



SAHLGRENSKA ACADEMY

**A Comparison of Maternal and Reproductive Health in Nepal
between 1996-2011**

Degree Project in Medicine

Matilda Bergendahl

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Supervisor: Göran Kurlberg
University of Gothenburg

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Abstract

A Comparison of Maternal and Reproductive Health in Nepal between 1996-2011

Author: Matilda Bergendahl
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Background: Nepal is a South-Asian country facing many difficulties in health care. A particularly vulnerable group is pregnant women. Due to lack of education and accessibility to health care such as antenatal care, skilled birth attendance, and adequate family planning, Nepal has had a high maternal mortality rate. Most mothers die from preventable causes such as haemorrhage, infections, and complications from abortion. Demographic and Health Surveys (DHS) have been conducted in various countries worldwide, as well as in Nepal. This is to elucidate demographic characteristics, with a focus on maternal and child health, often used to measure achievements made towards global goals, such as the Millennium Development Goals.

Aim: The aim of this study was to elucidate the development with regards to maternal and reproductive health among women in Nepal; has there been any advancement concerning the Millennium Development Goal no 5 “*To improve maternal health*”, by comparing Demographic and Health Surveys of Nepal conducted in the years 1996 and 2011.

Methods: This was a retrospective study of women’s maternal and reproductive health in Nepal by comparing aggregated datasets from the DHSs of 1996 and 2011. The 1996 DHS served as a foundation of the study, and comparable data was analysed mainly using “individual confidence interval for the difference between proportions”. Results were presented in tables.

Results: The maternal and reproductive health in Nepal has remarkably improved between 1996 and 2011 in nearly all variables over all regions. Contraceptive prevalence rate has increased. Less adolescents give birth. More women attend antenatal care and give birth with skilled birth attendance.

Conclusions: The maternal and reproductive health appears to have improved in all studied regions; however remote areas tend to lag urban areas and the Millennium Development Goals are rather far from being fulfilled. A comparison of aggregated datasets implies statistical limitations, whereas the statistics should be approached with caution.

Acronyms and Abbreviations

VDC	Village development committee
MIS	Maternity Incentive Scheme
ANC	Antenatal care
PNC	Postnatal care
FCHV	Female Community Health Volunteer
TBA	Traditional Birth Attendant
SBA	Skilled Birth Attendant
WHO	World Health Organization
MCHW	Maternal and Child Health Worker
MDG	Millennium Development Goal
SDG	Sustainable Development Goal
IUD	Intrauterine device
BMI	Body mass index
STD	Sexually Transmitted diseases
MMR	Maternal Mortality Rate
HPV	Human papillomavirus
CT	Chlamydia trachomatis
NG	Neisseria gonorrhoeae
HSV	Herpes simplex virus
HIV	Human immunodeficiency virus
USAID	United States Agency for International Development
DHS	Demographic and Health Survey
NFHS	Nepal Family and Health Survey
EA	Enumeration area
PSU	Primary sampling units
CI	Confidence interval
PP	Percentage points

