement for a country coping with political instability.

1 Introduction

In July 2007 the results of the 2006 Nepal Demographic and Health Survey (NDHS) were published. The results suggested a halving of the maternal mortality ratio (MMR) from the 1996 NDHS. The new figures indicate that maternal mortality is now as low as 281 maternal deaths per 100,000 live births¹. In 1996, the NDHS found an MMR of 539 maternal deaths per 100,000 live births². The 2006 NDHS also indicates increases in antenatal care (ANC), postnatal care (PNC), Caesarean sections (CS), and female education alongside a decline in fertility and unmet need for contraception. There was also a decrease in the percentage of women who give birth at home and a commensurate increase in the percentage giving birth with a trained health worker in attendance. Despite these measured improvements, 82 percent of women still give birth at home without the presence of a skilled birth attendant (SBA)¹.

Maternal mortality is notoriously hard to measure. Survey estimates are based on reports from respondents about the deaths of their sisters. The methodology often underestimates the true scale of the problem and comes with large uncertainty bounds⁸. The maternal mortality ratio however is only one indicator from a potentially rich set of associated information that could be used to better understand recent changes in health in Nepal. This study is a critical review and analysis of data on maternal health over the last decade. Using a range of data sources to supplement survey results, the report builds a more informed picture of the context within which the reported change in maternal mortality has apparently occurred.

1.1 *What does this study do?*

This study examines trends in maternal mortality as reported by the NDHS. It examines the use of maternal health services and socio-demographic changes in Nepal using the results of successive surveys from 1996 to 2006. It draws on supporting evidence from national health service statistics from the Nepal Health Management Information System (HMIS) and indicators from Nepali facilities on emergency obstetric care (EOC) (the United Nations 'process' indicators⁹) which have been collected in 13 of the 75 districts in Nepal over the period of interest. Additional sources of data for this study are derived from Ministry of Health records as well as recent budget surveys that record information on household expenditure on health. Problems of under-reporting and inaccuracy are associated with all of these data sources (see Annex 1), but by using the information in combination it is possible to build up a reasonably good impression of progress in maternal health in Nepal.

1.2 *Report structure*

- Section 2 examines successive estimates of maternal mortality from the DHS.
- Section 3 investigates evidence on the uptake of care during pregnancy and childbirth and beyond in Nepal as well as data on the state of the Nepali health system. It also reviews key socio-economic changes over the past 10 years so that the maternal mortality estimates can be put in the context of what is possible in Nepal.
- Section 4 presents information on interventions in maternal health made within the last 15 years that may have contributed to an improvement in maternal health. This includes the Support to Safe Motherhood Programme (SSMP), funded by DfID.
- Section 5 brings the evidence together in a discussion, consolidating the previous sections together with concluding comments. This section also assesses the likelihood of a continued decline in maternal mortality over the next five to ten years in light of existing and proposed changes in maternal health policy, services and the health system in Nepal.

2 Maternal Mortality in Nepal

2.1 Maternal mortality in Nepal

Maternal health care is a crucial part of any health care system. Health care that a woman receives during pregnancy, at the time of childbirth, and soon after is important for the survival and well-being of both mother and newborn¹⁰. Nepal is committed to the Millennium Development Goals (MDGs) including Millennium Development Goal 5 (MDG5). The Government of Nepal aspires to improve maternal health and has developed various policies and strategies to move towards the commitments¹¹.

The MDG5 aims for a three-quarters reduction in maternal mortality by 2015^{12,13}. The maternal mortality trend derived from household surveys in 1996 and 2006 suggests that Nepal may achieve this goal. However, the related MDG indicator on the proportion of women who are attended by a skilled professional when they give birth is still below 20 percent¹. Only one in five women has a skilled health worker to help them at potentially the riskiest moment in their reproductive lives. Despite the recent endorsement by Government of Nepal (GoN) of the importance of access to care to ensure improved reproductive health services, which is highlighted in the new MDG target of universal access to reproductive health services, Nepal still stands a long way from satisfying MDG5.

2.2 Estimates of maternal mortality

2.2.1 DHS estimates

The 2006 NDHS estimates MMR at 281 deaths per 100,000 live births compared to the estimate from the 1996 Nepal Family Health Survey (NFHS) of 539. The two survey estimates indicate a 50 percent decline in MMR over the past 10 years. The confidence intervals for this indicator are, however, wide and depending on where the real figure, if accurately captured, lies for both years, the decline could be as low as 2 percent (that is the difference between 392 and 384) or as high as 74 percent (that is the difference between 686 and 178). Nevertheless, the lower confidence interval for 1996 (392) and the higher one for 2006 (384) are close but do not overlap, suggesting a real decline in maternal mortality.

A sisterhood survey asks questions about the past deaths of the sisters of respondents. The date that the estimate refers to is, therefore, not the same as the date of data collection. The estimate refers more accurately to some seven years before the date of survey. In 1996, the reference period for the MMR estimate from the NFHS survey was between 1989 and 1995 and a total of 87 deaths were captured in the survey. In 2006, the reference period for the MMR was between 1999 and 2005 and a total of only 39 deaths were captured in the survey (see Table 2.1). These small numbers of deaths make analysis by region or poverty quintile, for example, interesting but not reliable and these analyses are therefore not included in this study.

Table 2.1 DHS maternal mortality estimates for Nepal 1996-2006

Year of data collection	Reference period	Estimated MMR	N ¹	95 percent CI ² / uncertainty bounds
1996	1990-1996	539 ^a	87	(392 – 686)
2006	2000-2006	281 ^a	39	(178 – 384)

¹ Number of maternal deaths on which estimate is based

² Confidence interval

^a Maternal deaths per 100,000 live births

2.2.2 Health Management Information System (HMIS)

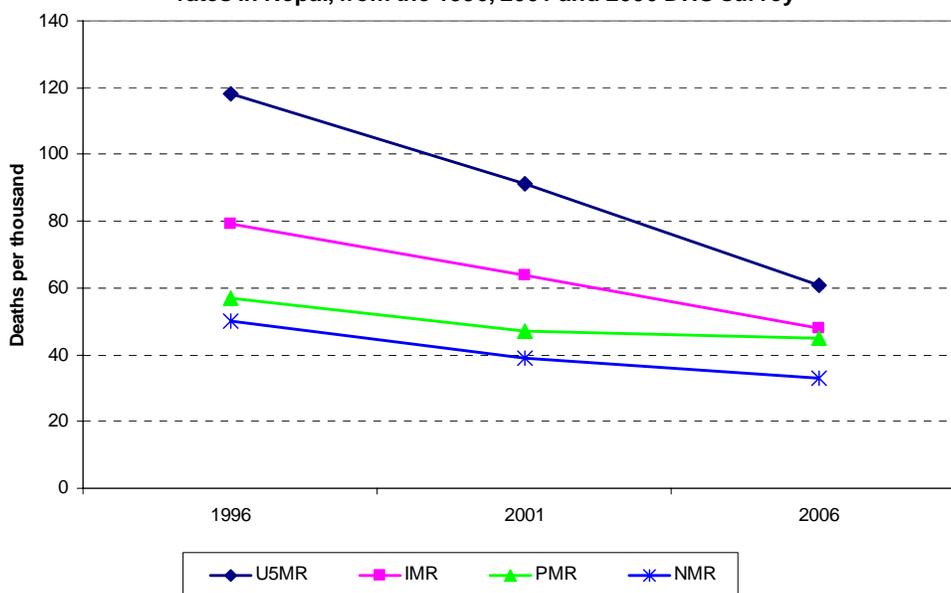
Routine data on the total number of births and the total number of maternal deaths at facilities are captured in the Nepal HMIS (see Appendix A for a review of data quality). From this source, a third set of maternal mortality ratios can be calculated. The data, however, are likely to seriously underestimate the total number of deaths because deaths in the community are not captured. The large majority of maternal deaths occur in the community, mostly unregistered and uncounted. Maternal mortality is known to be undercounted even within facilities, including in developed countries (e.g. the United Kingdom¹⁴). However, if we make the assumption that the likely error in the measurement of maternal death rates from the HMIS is roughly even over this time period (during which there was no concerted effort to improve recording of data), then the trend in mortality is still downwards. This reinforces the picture of a decline in maternal mortality over the last decade.

Against a background of stagnating maternal mortality rates worldwide this is a considerable achievement for Nepal. Given the recent conflict and rising numbers of births (despite the decline in fertility) this decline is particularly impressive.

2.2.3 Infant and child mortality

The data presented for perinatal, neonatal, infant and under-five mortality rate from the same series of NDHS surveys supports a decline in maternal deaths. The decline in the neonatal mortality rate (NMR) from 50 deaths per 1,000 live births to 33 from the 1996 NDHS to 2006 NDHS, and the decline in the perinatal mortality rate (PMR) from 57 to 45 deaths per 1,000 births for the same time period, implies that both newborn babies and mothers are increasingly saved from life-threatening conditions around the time of birth (Figure 2.1). Reporting of newborn deaths during a survey is prone to underestimation and distortion, as mothers sometimes fail to mention deaths of newborns, however, the estimation technique for newborns is still far superior to the sisterhood method for counting maternal deaths, and the resulting estimate based on a much larger sample size. In order to achieve MDG4 of reducing under-five mortality rate (U5MR) by two-thirds by the year 2015, Nepal will need to increasingly focus on reducing neonatal deaths and continue to push towards better maternal health care service use and availability.

Figure 2.1 Trends in under-five, infant, perinatal and neonatal mortality rates in Nepal, from the 1996, 2001 and 2006 DHS survey



Source: NFHS 2006, NDHS 2001 and NDHS 2006 (direct estimates based on retrospective data for the five years preceding the survey except the PMR in 1996 is based on the preceding 10 years)

3 Improvements in Maternal Care, the Nepali Health System and Socioeconomic Conditions 1995-2007

3.1 Socioeconomic context

3.1.1 Reproductive health care: Are recent trends consistent with evidence of improvements in maternal mortality?

Information on care during pregnancy, childbirth, and the postpartum period can be derived from three recent surveys: NDHS 1996, NDHS 2001, and the NDHS 2006 (only the first and the last of these collected maternal mortality data, but all collected data on care). Maternal health analysts agree that to substantially reduce both maternal and child deaths, care needs to be scaled up in a continuum, from safe sex and family planning to pregnancy and delivery care. There should also be follow-up care for women and their newborn after delivery and as they become older¹⁵. Safe abortion care is also a key factor in keeping maternal mortality low¹⁶.

An analysis has been carried out using the three NDHS surveys to investigate changes in maternal health care utilization among women and particularly whether the observed increases in health care utilization between 1996-2001, 2001-2006 and 1996-2006 are statistically significant. The indicators that are widely used to track maternal health care can be broadly classified into four groups, contraceptive use, antenatal care, care at delivery, and postpartum care. See table in Annex 2 showing the distribution of women aged 15-49 by their selected maternal health utilization characteristics based on 1996 and 2006 NDHS data.

3.1.2 Contraceptive use and fertility

One of the key building blocks underlying good maternal health is access to adequate family planning services. Family planning reduces unwanted pregnancies and births, which reduces the need for abortion services, often provided in unsafe circumstances, and thus more risky than wanted pregnancies and births. Furthermore, the number of births to very young (15-19 years) women and girls can be substantially reduced by meeting their need for family planning. The risk of maternal deaths for these age groups is slightly higher than the risk to women in their twenties or early thirties. The importance of family planning to maternal health has recently been reiterated by the United Nations in its recent decision to include the proportion of women with an unmet need for contraception in a newly amended MDG indicator framework under MDG5 (UN Secretary General's annual report published October 2007).

The Government of Nepal has targeted for a reduction in the total fertility rate to 2.1 by the end of the Twelfth Plan in 2017 and a balance between population growth and economic development in Nepal. Family planning is one of the programmes launched to achieve this goal. It is well established that current use of contraception is one of the key determinants of fertility⁴ and that fertility is directly related to maternal mortality⁵. In simple terms, if a woman does not become pregnant she would not die of maternal death. It is documented that existing demand for family planning services could reduce maternal deaths in developing countries by 20 percent or more⁶.

Table 3.1 Trends in contraceptive use, unmet need for family planning, and total fertility rate in Nepal 1996-2006

Survey year	Current use of any contraception ¹ (percent)	Unmet need for family planning (percent)	Percentage of demand satisfied	Total fertility rate (children per woman)
1996	28.5	31.4	47.6	4.6
2001	39.3	27.8	58.6	4.1
2006	48.0	24.6	66.1	3.1

¹ Includes traditional methods

Source: NFHS 1996, NDHS 2001 and NDHS 2006

The use of family planning methods in Nepal has increased steadily from 29 percent in 1996 to 39 percent in 2001 and to 48 percent in 2006. This represents a considerable increase in contraceptive use i.e., a 66 percent increase in the contraceptive prevalence rate in only one decade. In terms of contraceptives methods, the increase has been dominated by modern methods, with female sterilisation playing a major role. As shown in Table 3.1, fertility has dropped from 4.6 children per woman in 1996 to 3.1 in 2006, showing that fertility decline is fully underway. If the risk of maternal mortality is expressed in terms of lifetime risk of maternal death, then the risk for Nepali women has declined significantly, simply because women have fewer births.

3.1.3 Safe abortion services

The 2006 NDHS shows that about one-third of pregnancies are unplanned. Women often seek abortion under such circumstances. Despite the legalisation of abortion, complications of unsafe abortion are responsible for many maternal deaths. Thus, safe abortion services are a key part of the drive to reduce maternal deaths.

It is estimated that unsafe abortion played a part in over 5 percent of maternal deaths in hospitals prior to the 2002 legalisation of abortion in Nepal^{17,18}. A hospital-based study conducted in 1984-85 at five major hospitals in and around Kathmandu valley reported 1,576 cases of abortion-related complications. Of these, 1,411 cases (90 percent) were spontaneous abortions, 124 cases (8 percent) were induced abortions, and a further 41 (3 percent) were possibly induced abortions¹⁹. Another hospital-based study conducted amongst women from government hospitals and private clinics in Kathmandu Valley found that almost 20 percent were induced abortions²⁰. In another study, which was conducted in 1994 amongst 13,229 women in the reproductive age group, a total of 109 induced abortion cases were identified in a period of approximately 30 months, which is very low compared with other studies²¹. Studies conducted by the Centre for Research on Environment Health and Population Activities^{22,23} show that between 20 percent and 60 percent of all obstetric and gynaecological admissions in major hospitals of the country were abortion complication cases before the law was changed.

Abortion was legalized in Nepal in September 2002. The legal provision is that a woman can seek abortion care if her pregnancy is not more than 12 weeks, regardless of the reason for seeking the service. Service statistics show that there has been rapid increase in the number of service sites across the country as well as trained service providers. The provision of safe abortion service has rapidly increased, resulting in a higher proportion of induced abortions being from all (government, private and NGO) trained providers (see Table 3.2).

Table 3.2 Number of safe abortion service clients by fiscal year

Fiscal year	Number of clients served
2003/04	719
2004/05	10,561
2005/06	47,451

Source: Family Health Division, Department of Health Services (DoHS) Unpublished Statistics

Access to safe abortion services did not automatically follow the change in the abortion law in 2002. Safe services were not comprehensively rolled out until 2004. This introduction of safe abortion services occurred over a period toward the latter end of the reference period used for the calculation of the 2006 NDHS estimate (reference period 1999-2005). The ratio calculated for the 2006 estimate, therefore, is likely to have captured little if any of the impact of the introduction of safe abortion services. Any subsequent NDHS MMR estimates will be more likely to capture the impact of increased access to safe services, assuming that respondents report deaths of sisters that have died of abortion-related complications or that they state in the survey that they were pregnant at the time of death.

In 13 of 75 districts in Nepal an EOC monitoring system is in place which captures data on obstetric complications. In 2002-03, 35 percent of obstetric complications in these districts were abortion related. In 2003-04, this percentage was 30 percent and in 2004-05 and 2005-06, the percentage of complications that were abortion related was around 28 percent. Some of these 13 districts were among the first districts to receive safe abortion training. (Source: Internal records of

the Family Health Division, Department of Health Services, Ministry of Health, Government of Nepal).

3.1.4 Uptake of antenatal care

The provision of antenatal care to increasing proportions of women, although not directly linked to improvements in maternal survival, is important to track because of the opportunity that it provides to relay health messages to women. Some complications can be addressed during pregnancy (although most occur at the time of birth or in the hours afterwards). Indeed a substantial proportion of maternal deaths – perhaps as many as one in four – occur during pregnancy¹⁰. Women who seek antenatal care also tend to seek a skilled professional at childbirth. Antenatal care is an important time for women to establish a relationship with health care services and for health care professionals to deliver key messages to women on health problems more generally, especially relating to the upcoming birth, but also relating to sexual health, family planning, HIV/AIDS, and the care of the newborn and child. The importance of this period has been endorsed by the United Nations by its recent decision to include the proportion of women with one or more antenatal care contacts (as well as four or more visits) in the newly amended MDG indicator framework under MDG5.

Survey data from NDHS can provide reliable information on the number of antenatal care visits for each woman's pregnancy, the timing of the first visit, and the quality of antenatal care by the type of provider. Antenatal care can also be monitored via surveys through the content of services received and the kind of information mothers are given during their visit. This information can be obtained in surveys from the questionnaire responses of women who gave birth in the five years preceding each survey. WHO recommends that four antenatal visits can be enough as long as the content of the visits are satisfactory. The preference is for the first antenatal care contact to be in the first trimester of pregnancy²⁴.

NDHS data show that the proportion of women reporting at least one antenatal care contact between 1996 and 2006 has increased considerably, especially in rural areas where it has increased by more than 50 percent (Figure 3.1). Similarly, the proportion of women reporting at least four antenatal care contacts has increased by 20 percent throughout Nepal (see Figure 3.2). These increases are statistically significant.

Figure 3.1 Percentage of women 15-49 years who have had at least one antenatal care contact

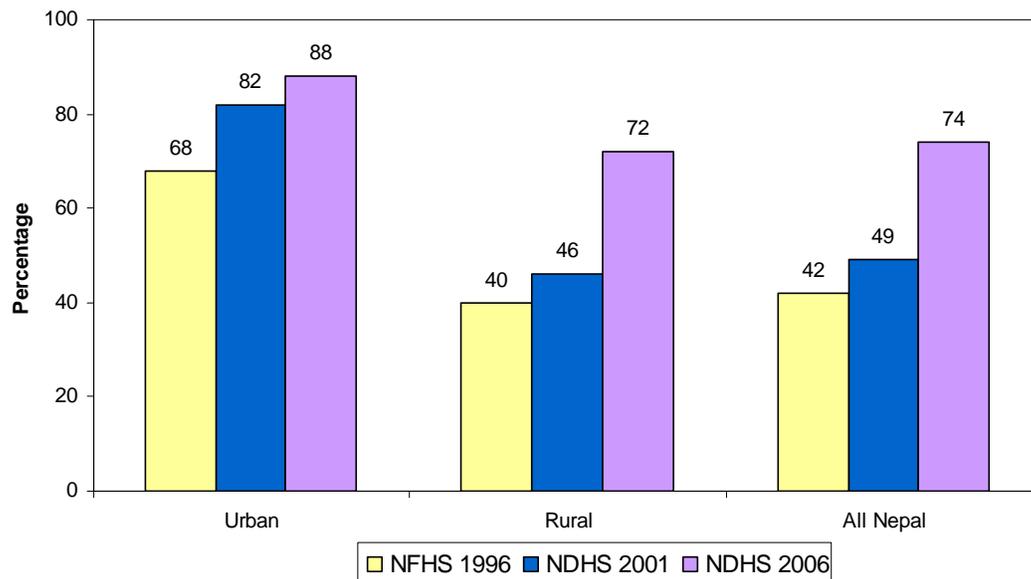
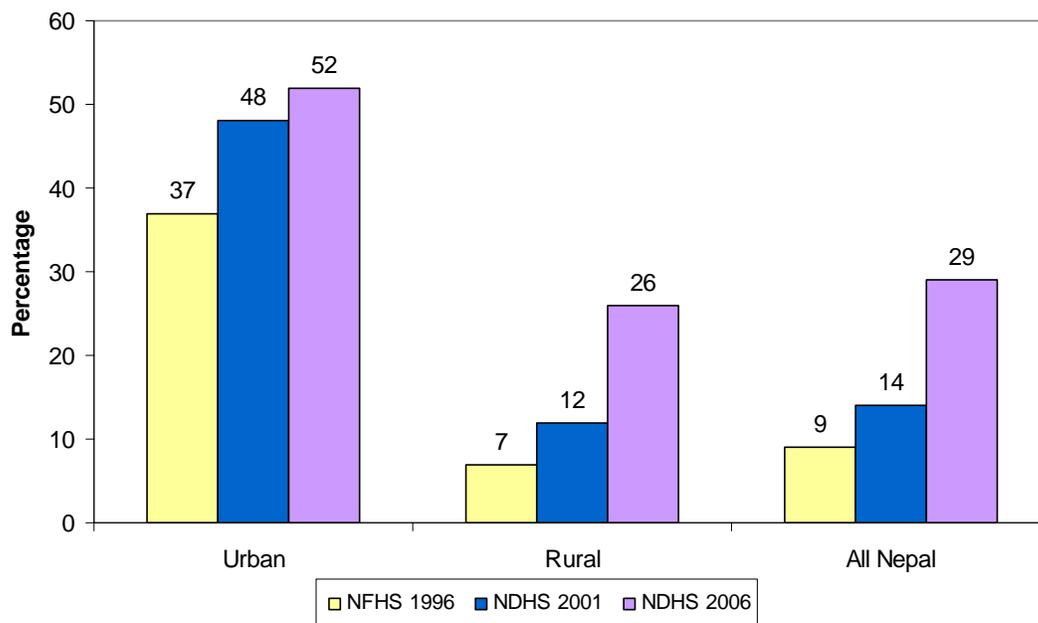
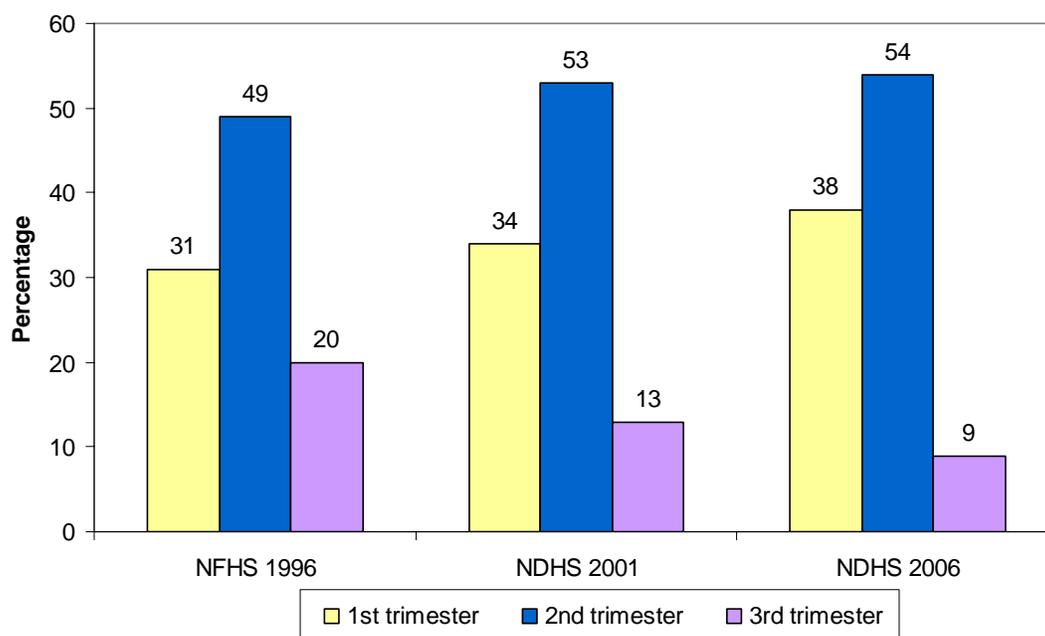


Figure 3.2 Percentage of women 15-49 years who have had four or more antenatal care contacts



The percentage of women who made their first antenatal care contact within the first three months of their pregnancy has also increased by 20 percent during the ten-year period with a pronounced increase in the rural areas, as can be seen in Figure 3.3.