Background

About Nepal

Geography and topography

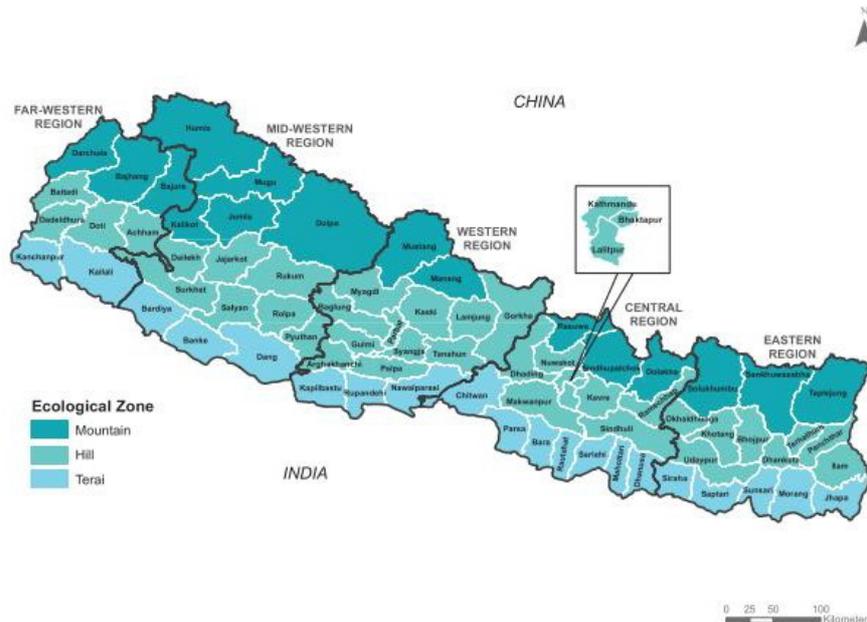


Figure 1: *Ecological and Developing regions in Nepal* – a map illustrating the three ecological zones in different greens (Mountain, Hill and Terai) and the five development regions divided by black lines.
Source: Demographic and Health Survey 2011 (1)

Nepal is located at the southern slope of the Himalaya, between China to the north and India to the east, west and south. The climate is characterized by its height above sea level - from subtropical to subarctic. The altitude differs from less than 100 m to 8,848 m with three different main ecologic zones; the mountain region covering 35% of the surface, the Hills 42% and the Terai (Plains) 23% of the land.(2) The difficult terrain in combination with heavy Monsoon rains makes Nepal prone to natural disasters such as flooding and landslides. (3) The ecological zones vary, the Mountains emerge itself by its restricted transportation and communication due to harsh terrain and a low-density population. (1) The Hills are more populated although with a big variation where the valleys are most populated and the least density of population is found above 2000 meters – the Hills includes the Kathmandu valley

which is Nepal's capital and most fertile area(1). The last ecological zone is the Terai, or Plains, with its dense forests and rich wildlife. The Terai contains 50% of the population of Nepal, even though it is relatively small in area compared to the two other ecological zones. The flat terrain and high population density facilitate transportation and communication(1).

Administrative sections

Before 2015, the main division was five development regions: Eastern, Central, Western, Mid-Western, and Far-Western. Further, Nepal was divided into 14 zones and 75 administrative districts. The districts consisted of village development committees (VDCs) and municipalities where VDCs were rural areas whereas municipalities were urban areas. In 2011 the VDCs were 3,195 and the municipalities were 58. VDCs are further divided into wards, where each VDC consists of 9 wards. (1)

History of Nepal

From the beginning, Nepal consisted of multiple independent kingdoms. In 1768 A.D. the country united, and the dynasty of Shah officially ruled the country. However, the Rana lineage assumed power in 1846 which they kept until 1951 when King Tribhuvan Shah ended the hereditary Rana-lineage and opened the country for international influences, as well as starting transformations with the aim of creating a modern democracy and a more open society. In 1990 a multiparty democracy was established, with the framework of a monarchy. In 1996 the Nepal Communist Party (Maoist) saw their opportunity with the people's growing dissatisfaction with the government and a civil war begun. The civil war lasted from 1996 till 2006 and was characterized by a bloody and armed conflict between the Maoist guerrilla and the National Army, resulting in a mass internal migration to urban centres as well as to neighbouring countries. The civil war led in 2005 to a dissolution of the government with imprisonment of King Gyanendra Bir Bikram Shah as the leader of the country. In 2006 a peace movement with mass demonstration from the seven major political parties and the Maoist started that called to an end for the 10-year long conflict and utilised a new interim government to unite. In 2008 the negotiations dissolved in a dethroning of King Gyanendra Bir Bikram Shah and Nepal was declared secular and federal with a president as head of state. (1)

Population and demographics

Nepal had an approximate population of 22.09 million in 1996 and 27.04 million in 2011. (4) In 2011, 17% of the population resided in urban areas thus most of the population were based in rural areas. (1) Overall, Nepal has a young population with 20% of the population below age 15, due to a relatively high fertility. (5) In 1996 the estimated life expectancy at birth was approximately 59 years and in 2011 around 69 years. (4)

Nepal is a country with a wide range of diversity and consists of approximately 126 different ethnic/caste groups where the major groups are Chhetri, Brahmins, Magar, Tharu, Tamang, and Newar. There are 123 languages spoken, where Nepali is most frequently used. (6)