Figure 3.3 Distribution of women 15-49 years by timing of first antenatal care contact



Antenatal care service utilisation from a nurse in urban and rural Nepal between 1996 and 2006 has increased by 1.81 and 2.18 times, respectively. Considering doctors and nurses as trained health providers, survey data show that use of antenatal care from trained providers during the ten year period has substantially increased in Nepal and the increase is more pronounced in the rural areas.

The analysis of the content of antenatal care gives some idea of the quality of antenatal care services. In the NDHS 2006, over half (57 percent) of the mothers who received antenatal care reported that they were informed about pregnancy complications during their antenatal visit. Of those who were informed of pregnancy complications, almost all (96 percent) were informed about a place to go in case of symptoms of complications. About three-quarters of pregnant women who sought antenatal care were weighed and had their blood pressure taken. About three in ten women had their urine and blood tested for routine screening. The comparison of the component of antenatal care received by women over the period has substantially improved in the past five years. The percentage of pregnant women informed of pregnancy complications increased by 20 percent, while the percentage of women who were weighed or had their blood pressure measured increased by 59 percent and 31 percent, respectively, in the past five years. However, there was no substantial difference in the percentage of pregnant women who had blood or urine samples taken.

The HMIS data from various annual reports of the Department of Health Services also show that the number of ANC visits, iron, and Tetanus Toxoid (TT) coverage and continuity of ANC between 1998 and 2005 have substantially increased. This is an additional source of information which also shows that the use of ANC by pregnant women in Nepal has substantially increased during the last decade. TT injections are given during pregnancy for the prevention of neonatal tetanus, a major cause of death among infants. For full protection, a pregnant woman should receive at least two doses during each pregnancy. If a woman has been vaccinated during a previous pregnancy or during maternal and neonatal tetanus vaccination campaigns, she may only require one dose for the current pregnancy. Five doses are considered to provide lifetime protection. The proportion of women who have received at least two doses of TT was found to have substantially increased between 1996 and 2006, and particularly more pronounced in the rural area. Administering two doses of TT vaccine to women between 2001 and 2006 has increased by 40 percent. The corresponding increase between 1996 and 2006 was 95 percent.

3.1.5 Birth preparedness

Information on birth preparedness by pregnant women and their families is available only from the 2006 NDHS. This component is considered important in reducing maternal morbidity and mortality related to pregnancy by ensuring appropriate care during delivery and reducing delays in obtaining appropriate care. In the 2006 NDHS, women were asked how they prepared for the birth of a child during their last pregnancy. A similar question was also asked of men whose youngest child was less than four years old.

The data show that more than one in three women (37 percent) saved money for delivery, 9 percent bought a home delivery kit, 4 percent contacted a health worker, and about 26 percent arranged for food and clothing for the newborn. Nearly one in two mothers said they had not made any preparation at all. Men's responses differed somewhat from women's responses. Fifty four percent of men mentioned that they saved money for the birth, 10 percent of men said they bought a home delivery kit, 9 percent contacted a health worker, and 6 percent arranged for transport. Twenty-nine percent of men said they did not make any preparations for the birth of their youngest child.

3.1.6 Care at childbirth

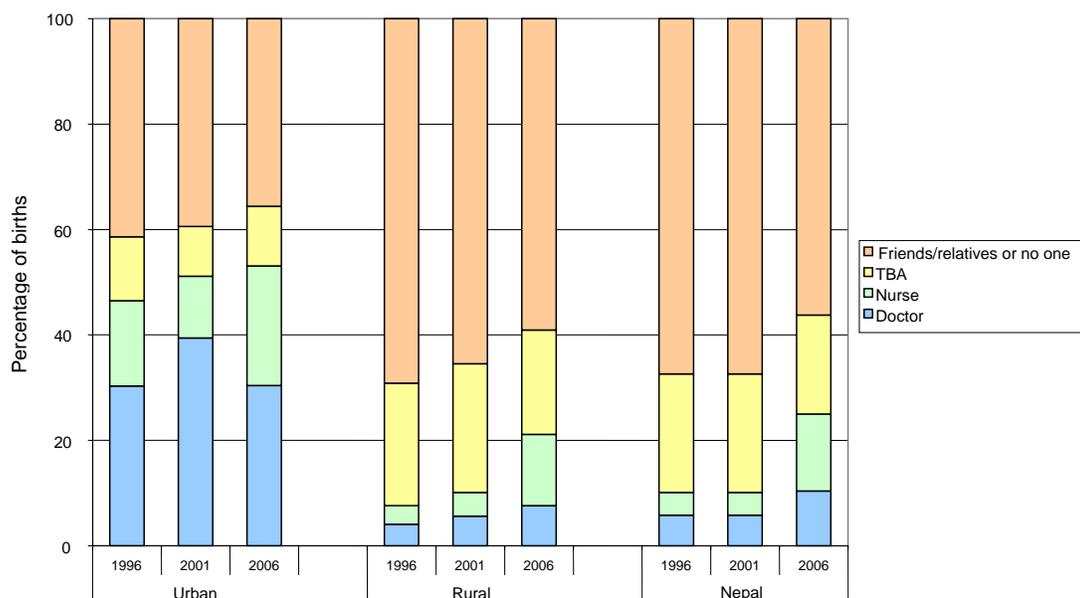
Care provided by trained providers, such as midwives or doctors, at the time of birth is the most important intervention in the continuum of care for pregnant women. It is during the intrapartum period and birth that unexpected complications can occur and in these cases there is need for staff, equipment, facilities, and sometimes surgical resources to be available and accessible at a very short notice. Some strategies for the reduction of maternal mortality priority se care at birth over other parts of the continuum, although many commentators now agree that care over the whole continuum from pregnancy to the time after the birth is needed. Majority of maternal deaths occur at the time of birth or very shortly afterwards. A trained person (a 'skilled attendant') who has the requisite midwifery skills should be available to monitor the progress of labour, and if necessary avert complications (such as postpartum haemorrhage) and intervene in a timely way if complications occur that threaten the life of either the mother or the newborn^{10,25}.

3.1.7 Understanding care at childbirth from survey data

Proper medical attention and hygienic conditions during childbirth can reduce the risk of complications and infections that may cause the death or serious illness of the mother and the baby or both. Hence, an important component in the effort to reduce the health risks of mothers and children is to increase the proportion of babies who are born in a safe and clean environment and under the supervision of a trained health professional. Nepal is promoting safe motherhood through various activities, especially by ensuring childbirth with SBA. Experience from Malaysia and Thailand shows that maternal mortality can be reduced in low-income settings by increasing access to skilled attendants (professional health workers with midwifery skills), emergency obstetric care, and family planning services²⁶. Accordingly, the current policy emphasizes the provision of skilled birth attendants and improved obstetric services in health facilities as key interventions to reduce neonatal and maternal mortality.

Data on care at childbirth is available. The NDHS provides data on care for all births that occurred in the three to five years preceding the NDHS surveys. The primary finding for this is shown in Figure 3.4 and should be seen as an important part of the argument that supports the finding that there have been improvements in maternal survival in Nepal. Still, the improvements have not been particularly great.

Figure 3.4 Skill level of primary caregiver at childbirth in Nepal 1996-2006

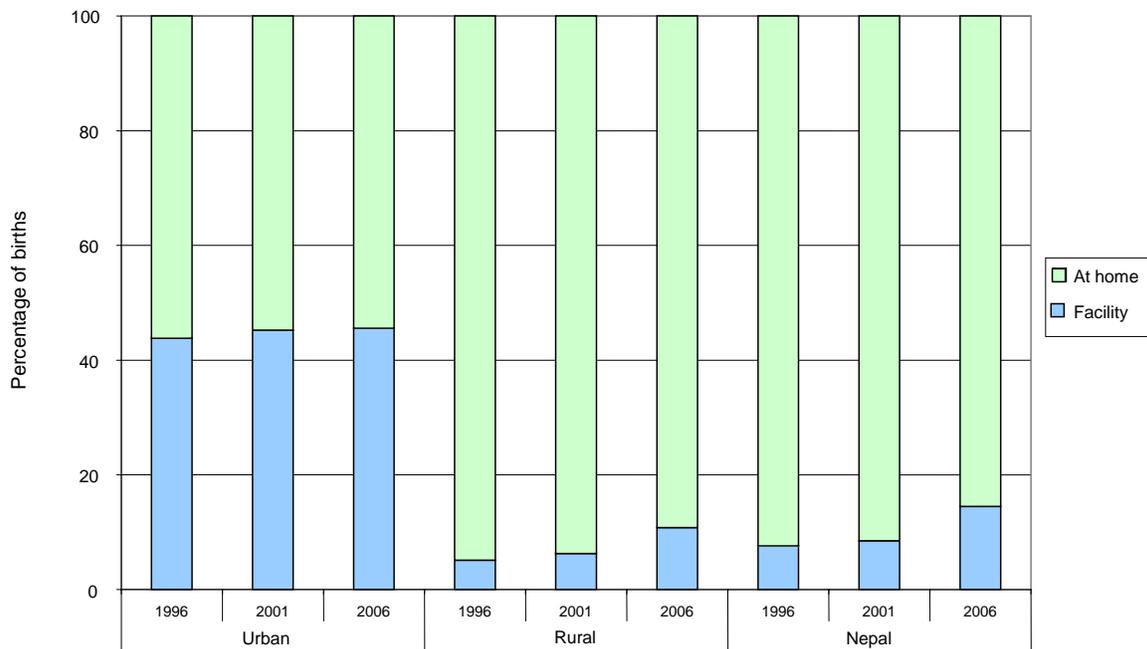


Source: NFHS 1996, NDHS 2001 & NDHS 2006.

The percentage of births assisted by skilled birth attendants has increased from under 10 percent in 1996 to about 20 percent by 2006. This has mainly been achieved by the improvement in nurse-led childbirth in rural areas, which has more than tripled over the time period. Nevertheless, the percentage of births assisted by laypersons has declined only marginally (56 percent in 1996, 55 percent in 2001, and 51 percent in 2006). In addition, delivery assistance by an SBA changed little in urban areas over the past ten years, remaining at around 50 percent of births. The HMIS data from various annual reports of the Department of Health Services also show that the number of women assisted by health personnel between 1999 and 2005 has substantially increased.

There has been a commensurate rise in the proportion of facility births because most births with a skilled person in attendance take place in a facility. Figure 3.5 shows the rise in institutional births, which although still far too low at less than one in five, have doubled since the mid-1990s. Of those institutional births, just over a quarter were at a private facility in 2006, which is more than double compared with 1996.

Figure 3.5 Place of birth in Nepal 1996-2006



Source: NFHS 1996, NDHS 2001 & NDHS 2006.

To get a better understanding of why women do not give birth in a health facility, the 2006 NDHS asked women who gave birth in the five years before the survey why they did not give birth in a health facility. The majority of women (73 percent) believed that it was not necessary to give birth in a health facility, 17 percent mentioned that it was not customary, 10 percent said that it cost too much, and 9 percent said that a health facility was too far or that there was no transportation to a health facility. In addition, 3 percent of women mentioned that the baby was born before they could actually get to the facility, even though they had planned to go to a health facility for delivery.

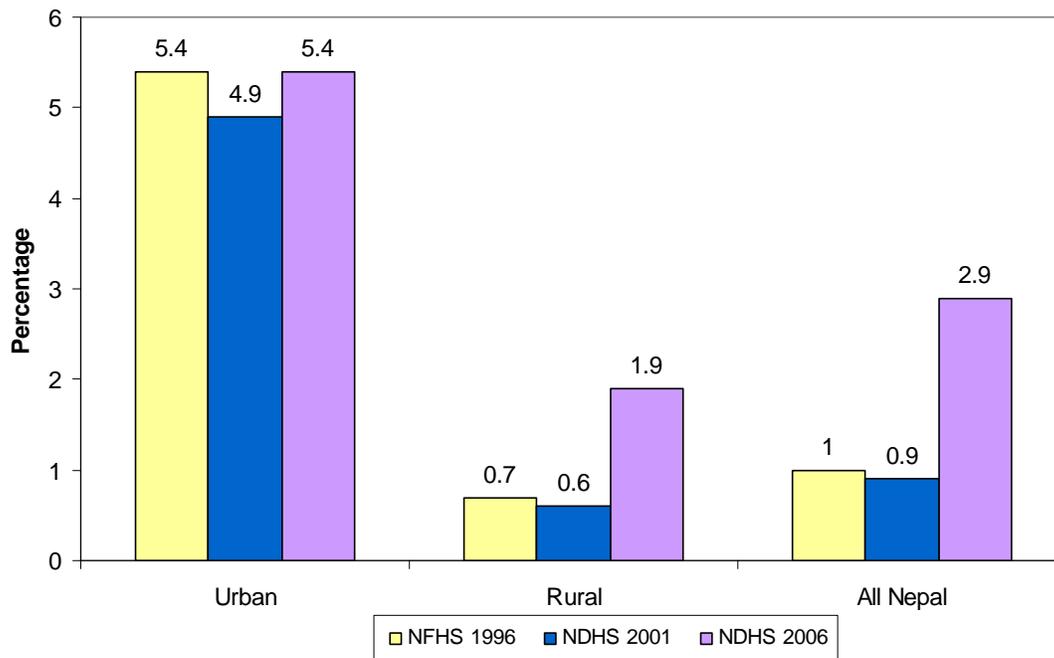
Women with severe complications need to have a Caesarean section, which can be a life-saving surgical operation. If there are less than 5 percent of women receiving such interventions, it is possible that many women who need this intervention are not receiving it. In 2006, 3 percent of births were delivered by C-section as against 1 percent in 1996 (Figure 3.6). The coverage of delivery by C-section in the urban area did not change much between 2006 than in 1996. The corresponding figure for rural areas is even greater; that is, about three times higher in 2006 than in 1996. The increase in

the coverage in C-sections in both rural and urban Nepal between 1996 and 2006 was statistically significant.

In terms of the percentage of all public facility based births in 1996, 11 percent were delivered by C-section compared to 14 percent in 2006. At private facilities, the percentage delivered by C-section was 15 percent in 1996 compared to 18 percent in 2006.

The rate of C-sections in Nepal is still very low – especially as the rise in births in private facilities implies that some proportion of those that experience a Caesarean section may not be undergoing the procedure as a life-saving intervention. The rural rates are especially low.

Figure 3.6 Caesarean section rates

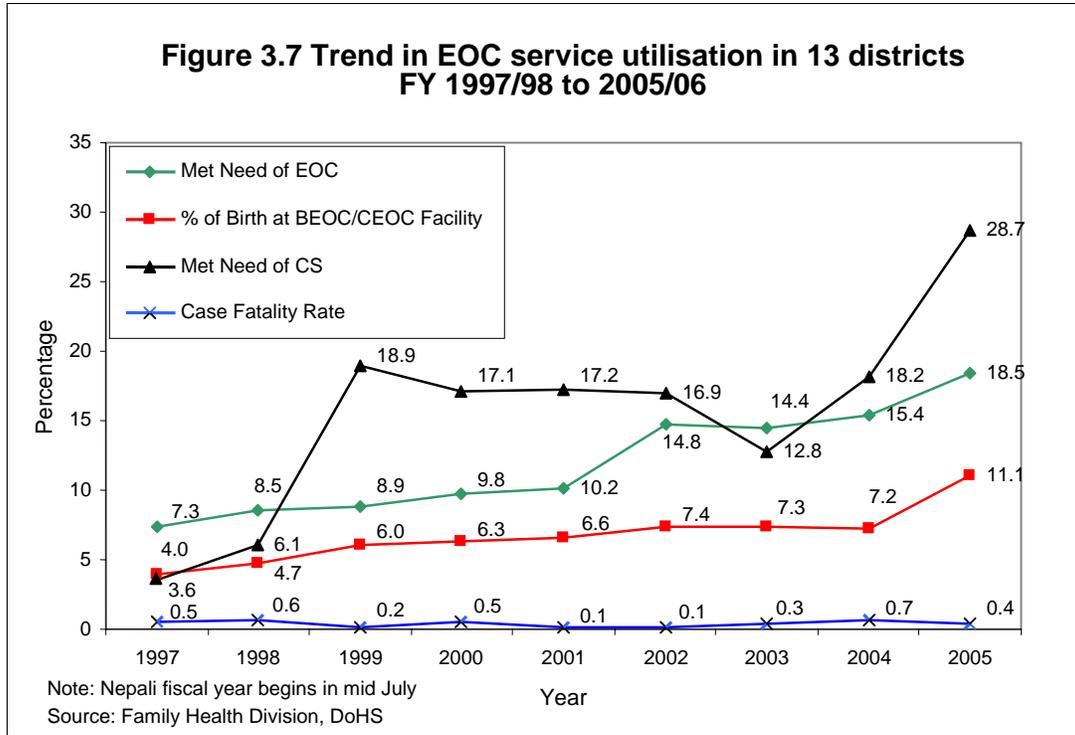


3.1.8 Understanding care at childbirth from facility data

In addition to the above mentioned sources, it is possible to review data on care at childbirth from districts where an EOC monitoring system has been running since 1997-98. This system was initiated during the Nepal Safe Motherhood Project (NSMP) in the three project districts in phase one. The second phase NSMP scaled up its activities to six additional districts in the fiscal year 1999-2000 as part of the project activity. In 2001, NSMP commenced support to EOC monitoring by scaling it up to a total of 13 districts (nine supported by DfID and four supported by UNICEF). At the same time, Family Health Division’s Demography Section took the lead in collecting, analysing, and sharing the information with NSMP and UNICEF and providing feedback to the concerned District Public Health Offices, Hospitals and Primary Health Care Centres. The selected facilities in the thirteen districts continue to report EOC data to the Demography Unit within the DoHS. The EOC monitoring essentially focuses on utilisation of critical safe motherhood services, which prevents maternal death.

Figure 3.7 presents the trend in the utilisation of services, such as proportion of births in a basic or comprehensive EOC facility (BEOC/CEOC), met need of EOC, CS rate and met need of CS, and case fatality rate for 1997 to 2006. The proportion of births in BEOC/CEOC facility was only 4 percent in 1997-98. It more than doubled to 11.1 percent by 2005-06. The met need of EOC increased steadily from 7.3 percent in 1997-98 to 18.5 percent in 2005-06. The CS rate increased from 0.2

percent in 1997-98 to 1.4 percent in 2005-06. The met need for CS went up from 3.6 percent to 28.7 percent in 2005-06. The Safe Motherhood Programme aims to increase the CS rate to 5 percent of total pregnancy. The programme also aims to increase the proportion of delivery in BEOC/CEOC facility to 15 percent while the goal for met need for EOC and CS is 100 percent. The trend data for the nine-year period in these 13 districts indicate that critical safe motherhood service utilisations are increasing steadily, but are still low. The case fatality rate (CFR) is a quality of care indicator, for which up to one percent is considered an acceptable level. The aggregated CFR for the thirteen districts has remained below one percent from 1997 to 2006. However, in some districts during this time period the CFR exceeded one percent indicating an urgent need for improvement in the quality of care in those districts.



The 13 districts that monitor EOC also regularly report the type and number of direct obstetric complication. Of the total direct obstetric complications in the facilities in the 13 districts, the leading cause of direct obstetric complication is prolonged/obstructed labour followed by abortion complications, retained placenta, postpartum haemorrhage (PPH), pre-eclampsia, postpartum sepsis, antepartum haemorrhage (APH), ruptured uterus, and ectopic pregnancy. All the prolonged obstructed labour, ruptured uterus and ectopic pregnancy cases required surgical intervention while some of the APH cases also would require surgical intervention. These account for about 50 percent of total direct obstetric complications. It should also be noted that studies conducted in Nepal and elsewhere indicate 70 to 75 percent of total maternal deaths are due to the direct obstetric complication. This clearly indicates an urgent need for surgical facilities to manage such cases and save the lives of mothers and the newborns. There are programmatic implications for human resource management and ensuring availability of services 24 hours a day, seven days a week. In this regard, 36 comprehensive emergency obstetric care facilities in 28 of 75 districts and 64 BEOC facilities in 46 districts have been providing these critical surgical procedures.

Table 3.3 Trends in direct obstetric complications in 13 EOC monitored districts: FY 2002/03-2005/06

Total complications	Fiscal year							
	2002/03	Percent	2003/04	Percent	2004/05	Percent	2005/06	Percent
Antipartum haemorrhage	144	4.3	155	4.4	146	4.0	123	2.8
Postpartum haemorrhage	231	6.9	252	7.1	318	8.7	302	6.8
Ectopic pregnancy	37	1.1	31	0.9	31	0.8	41	0.9
Prolonged/obs. labour	1,016	30.2	1,280	36.3	1,527	41.8	1,925	43.4
Ruptured uterus	31	0.9	53	1.5	18	0.5	89	2.0
Pre-eclampsia	287	8.5	254	7.2	192	5.3	190	4.3
Retained placenta	326	9.7	301	8.5	301	8.2	368	8.3
Postpartum sepsis	108	3.2	129	3.7	87	2.4	135	3.0
Abortion	1,184	35.2	1,074	30.4	1,035	28.3	1,260	28.4
Total	3,364	100.0	3,529	100.0	3,655	100.0	4,433	100.0

Source: Internal records of Family Health Division, Department of Health Services, Ministry of Health, Government of Nepal.

The blood transfusion service in Nepal has more than doubled in the last ten years (from about 50,000 units to about 112,000 units per year). However, the demand for blood still far exceeds what is collected. It is estimated that about 50 percent of the blood for transfusion goes to women, largely for obstetric purposes. Therefore blood transfusion services will contribute towards reducing maternal deaths.

3.1.9 Postnatal care

A large proportion of maternal and neonatal deaths occur during the hours and days following childbirth. The first few days following birth are critical as serious complications such as infection and bleeding can occur during these early days. Many deaths do occur during this time. A postnatal care visit is critical during this period. If the woman has given birth in a hospital, she is more likely to have received postnatal care prior to being discharged. The postpartum period is also an ideal time to educate a new mother on how to care for herself and her newborn. Safe motherhood programmes emphasize the importance of postnatal care, recommending that all women receive at least two postnatal checkups and iron supplementation for 45 days following a delivery. In 1996, 9 percent of women who had a birth in the three years before the survey reported receiving postnatal care within 24 hours from an SBA. Postnatal care from an SBA for the last birth among births in the five years before the survey was 19 percent in 2006. Although these data are not totally comparable, they do indicate a sizeable increase in postnatal care from an SBA over the decade. Nevertheless, there is still a lot of room for improvement. The HMIS data from various annual reports of the Ministry of Health show that the number of PNC service use among mothers in Nepal between 1998 and 2005 has substantially increased.

3.2 Maternity services and Nepal's health system

3.2.1 Strength of the health system: Human resources and infrastructure for maternal health

In order for women to be able to access family planning, antenatal care, childbirth, postnatal, and abortion care, a functioning health system is required. This consists not only of critical human resources (such as midwives, doctors, obstetricians, and paediatricians) as well as personnel to effectively manage, remunerate, train, deploy, and regulate them. Furthermore, this also requires an effective infrastructure (including drugs, supplies, health facility buildings, power supply, clean water, transportation, and communication).

In countries where health systems are fragile, health workers are often poorly paid. In addition, if health workers are insufficiently skilled, inadequately managed or trained, it can result in an unmotivated and demoralised workforce. Furthermore, the needed infrastructure needs to be in place and supply logistics maintained for smooth and efficient operation. Some data from Nepal is able to shed light on the extent to which the existing health system is strong enough to support the rapidly declining maternal mortality rates.