Economy

In 1996 the gross domestic product was 4.5 billion US dollars compared to 21.6 billion US dollars in 2011(4). The main sectors accounting for the gross domestic product are the service sector, followed by agriculture, and the manufacturing sector.(5) Nepal has undergone drastic economical changes but is still as of 2021 considered a low/low-middle-income country.(4) During the two decades prior to 2011 Nepal made progress in poverty reduction, but still remains on a level where 25% of population live in absolute poverty. (7) Absolute poverty refers to a person or a household not having the minimum amount of income to cover basic needs to the minimum cost. (8)

The agricultural sector is the main employer of Nepalese people with women being less likely to have occupations in other sectors. Women are also less likely to being paid, and overall, 61% of women are not paid for their work. In the agricultural sector this number is 76%. (1)

Education and literacy

The ability to read and write is considered a human right and empowers women and men(9). Literacy enables education and informed choices, not in the least concerning health. A low literacy rate is associated with poverty, increased child and maternal mortality, illness, and poorer health outcomes. (9, 10) Literacy statistics are important to follow the development in a country since it is speaking for a country's well-being.

The literacy rates of Nepal in 2011 were 87% among men, and 67% among women. The literacy rate varies with age, where women aged 15-19 are more prone to a higher level of literacy compared to women aged above 19. The literacy varies between rural and urban areas, where the urban female residents have a higher literacy rate (83%) compared to rural female residents (64%). Wealth is an important factor to literacy, where the poorest women have a literacy rate at 44 % and the richest women have a literacy rate at 91%.(1)

Education, as well as literacy, is important for empowerment and liberation, not at least among women. Education is a way for women to reach other than traditional occupations and is important to spread essential information. (1) The number of women studying in Nepal follow the same trend as literacy where rich, urban women are much more likely to have completed secondary school compared to poorer, rural women. In Nepal the median length for women attending school is 3.5 years. (1)

Health care in Nepal

Until the mid-1900's the health care coverage in Nepal was poor with low availability and accessibility. Since, different developmental plans and action programs have transformed Nepal's health care to a more available form with its start in 1956 with the General Health Plan and the First Five Year Plan. The General Health Plan were followed by many actions' programs such as the Family Planning Program, the Leprosy and Tuberculosis Program and numbers of Development Plans.(1) A considerable number of actions programs and policies have been aimed towards mothers and children. In 1998 the Government of Nepal adopted a Safe Motherhood Policy addressed to ensure that a selection of health facilities had 24 hours a day-availability for emergency obstetric care services with presence of skilled health workers(11). The Maternity Incentive Scheme (MIS), later called the Aama Surakshya Programme or the Aama Programme (The Mother Program), was introduced 2005. The main goal of the Aama Programme is to make pregnant women more prone to giving birth at health facilities and getting their four recommended antenatal care (ANC) visits. The first version of the programme strived for an easing of economic burden for expecting mothers where they receive cash to utilise transportation to health care facilities and to afford four ANC visits. Later in 2006 an additional free delivery care was introduced in a selection of health institutions. In 2009 these initiatives further on included all women in Nepal. However, these policies and strategies had some success but majority of women giving birth in a health facility still pay for delivery care services, most women still give birth at home, most women

does not have any antenatal care, and many women do not get entitled money for transportation.(11)

The health care in Nepal is constructed in three levels: primary level, secondary level, and tertiary level with the Ministry of Health and the Department of Health Services as head with a hierarchy of departments below responsible for delivery of care. Tertiary level services are provided in Regional and Central Hospitals and conduct advanced medical care. Several of these hospitals also provide health educational programs and there are 20 medical colleges in the country. Secondary level services are provided in Zonal and Districts Hospitals and are more basic than tertiary level care. Primary level services are provided in Primary Health Centres, Health Centres, Health Posts and Sub-Health posts. Female Community Health Volunteers (FCHV) and Traditional Birth Attendants (TBA) have a most important role in providing primary level health care services, especially concerning family planning and maternal and child health. (2)

Female Community Health Volunteers, Traditional Birth Attendants, and Skilled Birth Attendants

FCHVs has contributed to a more sufficient primary health care in Nepal since 1988 and reach even the least accessible areas. FCHVs participate in 18 days of training in basic healthcare, including maternal and child healthcare services. There are approximately 50 000 FCHVs in Nepal, and they link the government and community people together. FCHV is mainly focused on maternal and child health. By providing with health education, pregnancy information, family planning services, distribution of Vitamin A-capsules and participating in immunization programmes they play a significant role to mothers and children's health. FCHVs also treats respiratory infections in children, distributes misoprostol to prevent post-partum haemorrhage and refer pregnant women to health check-ups. Furthermore, FCHVs made a big impact on women's empowerment and leadership, especially at the VDC level.(12, 13)