3.2.2 How is health care organised?

The health care delivery system related to maternal health begins with the peripheral-level female community health volunteers (FCHV) in the wards. At the village development committee government's policy is to have a sub-health post staffed with maternal and child health workers (MCHW) to provide maternal and child care services. At the ilaka level (each district is divided into 9 ilaka) health post staffed with auxiliary nurse midwives (ANM) provide maternal health services. Both the MCHWs and ANMs attend home deliveries, while institutional deliveries at health posts take place only if there is a birthing center. In each of the 205 electoral constituencies in Nepal, the primary health care centre (PHCC) usually has one medical doctor and three ANM or staff nurses to provide maternal services. PHCCs also usually have just one delivery bed. The government's policy is to ensure there is a district or higher level hospital in each district (zonal, sub-regional, regional or national tertiary referral hospital).

3.2.3 Infrastructure and procurement

The GoN is currently in the process of defining the functions and standard designs of all levels of health facilities. At present, all levels of facilities have maternal services as an integral component with standard designs for birthing centres, BEOC, CEOC and CAC services have already been defined. There are seven types of government health facilities in Nepal:

- There are four National Hospitals, including medical colleges and specialised hospitals. Most of these provide obstetric care and all have CEOCs and maternity departments (with Obs/Gyne positions, anesthesia, and nurses).
- There are four regional and sub-regional hospitals, and all of these have CEOCs and maternity departments (with Obs/Gyne positions, anesthesia, and nurses).
- There are eight Zonal Hospitals, and all of these have CEOCs and maternity departments (with Obs/Gyne positions, anesthesia, and nurses).
- There are 65 District Hospitals of which 13 have CEOC and 38 have BEOC. They all provide ANC, delivery and PNC.
- There are 168 Primary Health Care Centres (PHCCs) of which 42 have BEOCs. They all provide ANC, delivery and PNC. They have 1 doctor, 4 nurses, and aim to have 15 beds with 3 maternity beds.
- There are 696 Health Posts (HPs), with all providing ANC and PNC and some have birthing centres.
- There are 3,129 Sub-health Posts providing ANC and PNC.

From the perspective of essential drugs, the current annual indent of drugs supplied to the government health institutions includes oxytocin but not magnesium sulphate.

There are a number of initiatives currently in place to improve the quality of government maternal health services:

- The number of PHCCs has increased dramatically, with many health posts being upgraded to PHCCs (due to policy changes in 1991 stating that each electoral constituency should have at least one PHCC). The level of these facilities may have changed, but often the infrastructure has not and many more PHCCs need to be constructed. The concept of PHCCs having BEOC facilities only started in 1997 and almost all of those established before 2005 do not have appropriate infrastructure for BEOC.

- Birthing centres are being added to Health Posts to increase the number of institutional deliveries, but coverage is currently low.
- A new procurement act has been introduced that has resulted in recent improvements in the quality assurance mechanisms in the procurement of equipment and instruments through hiring specialised agencies for quality control at all stages including specification preparation, monitoring at manufacturing and storage sites, and only drugs with good manufacture practice (GMP). Certification is allowed to be bought through competitive bidding process. However, the lack of human resources and facilities for verifying the quality of instruments and equipment means that it is still difficult to assure quality without support from external experts.
- A more decentralised approach has been taken by the government towards drug procurement. Forecasting systems have been developed for essential drugs and procurement is increasingly being made by the districts. This year the budget allocated to the districts for drugs is almost 3.5 times the amount that was previously sent to the districts. However, the money is allocated on the basis of client load, and this is likely to be higher in places where good services are available.
- Bio Medical Equipment Technician Training has been developed and conducted by National Health Training Centre (NHTC) to enable development of technicians at different levels of health facilities to repair maintain and operation of equipments.
- In the last 15 years stores have been built in about 45 districts by MoHP for storage of drugs and for cold chains.

3.2.4 Human resources

It is increasingly recognised that the most important intervention to reduce maternal mortality is the care provided by a skilled birth attendant working within a supportive environment that provides an adequate system for referral and emergency obstetric care. GoN endorsed the national policy on skilled birth attendants in 2006²⁷ and the SBA strategy was endorsed in 2007²⁸. Based on the new strategy 159 SBA's have been trained to date (MoHP training records). 1486 SBAs need to be trained to achieve the GoN goal of 20 percent coverage of deliveries by SBAs in 2007 and 4528 SBAs need to be trained by 2015 to achieve the goal of 60 percent of deliveries to be attended by SBAs.

There has been a 14 percent increase in FCHVs from 42,427 to 48,164. Although FCHVs distribute pills and condoms and help with immunisation campaigns, such as Vitamin A and polio immunisation campaigns they also educate and inform women and their communities about birth preparedness. For example, in Banke District, FCHVs distributed misoprostal as a pilot for the prevention of postpartum haemorrhage.

The Department of Health Services has produced annual reports regularly since fiscal year 1994/95, of which quite a few have included information such as sanctioned post (positions) by broad categories of human resources in various health facilities. Table 3.4 shows increases in medical doctors and nurses between fiscal year 1998-99 to fiscal year 2005-06. The trend does not reveal any substantial improvement in the number of sanctioned posts (positions) of critical human resources, such as doctors and nurses.

Table 3.4 Sanctioned post of doctors and nurses in the public sector of Nepal, 1996/97-2005/06

Fiscal year	Sanctioned posts	
	Doctors	Nurses
1996/97	na	na
1997/98	na	na
1998/99	923	6,023
1999/00	935	6,163
2000/01	977	6,154
2001/02	978	6,157
2002/03	998	6,214
2003/04	1,000	6,208
2004/05	1,000	6,208
2005/06	624	2,079

Note: FY 2005/06 data do not include national level hospitals. Source: Annual Reports of Department of Health Services for fiscal years 1996/97, 1997/98, 1998/99, 1999/2000, 2000/01, 2001/02, 2002/03, 2003/04, 2004/05, 2005/06, Department of Health Services, Kathmandu, 1997 to 2006. Kathmandu

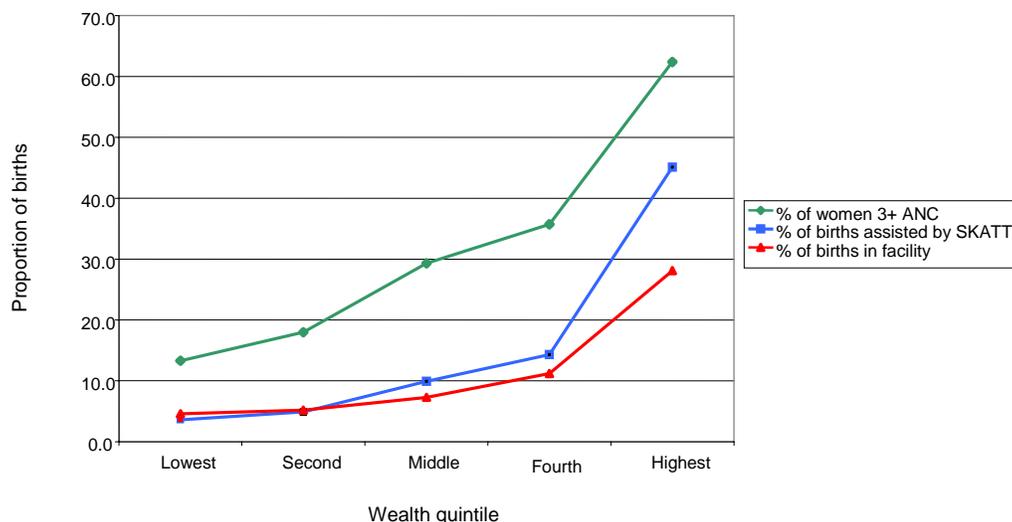
There is currently a critical shortage of human resources. The Department of Health Services annual report for 2005/06 reports that in hospitals (excluding central level) and PHCCs 47 percent of doctors' positions (these include those not trained in obstetrics); 22 percent of staff nurse positions; and 9 percent of ANM positions are vacant²⁹.

3.2.5 Financial access to health

An important part of any health system is the mechanism by which health costs are financed and pooled. The mix of financing mechanisms, such as direct taxation, social insurance, and private payments, has an important effect on access to services. Maternity services are a classic example of this. The majority of women give birth at least once and costs can spiral for the families of women who experience complications if there is no financial protection for health or if the financial protection mechanisms are not effective. With direct costs of care being only part of the total burden for families (other costs being travel, interrupted employment, and time), families can be pushed into poverty as a result, even if the only care accessed is routine check-ups or care for normal births.

Poor families, and those that anticipate high costs of health care related to pregnancy and childbirth, tend not to access services, which places women in these families at increased risk of maternal death. This is particularly true with care at childbirth, where the differences between rich and poor are dramatic across a wide range of countries³⁰. Figure 3.8 shows that in Nepal access to maternal health services have improved slightly for all wealth quintiles. The only significant changes have been for the middle quintiles whose access has increased moderately over the 10 years that maternal mortality has declined. Figure 3.8 shows these changes in equity across wealth quintiles in the percentage of women accessing three or more ANC visits; the percentage of births assisted by a skilled attendant, and the percentage of births in the facility. This modest improvement in access for those with average wealth is consistent with a moderate mortality rate reduction.

**Figure 3.8 Antenatal and delivery service utilisation by wealth quintile
Nepal 2001**



It is also possible to examine out-of-pocket costs for health. Although costs just for maternal health care are not available from general household budget surveys, total costs for health are available, and it is a fair assumption that high out-of-pocket costs for all health care does not bode well for costs associated with pregnancy and childbirth. In Nepal evidence from the 1995-96 Living Standards Survey, with 3,388 respondents, suggests that 2.8 percent of total household resources are spent on health care³¹. This is high in a country where, according to the same survey, 40 percent of the population are poor (living below a dollar per day), even before the health payments have been taken into account. After these costs are added, an additional 2.2 percent of households cross below the poverty line, the equivalent of more than half a million extra people pushed into poverty because of health costs³². It would be interesting to see if this situation has improved since the mid-1990, but high out-of-pocket costs at this level combined with widespread poverty are not likely to have been conducive to dramatic drops in maternal mortality.

More recent estimates are available for care costs that relate specifically to maternal health. Although these are not comparable, they do suggest that out-of-pocket costs are still high in Nepal, and that this affects childbearing women in particular. A survey on out-of-pocket expenditure on sexual and reproductive and HIV/AIDS conducted among urban populations of Nepal in 2006 collected cost estimates for antenatal, postnatal, and childbirth care³³. The results showed that annual gross out-of-pocket expenditure as a percentage of total annual household expenditure was 1.1 percent on average for sexual and reproductive health care and 2.9 percent on average for HIV/AIDS care services. This is lower than for some other developing countries. However, the study revealed that catastrophic financial payments are likely to be incurred by households with one or more members suffering maternal health problems and/or utilising obstetric care services. Almost 9 percent of such households' total annual expenditure consists of payment for obstetric care, which is close to the 10 percent threshold, which has been defined by several authors as catastrophic payment for total health care costs^{34,35}. This result implies that a multitude of reproductive and sexual health problems can seriously aggravate the financial situation within households. The financial burden on households becomes even more serious when the cost of transportation becomes a large component of out-of-pocket expenditures, especially in rural settings, which were not covered in this survey³⁶.

The same survey showed that health insurance for urban household members is almost non-existent. Roughly half of the households reported that they were able to meet hospital costs

exclusively from their own resources and about 19 percent of the households financed the cost of treatment by their own savings. A quarter of the households received free treatment from NGOs. The rest of the households had to manage by borrowing cash from relatives and friends or by selling household assets. None of the respondents mentioned that they received any cash from either insurance companies or commercial bank³⁷.

To address some of the financial barriers the GoN introduced a maternity financing scheme in 2005. Details of the scheme are discussed in Section 4.

3.3 Changes in the socioeconomic landscape of Nepal: Are there other factors that could have triggered a reduction in maternal deaths?

3.3.1 Socio-economic context

Between 1996 and 2006 there have been some relatively dramatic changes in indicators, including education and poverty levels that help to understand the changes in maternal health.

In the early 1990s, an extensive economic reform agenda was initiated. Reforms were introduced, for example, to liberalize trade, investment and foreign exchange regimes, to unify the exchange rate, rationalize the tariff structure and the tax system, promote exports, strengthen financial and capital markets, foster private sector development, and strengthen public expenditure management. These efforts yielded impressive results early on. They helped to transform the Nepalese economy from a highly regulated one to a more open market-oriented economy. They also created an energetic private sector and expanded its role in such areas as manufacturing, industry, exports, education, health, air transport, finance, and power. This combination helped to create increased employment and income-earning opportunities in urban areas and kept urban poverty at low levels. Urban poverty declined from 22 percent in 1995/96 to 10 percent in 2003/04 while the overall national poverty incidence declined from 42 percent to 31 percent in the same period³⁶.

More recently, economic development has been severely disrupted by adverse domestic political instability. The resulting slowdown in economic growth, diversion of resources for security needs, reduced availability of resources and the difficulties in carrying out development work in the affected areas severely constrained development. Nevertheless, significant progress was made in some important areas. For example, some key human development indicators showed notable improvement while some progress was also made early on in reducing poverty. Key macroeconomic indicators, such as the balance of payments, monetary growth, and control of inflation indicate good progress while some actions have been taken in implementing policy reforms in key sectors, such as education, health, and power, which hold considerable promise for the future. Nevertheless, progress in a number of areas has been below expectations, including reducing poverty and inequality, in fiscal management, in improving the quality and delivery of essential social services and rural infrastructure, and the effective implementation of announced policies and programs, all of which were critical to the attainment of the primary goal of poverty reduction.

Overall GDP growth averaged only 3.6 percent per annum in recent years. Agriculture is growing at the rate of only 3.3 percent per annum, and non-agricultural sector at 3.9 percent per annum. Allowing for population growth (estimated at 2.25 percent per annum), per capita income grew at 1.3 percent per annum, well below expectation and below the rate necessary to make a significant dent on poverty. This is not surprising, given the slow growth of per capita incomes, especially in rural areas, in view of continued weak agricultural performance. It is also highly likely that since then, given the sharp decline (by about 3 percent) in per capita income during 2001-02 and the continued disruptions to investment and economic activities caused by the violence, that the poverty situation in rural areas may have deteriorated significantly during the period of instability.

Despite this, a number of significant improvements have been measured since 1996. For example, 80 percent of women had no education in 1996 but in 2006 that figure had declined to 62

percent. In 1996, 11 percent had only primary education and 6 percent some secondary and 3 percent School Leaving Certificate or above. In 2006, the equivalent figures were 17 percent, 14 percent and 6 percent, respectively. Over this period, age at first marriage increased by almost a year from 16 to 16.9 while the mean number of children ever born declined from 3.4 to 3. The neonatal mortality declined from 50 per 1000 live birth to 33 per 1000 and infant mortality has declined from 79 per 1000 live births to 48 per 1000 live births. There has been a 33 percent decline in under-five mortality from 118 to 61 during the same period. The percentage exposed to a family planning message (a proxy indicator for access to information and health promotion) increased from 53 percent to 72 percent. Table 3.5 illustrates differences in selected variables of interest between 1996 NFHS and 2006 NDHS. The changing socio-economic status in Nepal has provided the critical foundation for changes in maternal health outcomes and greater use of health services.

Table 3.5 Differences in selected variables of interest between NFHS 1996 and NDHS 2006, Nepal

Variables	Number	Mean	Level of Significance
Exposed to FP message			
NFHS 1996	8,429	0.531	*
NDHS 2006	8,644	0.718	
Current marital status			
NFHS 1996	8,429	1.146	*
NDHS 2006	8,644	1.121	
Age at first marriage			
NFHS 1996	8,429	16.029	*
NDHS 2006	8,644	16.943	
Children ever born			
NFHS 1996	8,429	3.420	*
NDHS 2006	8,644	3.047	
Number of living children			
NFHS 1996	8,429	2.786	*
NDHS 2006	8,644	2.660	
Current contraceptive use			
NFHS 1996	7,982	0.285	*
NDHS 2006	8,257	0.480	
Unmet Need for FP			
NFHS 1996	7,982	0.330	*
NDHS 2006	8,257	0.250	

* <.05

4 Recent Interventions in Nepal to Improve Safe Motherhood

To help understand the context of these changes, it is important to briefly review the investments made in maternal health in Nepal over the past 15 years. In 1991, The National Health Policy was endorsed. It stressed reduction of maternal and child mortality through expansion of services. Subsequently, in every VDC, the lowest administrative unit, a health institution (sub-health post) was established and manned by three health workers, one of whom was Maternal and Child Health Worker specifically given the task of providing basic health services to mother and child. This had the important effect of securing accessibility and availability of health workers in the community. In addition, Primary Health Care Centres or (PHCC) were established in all the districts manned by doctors, nurses, and other health workers, helping to provide basic services as well as referral. To provide accessibility to the health services, in every VDC two to four outreach clinics were established so that women could get antenatal and postnatal care. Immunisation is also provided in these clinics. From a total of 11,158 Out Reach Clinics (ORC) in 1997-98, the number of ORCs has increased to 14,366 in 2005-06. In the fiscal year 1997-98, services were provided to 355,733 clients and in 2005-06 services were provided to 2,264,847 clients which is 6.4 fold increase in clients during that period.

To mobilize the community and promote health, FCHV are actively involved in promoting and caring for maternal health. At least one FCHV serves one ward and the population FCHV ratio was 706 in terai, 488 in hills and 334 in the mountain areas while in 28 districts, population based FCHVs are institutionalised and the population FCHV ratio was 454 in terai, 270 in hills and 156 in the mountain area³⁷. FCHVs instructs pregnant women about danger signs during pregnancy, childbirth and post-partum period. Similarly, she also carries out iron tablet distribution to pregnant women, contraceptive distribution to eligible couples as well as education on nutrition and child care. During the last ten years, the services provided by FCHVs have dramatically increased from 712,735 in 1997/98 to 6,445,869 in 2005/06.

A number of medical colleges have been established in Nepal during the last decade with experienced faculties and departments. A minimum standard of services and minimum client load has been defined for medical colleges. The medical colleges have been spread in various parts of the country and access to them is relatively easy. Cross referral from public health institutions and the medical colleges ensures women and children have continuity of care. The number of private health institutions has increased over the last 10 years. From only 15 private health institutions, now the number stands at 108. From these institutions women and children are getting various types of services and a few essential services are made mandatory to be provided by these private institutions free of cost. That means the access and availability of services is there in these institutions.

Together with WHO, the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), the Department for International Development of the United Kingdom (DfID), the United States Agency for International Development (USAID), Germany's Gesellschaft für Technische Zusammenarbeit (GTZ), and other international and national NGOs, the Nepal Ministry of Health and Population has been committed to improving access to higher quality health services to improve health and survival prospects for mothers over the period that this review covers.

The Support to Safe Motherhood Programme (SSMP) is DfID's longest running and largest Maternal Health programme in Asia. The programme has been running for more than 10 years, since its inception as the Nepal Safer Motherhood Project (NSMP) in 1997. During its lifetime it has expanded aspects of family care in 70 districts of Nepal.

SSMP works on all fronts to strengthen the health system and quality of health service delivery while delivering an intensive programme working with communities to increase demand amongst the most socially excluded. SSMP supports the implementation of the DfID-funded

nationwide maternity incentive scheme, which provides all women who deliver at a facility with a cash payment to help cover costs incurred in accessing the facility, pays an incentive to trained health workers who support women to deliver in facilities and at home, and provides free delivery for complications in the most disadvantaged areas in the country.

In this section we reflect on some of the key contributions SSMP and their partners have made to strengthen maternal and perinatal health services and help to reduce maternal mortality. These include:

- Strengthened policy development and planning, with endorsement in 2006 of the National Policy for Skilled Birth Attendance, Revised National Blood Policy, Essential SMNH Package and National SMNH Long Term Plan (2006-17) all of which are evidence-based and reflect recent developments in global thinking and Nepal experiences. These documents have become the basis for implementation of district SMNH planning and programming.
- Safe abortion services are now available in 70 out of the 75 districts from 167 listed sites (89 government and 78 private). Over 132,205 women have received services since legalisation, 83 percent of these from non-government sites and 17 percent from government sites³⁸.
- The development and strengthening of 36 comprehensive emergency obstetric care facilities and 40 basic emergency obstetric care facilities, which have been developed and strengthened across the country³⁹.
- Current infrastructure support through SSMP Financial Aid (FA) to 127 sites, of which 90 are for two-room additions at 80 health posts and 10 PHCCs, to enable the provision of locally accessible 24-hour birthing services. So far 27 have been completed and the rest are expected to be completed soon. The SSMP FA is also providing support for the construction of 18 BEOC sites, 13 CEOC sites, three major CAC sites and three minor CAC sites, including new sites planned for the year 2007-08⁴⁰.
- The SSMP has worked with the Logistics Management Division (LMD) to establish strict technical inspection of samples to ensure compliance with the specifications and good quality before awarding contracts. SSMP has also been exploring opportunities for cooperation with laboratories in adjoining countries for quality assessment where such service is not available in Nepal.
- Prioritising support for finalising and implementing the maintenance strategy, to halt the current wastage caused by a “crisis maintenance” approach.
- Continuing to support the Department for Urban Development and Building Construction (DUDBC) in establishing a coordination mechanism between the DUDBC district office responsible for implementing construction work and the local facility management committees (users) to ensure local ownership and involvement.
- Working closely with DUDBC, SSMP has completed a database inventory of existing government health infrastructures containing details of their physical condition and with the capacity to provide information on the number of different types of facility, quality, land ownership details, physical condition, size and many other details. This major breakthrough made it possible to develop a maintenance strategy, which was presented during the recent Joint Annual Review (JAR). The strategy has a clear plan and estimated budget for regular maintenance, repair and reconstruction work required to ensure all government health infrastructures are functioning. The inventory will also support planning of future infrastructure expansion; upgrading, renovation and reconstruction needs and can be used to support pro-poor (inclusive) planning and many other purposes.

- Advocating for an equipment maintenance policy, with the support of other stakeholders. The standard equipment list will be used to develop a database of equipment at different facilities, as a base for development of an equipment maintenance plan. This will save resources currently wasted replacing major equipment that has been allowed to deteriorate.
- Strengthening government systems and capacity to improve the supply and procurement systems for essential drugs and commodities, SSMP is working to ensure year-round availability of SMNH drugs where needed.
- Working to improve infrastructure tendering practices, which are currently affecting quality by allowing domination by a few powerful cartels.
- Advocating with the government to amend regulations that promote the practice of always awarding contracts to the cheapest bidder, which can compromise quality.
- Addressing social inclusion both in policy development and programme implementation through the Equity and Access. This involves implementing district level activities to stimulate demand and increase the access of women to Maternal and Neonatal Health (MNH) services, with particular emphasis on those from poor and excluded communities. The Equity and Access Programme (EAP) operates through a network of 26 independent Equity and Access Support Organisations (EASO) in 10 districts¹ providing intensive support to a total of 120 VDCs and seven Municipalities.
- To help mitigate the high financial cost of childbirth (transport, loss of earning/support and medical costs), the Government of Nepal is implementing a policy, referred to locally as the maternity financing scheme, to provide financial assistance to women seeking institutional care at childbirth and also to provide an additional financial boost to the health care providers and institutions. The scheme is supported by the DfID, through SSMP as direct financial assistance to the Government of Nepal. Deliveries supported by health workers have increased to/by 6 percent since the launch the scheme two years ago and the increase in the numbers of women delivering at a facility and with the support of a health worker continues to grow. A total of 111,745 deliveries between July 2006 and February 2007 involved the provision of cash incentives under the scheme.

In the early years of the DfID-funded support to safe motherhood activities focused more directly on the sub-sector. Today, the Government of Nepal Family Health Division supported by SSMP is driving forward a number of initiatives which are not only critical to efforts to reduce maternal and perinatal mortality but also directly benefit the wider health sector.