Skilled Birth Attendants (SBAs) are defined by World Health Organization (WHO) as “*a health provider who has at least the minimum knowledge and skills to manage normal childbirth and provide basic (first line) emergency obstetric care*”(14). A SBA can be of various professions; midwives, doctors and nurses with the right skill and training all classify as SBA(14). In a remote setting as in Nepal, the issue lays within professional health personnel often being situated in urban areas and cities. This requires a framework for what skills and training that is the least minimum to be referred to as an SBA. A study suggests that

Maternal and Child Health Workers (MCHW) in general have an acceptable level of knowledge and skill acquired to manage a normal birth, and therefore might function as community level SBAs. MCHWs somewhat reminds of FCHV in the sense that they are local women without formal health education, but MCHWs are paid and get more training (15 weeks with additional 6 weeks of refreshment annually). MCHWs are fewer in number compared to FCHVs, but are similar to FCHVs present at the primary care level and are available in rural areas. (15) SBAs provide ANC, care during delivery and postnatal care (PNC), and are trained in referring expecting mothers to advanced care when necessary. (16)

TBAs are defined by WHO as “*traditional, independent (of the health system), non-formally trained and community-based providers of care during pregnancy, childbirth and the postnatal period*”(17), hence being classified as “non-skilled”. TBAs have the advantage that they are part of the cultural tradition and is present in the community, which may facilitate women to seek assistance and advice during pregnancy and delivery despite cultural and geographical barriers. TBAs does not automatically receive training and often keeps to traditional practices. (18) TBAs are often unable to treat complications or recognize signs of illnesses, and seldom refer to skilled health care. (15)

Millennium Development Goals

The Millennium Development Goals (MDGs) were set up by the United Nations in 2000 and are global goals for advancement in multiple areas with the aim to improve the health and well-being for all people. They included in total 8 goals, where one of them is goal no 5: “*to improve maternal health*”. The goals were set up to be achieved by the year of 2015.(19)

Introduction to maternal health, family planning and fertility

Maternal health refers to the health of women during pregnancy, childbirth, and the postpartum period(20). Family planning includes the controlling of number of children birthed and intervals between births using contraception methods or sterilization(21). Family planning leads to poverty reduction, health benefits and gender equality(22). Unmet need of family planning refers to the percentage of women not wanting to get pregnant but is not using contraceptives(22). MDG goal number 5, “*to improve maternal health*”, consists of 2 main targets, 5A stating: “*Reduce by three quarters, between 1990 and 2015 the maternal mortality ratio*” and 5B stating: “*Achieve, by 2015, universal access to reproductive health*”. Indicators were maternal mortality ratio connected to goal 5A, and proportion of births

attended by skilled health personnel, contraceptive prevalence rate, adolescent birth rate, antenatal care coverage and unmet need for family planning connected to goal 5B. (23)

Contraceptive methods

Family planning programs have a significant role in promoting the use of contraceptives, and in countries with high birth rates the use of family planning and contraceptive methods has the potential to improve the maternal and children health. Numbers imply that 32% of maternal deaths and 10% of childhood deaths can be avoided with the use of family planning. Apart from poverty reduction and health benefits, family planning will also improve women's status and empowerment by allowing more women to non-domestic chores and education. Smaller families are beneficial for children, they have more opportunities to education and are less likely to have a poor nutritional status. A family of many children increases the likelihood of a family to become poor, and they are less likely to recover from poverty and to access education.(22) Globally, fertility rates have declined since the 1950s which is partly due to women's increased participation in education (24).

Contraceptive methods are commonly divided into modern and traditional methods. Modern contraceptive methods are for example oral hormonal pills, injectables, female and male sterilization, intrauterine device (IUD) and male condom. Traditional methods are often connected to the physiology, for example interruption of coitus (Coitus Interruptus) and adaptation to the menstrual cycle (rhythm method). Other traditional contraceptive methods include rituals, use of traditional medicine and herbs. (25) Most effective methods are said to be sterilisation, IUD, implant and injectable, pill is said to be an effective method, and condom, Coitus Interruptus and abstinence is deemed least effective(22).

Family planning has since the 1960s been an important subject to Nepal with the main aim to decrease the fertility rate and reduce the unmet need. Since, Family planning programs have grown to be more focused on maternal health and women's wellbeing and is an integral part of the health system of Nepal. (1) Family planning services are available in all levels of health care, however with some differences in services provided. Condoms, oral pills and injectables are available in approximately all health facilities, whereas implants and IUD insertions are more rare and only available at a few hospitals and selected primary care level institutions due to the practical skill needed(5). FCHVs are important in teaching about and distributing pills

and condoms, approximately 25% of pills and condoms altogether is attributed to FCHVs(1). Substantial family planning would lead to a reduction of maternal deaths due to abortion(26).

High-risk fertility behaviour

Most of high-risk fertility behaviours are highly avoidable with family planning. High-risk fertility behaviours found in Nepali population are adolescent pregnancies, older women having children, children born in short intervals (less than 24 months) and children born to mothers with more than three children before(1).

Other factors that might lead to greater risk of pregnancy and delivery are low height, low weight, and a low body mass index (BMI), also found among Nepalese women. These three factors depend on nutritional status among women. The risk of an adverse outcome elevates when a woman has more risk factors.

Nutritional deficiency among pregnant women

Maternal diet and nutrition are important for the wellbeing of both the foetus and the mother. Poor nutritional status might conclude in adverse health outcomes, e.g., pre-term delivery, vulnerability for blood-loss and poor neuronal development. Micronutrients important for expecting mothers are primarily iron, iodine, calcium, and folate, but other nutrients such as B12 and magnesium might have an impact. Most vulnerable for micronutrient deficiency are poor, low-cast, young women. (27) In Nepal, FCHVs have an important role in providing substitution of important nutrients to expecting mothers (12).

Micronutrient deficiencies are a result of a compound of factors including poor diet, lack of access to proper health services, high fertility rates and short intervals between pregnancies. Approximately half of total cases of anaemia is due to iron deficiency. Iron deficiencies accelerates, among other conditions and diseases, with parasitic diseases prevalent in Nepal. Iron deficiency has an adverse effect before it translates to anaemia, in mothers it can lead to cognitive impairment and reduced immunity and the foetus have an increased risk of low oxygen levels, due to poorer binding of haemoglobin. (27) It is estimated that around 100 000 maternal deaths annually worldwide are associated with iron deficiency anaemia. (28)

Nutritional deficiency in mothers might lead to them having a short height, low weight, and a low BMI (<18.5 kg/m²). All three factors might lead to adverse outcomes while giving birth, both for mother and child. (29, 30)

Adolescent pregnancy

Adolescent pregnancies are defined as pregnancies to girls under the age of 20 (31).

Adolescent pregnancies are a problem both globally and in Nepal. Pregnant younger women are at higher risk during pregnancy and delivery with a greater risk of e.g., placental tear and obstruction during delivery(32), and the babies born are more often birthed preterm, have a small weight for the gestational age and are at higher risk of malformation(32, 33). Most young mothers come from low resource settings, many of whom have no education and bad economy(31).

Historically most of Nepalese population marry young, but a shift to delayed marriage has begun. This enables preterm sex for young Nepalese people, with high-risk behaviours being more usual leading to elevated risk for sexually transmitted diseases (STDs) and unwanted pregnancies. (34) Young people have in general a lower contraceptive rate, which accelerates the risk of STDs and unwanted pregnancies (32).

Birth intervals

Contraceptive methods can be used both to limit and spacing births. Birth spacing conducts to the utmost health benefit from contraceptive use, having children in shorter intervals might lead to adverse health outcomes for both mothers and children. The recommended interval between pregnancies is according to WHO 24 months(1). Short birth intervals increase the risk of being of low birthweight, prematurely born and the risk of infant death. Mothers giving birth in shorter intervals have an increased risk of severe bleeding, partly due to pre-mature rupture of membranes, poor nutritional status, and poor healing of reproductive tracts due to inadequate time to recover. The utmost adverse health outcome for mothers with short birth interval is death. Concerning the nutritional status, folate- and iron-deficiency is most damaging. Iron deficiencies make pregnant women more vulnerable to bleeding since they become anaemic, which turns dangerous accompanied by a tendency of bleeding. Folate deficiency in mothers affects children's development and is described as the underlying mechanism of low birthweight and prematurity. (22, 35)

Maternal health services

ANC is important through many aspects; it helps to identify and prevent illness early on in a pregnancy and it educates expecting mothers. The ANC should, according to WHO, include, among other interventions, one ultrasound scan, tetanus toxoid vaccination to unvaccinated expecting mothers, glucose-testing, advice concerning use of tobacco and alcohol, and, daily

oral iron and folic acid supplementation. (36) WHO recommends a minimum of four ANC visits, and if anything adverse emerges these should intensify(1).