Other interventions have also proved to be beneficial for maternal health – although only small areas of Nepal have been involved. For example, the MIRA Makwanpur trial in Nepal⁴¹ adapted a community mobilization action cycle based on women’s groups first used in Bolivia⁴². They conducted a large-scale cluster randomised controlled trial in one district of Nepal, covering a total population of 170,000. The project showed a reduction of 30 percent in neonatal mortality and a reduction of 78 percent in maternal mortality over a period of three years. However, the maternal mortality reduction was based on a very small sample size. This is a low cost intervention that just employs one facilitator per cluster, who facilitates a number of women's groups as they move through a four-phase participatory action cycle addressing the issues of pregnancy, childbirth and newborn health⁴³. The facilitator is not a health worker, but she does need to have a grasp of maternal and newborn health issues and some knowledge of participatory modes of communication. In phase one the groups identify and prioritise maternal and newborn problems in their community. In phase two they discuss possible strategies and choose which strategies they are going to implement. In phase three they implement their chosen strategies. In phase four they evaluate their work and identify areas for improvement.

¹ The Districts are Dandeldhura, Dailekh, Surkhet, Baglung, Parbat, Myagdi, Rupendhi, Nawalparasi, Chitawan, and Morang.

5 Discussion and Conclusions

5.1 Discussion

This study reviews the trend in maternal mortality as estimated by the DHS Surveys in 1996 and 2006. It explores factors known to influence maternal outcomes such as changes in levels and trends of selected maternal health utilisation behaviour, socio-demographic changes, emergency obstetric care data, and the availability of key health infrastructure and resources using data from various sources.

There has been an improvement in most indicators that impact maternal health in Nepal: these are:

- ✓ a significant decline in fertility;
- ✓ increased use, timing, and quality of antenatal care services;
- ✓ use of trained health professionals for delivery;
- ✓ an increase in facility births;
- ✓ a reduction in neonatal mortality;
- ✓ an increase in postnatal care; in birth preparedness knowledge; in the c-section rate; the number of hospitals and primary health care centres (bases for CEOC and BEOC depending on staff availability); and
- ✓ improved educational status of women

5.1.1 What next? Can Nepal expect a further decline in maternal mortality up to 2015?

The evidence suggests that the stage is set for a further decline in maternal mortality. Evidence of existing investments and future plans that are likely to expand access to safe services include:

- The Government of Nepal plans to upgrade sub-health post to health post, where the service of Auxiliary Nurse Midwife (ANM) is available. This will improve access for the rural population to trained health providers.
- All the Primary Health Care Centres will be upgraded and equipped to function as Basic Emergency Obstetric Care (BEOC) sites and it is hoped that 80 percent of PHCCs will function as a BEOC by 2017. Similarly, district hospitals will be equipped to provide as Comprehensive Emergency Obstetric Care (CEOC) and by the year 2017 60 districts are expected to have at least one CEOC institution (National Safe Motherhood and Newborn Health Long Term Plan (2006-2017)).
- All the BEOC and CEOC sites will provide safe abortion services.
- A plan is in place to train about 5000 SBAs in the next five years. Doctors, nurses and midwives will be trained to have the core skills to be SBAs and deployed to health institutions.
- Promotion of institutional delivery is the goal of the safer motherhood program. The Maternity Incentive Scheme (MIS) will encourage institutional deliveries.
- Construction of Birthing Centres, BEOC and CEOC, equipping them with instruments and deployment of human resources will be part of accelerating the intervention to save life of women.
- Safe Blood Transfusion Policy and expansion of blood transfusion services is also being implemented.

- Use of misoprostol for preventing postpartum haemorrhage (PPH) at community level has been piloted in one of the districts of Nepal. The study has shown encouraging results to reduce PPH. Given the geo-topographical structure of the country and keeping in view high home delivery rate, it seems a promising intervention for Nepal to reduce maternal mortality as 48 percent of maternal death is due to PPH.
- Improved conditions for financial protection from catastrophic expenditure on health care look likely over the next few years including a reduction and phasing out of user fees.

5.2 Conclusions

Data from the 1996 and 2006 surveys indicate a significant decline in maternal mortality in Nepal over the past 10 years. The improvement in maternal health utilisation and socio-economic indicators supports the evidence of maternal mortality decline.

Part of this significant achievement in reducing maternal deaths is likely to have been influenced by substantial fertility decline and the success of family planning measures in Nepal in recent years. Given the recent onset of safe abortion services, this trend is likely to continue as abortion-related deaths are averted. However, the current low level of care at childbirth, including care for women with complications, will need to improve in order for the maternal mortality rate to decline further. Although we have seen modest improvements in care at this crucial time in the continuum, there is still a large majority who remain excluded from care, and many do not have access to life-saving care they require to survive.

In this respect, the decline in maternal deaths seen in Nepal is reminiscent of improvements seen in some parts of Bangladesh⁷ where family planning and menstrual regulation services have initiated improvements in the absence of expanded care for women during birth. Evidence from Pakistan may have similarities, and it is possible that we are seeing a new generation of Asian case studies in maternal mortality, which although not echoing the landslide examples of maternal mortality decline seen in the 1980s in Sri Lanka, Thailand, and Malaysia, is nevertheless a modest but very significant shift in maternal health. This new generation of countries experiencing maternal health transitions are not fully understood yet, given their poor progress in care, but the contribution of family planning and/or abortion is undeniable.

In conclusion, Nepal has taken effective steps towards lowering maternal mortality. Much more effort is required to scale up care in order to move further towards achieving the target set by MDG5, but improved family planning and possibly improved status of women have reduced the death rate for pregnant women, and the recent legalisation of abortion looks set to reduce the deaths even more. This is an impressive achievement for a country still coping with political instability.

Appendix A Estimating Maternal Mortality from Alternative Sources

A.1 Estimating maternal mortality from the sisterhood method

The sisterhood method was originally developed in the late 1980s to overcome the problem of large sample sizes and thus reduce costs⁴⁴. The direct sisterhood method, developed later for Demographic and Health Surveys, asks survey respondents to provide information about their sisters, including the numbers reaching adulthood, the number that have died, the age at death, the year in which the death occurred and the years since the death. Additional questions determine whether the death was in pregnancy, childbirth or shortly afterwards⁴⁵. Usually in DHS surveys, the number of actual maternal deaths reported is very small (i.e. the sample size), although amplified by asking respondents about sisters, is still very small. In Nepal's 2006 NDHS survey, the total number of maternal deaths reported throughout the whole country was 39. To estimate the Maternal Mortality Ratio, deaths are counted and divided by woman years of exposure to obtain a rate of maternal death. This rate is then divided by the General Fertility Rate (also calculated from DHS survey responses on childbearing) to arrive at the Maternal Mortality Rate. This method of calculation is used in all DHS-reported MMR rates.

The direct sisterhood method applied in DHS surveys provides a maternal mortality estimate for 0-13 years before the survey date, and so the most reliable estimate is for a point at about seven years before the survey⁴⁵. For Nepal, this means that the change in maternal mortality reported from DHS surveys from 1996 to 2006 does not accurately refer to those years, and more reliably refers to 1989 to 1999 – both figures before the Millennium Declaration. Furthermore, the change in abortion law, sometimes claimed as contributing to the estimated drop in maternal mortality, came in the early 2000s, and will have had a negligible effect on the rates. Although the second survey was administered in 2006, implying that deaths within the year or two before the survey may have been reduced by the availability of safe abortion services, the reality is that given start-up time for services following the change in legislation, there is likely to be little effect. Maybe this may have been effective in late 2005 and the short part of 2006 before the survey – but this is only a small part of the 13 year window within which respondents recall their sisters deaths. Furthermore, it is questionable whether respondents report abortion-related deaths as maternal. Often, the pregnancy status of a woman who dies of abortion-related causes is not known by her relatives. It has been suggested that sisters in particular might know of important details of their sibling's situation, but whether they would report this in a household survey is also questionable. Overall, it is considered that abortion-related deaths are an additional and substantial source of under-reporting for maternal mortality estimates from all sources of data. The same applies for suicides – a cause of maternal deaths that is significant in many countries (it is the leading cause of maternal death in the UK⁴⁶) and is suspected to also be high in developing countries – but rarely counted or estimated.

A final problem with maternal mortality estimations using sisterhood approaches is that of selectivity. Because respondents have survived themselves to be interviewed, some siblings are not captured. These very respondents are likely to be those with dead sisters – mainly due to genetic, or family clustering of deaths. A recent study has estimated that this may distort and underestimate MMRs by as much as 50 percent⁴⁷.

A.2 Estimation of maternal mortality and other related variables by international agencies

International agencies WHO, UNICEF and UNFPA have joined together in producing five-yearly maternal mortality estimates across the world that have a consistent approach to monitoring. The first estimated appeared in 1990, but the most complete and thoroughly estimated data sets started to appear in 2000. As part of this approach, countries are grouped into eight categories according to their best evidence on maternal mortality as follows:

1. Complete civil registration – good cause of death reporting
2. Complete civil registration – poor cause of death reporting
3. Direct sisterhood estimates
4. Reproductive Age Mortality Surveys
5. Sample registration
6. Census
7. Special studies
8. No national data

For each group, the international agencies have applied the same rules about how under-estimation and other problems are corrected, in order to arrive at the final estimate for each country. For Group C with sisterhood estimates – the international agencies argue that there is evidence for the need for upward adjustment of the sisterhood data. Instead of using the estimate given by DHS reports for MMR, the agency calculations use the proportion maternal among deaths of females of reproductive age (PMDF). This is then applied to the WHO envelope of female deaths within those age groups – and divided by the UN estimated live births total for the year in question to arrive at the adjusted MMR. It is for this reason that the MMR reported by the agencies can be substantially different from that reported by DHS. It should be noted here that for those countries who have no recent data – group H - the international agency estimate is derived from a regression model – and depends on national levels of fertility, economic status and coverage of skilled birth attendants. It should also be noted that the year allocated to the estimate is distorted somewhat by the availability of data in the 5-year window of estimation for each set of global figures. For example, if there is data from 2006, the estimates will be emerging early 2007, and this will be too late to feed into the 2005 estimates. This is the case for Nepal.

The 2005 Nepali estimate of MMR (830 per 100,000 live births) from the international agencies was based on Nepal's categorisation as a group H – having no national data. The estimate was consequently high – being based on a low proportion of births attended by skilled personnel. In 2000, Nepal was categorised as Group C from the earlier sisterhood (inflated) estimate of 740 – with confidence limits of 440 to 1100. Clearly these two estimates are not comparable – and the agencies themselves warn against comparisons over time. However it is more reasonable to compare the earlier 2000 estimate with a later rate that has been calculated in the same way. Authors of this report therefore requested WHO to informally estimate the Nepali MMR using the second sisterhood estimate in the same way as the earlier estimate – arriving at 670 – suggesting a 20 percent drop in maternal mortality⁴⁸. However – no new confidence intervals were calculated – so it is not known if the two agency estimates suggest a significant decline.

A.3 Estimation of maternal mortality from service statistics in Nepal:

The Health Management Information System Section (HMIS Section) in the Management Division of the Department of Health Services is responsible for supervision and collection of service statistics at all levels. The HMIS Section reviews the collected data to maintain the data quality before computer entry. The data is processed and appropriate indicators are generated and provided to all the divisions and centres every month for programme monitoring. The HMIS Section staff participates in the regional level data verification workshop which is conducted two times every year and district level data verification workshops are conducted in all 75 districts once every year. Ilaka (each district is divided into nine ilakas) level data verification was conducted in 12 of 75 districts of the country. This data verification ensures the data quality to an extent but cannot identify deliberate over or under reporting.

Another independent source of data used to verify whether this decline is a true decline or not is the information from the service statistics. One thing that needs consideration at this point is that the maternal mortality ratio estimated using the service statistics is not strictly correct. Formally – the maternal mortality ratio is the number of maternal deaths divided by the number of live births. From the service statistics we only have data for women who deliver in a facility and the respective total

number of births. As we are not able to differentiate between a still and live birth the HMIS MMR is likely to be overestimated. However, this overestimation is likely to be negligible in comparison with the deaths missed (because they do not occur in hospitals) or misclassified (because they are incorrectly classified as deaths that are not maternal). Even in European Union and Nordic states under reporting in official statistics for maternal and perinatal deaths is estimated to be anything up to 67 percent and in some European regions, hospital monitoring systems are so patchy that many deaths of mothers and their babies are simply not counted⁴⁹. This is likely to be even more of a problem in Nepal.

Another inaccuracy here in the service statistics is that the numerator – the number of maternal deaths – counts only those women who die at the facility itself and do not cover deaths that occurred after discharge from the facility. The MMR definition covers deaths up to 42 days after the birth of the child. Later deaths are less likely than deaths around the time of birth – but with discharge from hospital after 2 or 3 days – the rate of postpartum bleeding after the 3rd day is not insubstantial and this is another source of underestimation for the service statistics.

Year	Total pregnant women who give birth in hospitals	Total maternal deaths in hospitals	Maternal mortality 'ratio'
1996/1997	53,105	256	482
1997/1998	73,661	342	464
1998/1999	125,479	277	221
1999/2000	129,583	369	285
2000/2001	136,231	373	274
2001/2002	152,088	300	197
2002/2003	254,999	378	148

Source: HMIS Annual Reports

Appendix B Distribution of Women Aged 15-49 by their Selected Maternal Health Utilisation Characteristics, NDHS, 1996 and 2006,

	Number	Proportions	Ratio 2006/1996	Level of significance
Place of delivery (facility versus home)				
1996 NFHS	4,375	0.08		
2006 NDHS	5,545	0.18	2.34	*
Birth attendants (doctors/nurse versus others)				
1996 NFHS	4,375	0.09		
2006 NDHS	5,545	0.19	2.08	*
Delivery by caesarean section (yes versus no)				
1996 NFHS	4,375	0.01		
2006 NDHS	5,545	0.03	2.67	*
Size of child at birth (average versus lower than average size)				
1996 NFHS	4,375	0.74		
2006 NDHS	5,545	0.81	1.08	*
vit_a Last 6 months Vitamin A (received versus not received)				
1996 NFHS	4,375	0.25		
2006 NDHS	5,545	0.22	0.86	*
ANC services from (doctor/nurse versus others)				
1996 NFHS	3,813	0.24		
2006 NDHS	4,066	0.44	1.84	*
Antenatal visits for pregnancy (yes versus no)				
1996 NFHS	3,813	0.09		
2006 NDHS	4,066	0.29	3.29	*
Tetanus injections bef. Birth (received two dose versus less than 2 doses)				
1996 NFHS	3,813	0.33		
2006 NDHS	4,066	0.63	1.94	*
Timing of 1st antenatal check (less than 6 month of pregnancy versus more than 6 months of pregnancy)				
1996 NFHS	341	0.84		
2006 NDHS	1,197	0.95	1.14	*
Post natal services (received from doctor/nurse versus others)				
1996 NFHS	3,813	0.09		
2006 NDHS	4,066	0.19	2.07	*
SDK Safe Delivery Kit (used versus not used)				
1996 NFHS	3,492	0.02		
2006 NDHS	3,271	0.18	8.82	*

References

- ¹ Nepal Demographic and Health Survey 2006, Population Division, Ministry of Health and Population, Government of Nepal, Kathmandu, Nepal and Macro International, Maryland Calverton, USA, 2007.
- ² Pradhan, Ajit, Ram Hari Aryal, Gokarna Regmi, Bharat Ban, and Pavalavalli Govindasamy, (1997). Nepal Family Health Survey 1996. Kathmandu, Nepal and Calverton, Maryland: Ministry of Health [Nepal], New ERA, and Macro International Inc.
- ³ National Planning Commission, Government of Nepal and United States Country Team of Nepal. (2005). Nepal Millennium Development Goals: Progress Report 2005. Kathmandu.
- ⁴ Bongaarts and Potter (1983). Fertility Biology and Behaviour - An Analysis of the Proximate Determinants, Academic Press.
- ⁵ Hill, Kevin Thomas, Carla AbouZahr, Neff Walker, Lale Say, Mie Inoue, Emi Suzuki, on behalf of the Maternal Mortality Working Group (2007). Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data The Lancet - Vol. 370, Issue 9595, Pages 1311-1319.
- ⁶ John Cleland, Stan Bernstein, Alex Ezeh, Anibal Faundes, Anna Glasier, Jolene Innis (2006). Family planning: the unfinished agenda The Lancet - Vol. 368, Issue 9549, Pages 1810-1827.
- ⁷ Mahbub Elahi Chowdhury, Roslin Botlero, Marge Koblinsky, Sajal Kumar Saha, Greet Dieltiens, Carine Ronsmans (2007). Determinants of reduction in maternal mortality in Matlab, Bangladesh: a 30-year cohort study The Lancet - Vol. 370, Issue 9595, Pages 1320-1328.
- ⁸ The sisterhood method for estimating maternal mortality: Guidance notes for potential users, World Health Organization, Geneva 1997. http://www.who.int/reproductivehealth/publications/rht_97_28/sisterhood_method_estimating_maternal_mortality.pdf
- ⁹ WHO/UNICEF/UNFPA (1997). The guidelines for monitoring the availability and use of obstetric services.
- ¹⁰ The World Health Report 2005 – Make Every Mother and Child Count, 2005 World Health Organisation, Geneva.
- ¹¹ His Majesty's Government of Nepal, Ministry of Health (2004) Health Sector Programme-Implementation Plan 2004-2009.
- ¹² Statement on maternal mortality: 1995 WHO/FIGO/ICM Reduction of maternal mortality. A joint WHO/UNFPA/UNICEF/World Bank statement, 1999 http://www.who.int/reproductivehealth/publications/reduction_of_maternal_mortality/reduction_of_maternal_mortality_contents.htm
- ¹³ Millennium Development Goals Report 2007, UN The Millennium Development Goals Report 2007, UN, New York <http://www.un.org/millenniumgoals/pdf/mdg2007.pdf>
- ¹⁴ Gwyneth Lewis (eds) Why mothers die 2000-2002: The sixth report on the confidential enquiry into maternal death in the United Kingdom. London 2004.
- ¹⁵ Kate J Kerber, Joseph E de Graft-Johnson, Zulfiqar A Bhutta, Pius Okong, Ann Starrs, Joy E Lawn (2007). Continuum of care for maternal, newborn, and child health: from slogan to service delivery The Lancet - Vol. 370, Issue 9595, Pages 1358-1369.

- ¹⁶ Marge Berer (2004). National Laws and Unsafe Abortion: The Parameters of Change in Reproductive Health Matters. Volume 12, Issue 24, Pages 1-8.
- ¹⁷ Ganga Shakya, Sabitri Kishore, Cherry Bird, Jennifer Barak (2004). Abortion Law Reform in Nepal: Women's Right to Life and Health in Reproductive Health Matters (Vol. 12, Issue 24, Pages 75-84).
- ¹⁸ Shyam Thapa (2004) Abortion Law in Nepal: The Road to Reform Reproductive Health Matters November (Vol. 12, Issue 24, Pages 85-94).
- ¹⁹ Thapa, P. J., Thapa, S. and Shrestha, N. (1992). A hospital based study of abortion in Nepal. *Studies in Family Planning*, 23 (5), 311-318.
- ²⁰ Tamang, A. (1996). Induced abortions and subsequent reproductive behaviour among women in urban areas of Nepal. *Social Change*, 26 (3), 271-285.
- ²¹ UNFPA (1999). *Reproductive health situations of Nepal: Nepal Country Report*. UNFPA-Nepal. Kathmandu.
- ²² CREHPA (2000). Unwanted pregnancy and unsafe abortion in Nepal. Some facts and figures. Kathmandu, Nepal.
- ²³ Puri, M. Ingham, R. Matthews, Z. (2007). Factors affecting abortion decision making among young couples. *Journal of Adolescent Health*, 40, 535-542.
- ²⁴ Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gülmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews* 2001, Issue 4.
- ²⁵ Making pregnancy Safer the critical role of the skilled attendant – a joint statement by WHO, ICM and FIGO, Geneva 2004. http://www.who.int/reproductivehealth/publications/2004/skilled_attendant.pdf
- ²⁶ Indra Pathmanathan, Jerker Liljestrand, Jo. M. Martins, Lalini C. Rajapaksa, Craig Lissner, Amala de Silva, Swarna Selvaraju, Prabha Joginder Singh. (2003). *Investing in Maternal Health: Learning from Malaysia and Sri Lanka*. Health, Nutrition, and Population Series, World Bank.
- ²⁷ Government of Nepal, MoHP (2006). National Policy on Skilled Birth Attendants. Kathmandu.
- ²⁸ Government of Nepal, MoHP (2007). National In-service Training Strategy for Skilled Birth Attendants: 2006-2012. Kathmandu.
- ²⁹ Department of Health Services (1997 to 2006). Annual report of Department of Health Services for Fiscal Years 1996/97 to 2005/06. Kathmandu. These are ten separate annual reports and available in the website www.dhs.gov.np
- ³⁰ TAJ Houweling, C Ronsmans, OMR Campbell, AE Kunst Huge poor–rich inequalities in maternity care: an international comparative study of maternity and child care in developing countries Bulletin of the World Health Organization, 2007.
- ³¹ Central Bureau of Statistics (2005). Nepal Living Standard Measurement Survey 2003/04. Vol. 1 and 2. Kathmandu.
- ³² Doorslaer et al Effect of payments for health care on poverty estimates in 11 countries of Asia: an analysis of household survey data, *The Lancet* 368 2006 pp 1357-1364

- ³³ Mahesh Puri , Zoë Matthews , Ronald Horstman , Jane Falkingham and Sabu Padmadas, Examining out-of-pocket expenditures on reproductive and sexual health among the urban population of Nepal, Southampton University Working paper.
- ³⁴ Berki S E A look at catastrophic medical expenses and the poor Health Affairs, Winter 1986; 5(4): 138-145.
- ³⁵ Wyszewianski L (1986). Families with catastrophic health care expenditures Health Service Research; 21(5): 617–634.
- ³⁶ Central Bureau of Statistics (2005). Poverty Trends in Nepal (1995/96 and 2003/05). National Planning Commission, Kathmandu.
- ³⁷ Government of Nepal, USAID, and New ERA. (2007). An analytical report on national survey o female community health volunteer of Nepal. Kathmandu.
- ³⁸ Family Health Division (nd) Internal records of Family Health Division, Department of Health Services, Ministry of Health, Government of Nepal, Kathmandu.
- ³⁹ Family Health Division (nd) Internal records of Family Health Division, Department of Health Services, Ministry of Health, Government of Nepal, Kathmandu.
- ⁴⁰ Family Health Division (nd) Internal records of Family Health Division, Department of Health Services, Ministry of Health, Government of Nepal, Kathmandu.
- ⁴¹ Manandhar DS, Osrin D, et al. (2004). "Effect of a participatory intervention with women's groups on birth outcomes in Nepal: "Cluster-randomised controlled trial." Lancet 364(9438): 970-9.
- ⁴² Howard-Grabman, L. The Warmi Project: A participatory approach to improve maternal and neonatal health. An implementer's manual. Mother Care/USAID/SCF, 1992.
- ⁴³ Morrison J, Tamang S, et al. (2005). "Women's health groups to improve perinatal care in rural Nepal." BMC Pregnancy Childbirth 5:6.
- ⁴⁴ Graham, W., Brass, W. and Snow, R.W. (1989). Indirect estimation of maternal mortality – the sisterhood method, Studies in Family Planning 20(3) pp 125-135.
- ⁴⁵ The Sisterhood method for estimating maternal/mortality, (1997). WHO, Geneva.
- ⁴⁶ CEMACH (2007). Saving Mothers lives: Reviewing maternal deaths to make motherhood safer: 2003-2005. Confidential Enquiry into Maternal and Child Health. United Kingdom.
- ⁴⁷ E Gakidou, G King (2006). Death by Survey: Estimating Adult Mortality without Selection Bias from Sibling Survival Data Demography - Volume 43, Number 3, pp. 569-585.
- ⁴⁸ Personal communication with Carla AbouZahr, WHO, Geneva.
- ⁴⁹ WHO Europe (2007) – Improving maternal and perinatal health: European strategic approach for making pregnancy safer, WHO Regional Office for Europe, Copenhagen, Denmark, pp. 11.