ANC is globally more common among rich, and even though it is seen as consensus that maternal health and poverty has a strong connection it cannot describe the whole picture. Different societal factors such as cultural belief and caste affects the outcome and the will to seek health care, probably more than earlier known. (37) Globally, young pregnant women are underrepresented in seeking antenatal care (38).

Many of the maternal deaths occurs in the immediate postpartum period, where women are more sensitive to developing hazardous complications such as haemorrhage and infections. A PNC visit with good timing is an opportunity to educate the mother in both taking care of herself and her new-born, and additionally to examine both mother and child to exclude life-threatening illnesses. Three postnatal check-ups are recommended, one during the first 24 hours, the second after 72 hours and the third a week after delivery. (1)

In Nepal homebirth without skilled surveillance is the most common, mostly due to a strong cultural tradition and geographic isolation with health facilities in a long distance(5). Most women give birth with a friend, relative or a TBA present, with friend/relative being the most common(1, 5). Traditional norms and culture consider menstruating and delivery as something un-clean, and in some areas, women are confined to a shed (gotha basne) when menstruating as well as during and after giving birth. This widely affects the sanitation during delivery, where clean hands and clean delivery kits are not seen as necessary. (39) Where and how women give birth vary with education and if they are rural or urban residents among other factors, where highly educated and urban residents are more prone to give birth at health facilities or with a skilled birth attendant compared to less educated rural residents(1, 5). The same trend can be seen concerning ANC, where poorer, less educated and rural women are less likely to receive health care before giving birth (1, 5). The Aama Programme (The Mother Program) was implemented as a solution to issues concerning maternal health service but has difficulties in reaching all Nepalese women (11). Crucial to maternal health in Nepal are the FCHV, who educate women about pregnancies, refer them to health facilities for ANC and health check-ups, and in some cases attend births. They also supply women with misoprostol to prevent post-partum haemorrhage.(13)

Maternal mortality

Maternal mortality rate (MMR) defines the number of deaths per 100,000. (40) Maternal mortality is an important indicator for the well-being of a country. (37) The definition of maternal death is described as “*The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (ICD-10)*”(41). Maternal deaths often occur during labour, delivery, and the most immediate post-partum period. Many of maternal deaths can be avoided with more substantial and regular antenatal and postnatal care, together with delivery surveillance by a skilled provider. A long transportation to health care facilities with the right competence often complicates the course of event. (42, 43)

Despite Nepal’s effort put in to reduce the maternal mortality, it is greater compared to other developing countries(44). The long distances and hard-to-reach areas is contributing to the maternal mortality as well as insufficient health facilities in rural areas, young mothers, unwanted pregnancies, and socio-economic factors such as poverty and illiteracy(2). The leading cause of maternal deaths in Nepal is haemorrhage, followed by eclampsia and complications due to abortion(45).

Causes of maternal deaths

Haemorrhage

Haemorrhage is globally as well in Nepal the leading cause of maternal death, approximately 125 000 deaths annually worldwide is due to haemorrhage. Haemorrhage often occurs within 24 hours of delivery and is most often due to uterine atony (insufficient contractions of the uterus after delivery) and uterine rupture as well as lacerations of the genital tract. Women in developing countries are more vulnerable since pregnant women globally have a higher prevalence of anaemia, and therefore are more sensitive to blood loss. Besides from postpartum haemorrhage, severe bleeding occurs from ruptured ectopic pregnancies and from postabortion haemorrhage – including both unsafe abortion and undiagnosed spontaneous abortions. (43, 46)

Many facilities in poor-resource countries lacks the ability to manage severe bleeding and the facilities with competence are often located in bigger cities, but there is potential in easily accessible drugs such as oxytocin that effectively helps the uterus to contract and therefor inhibits bleeding. Oxytocin is easily administered even for untrained personnel. (46)

Hypertensive disorders (Preeclampsia and eclampsia)

Preeclampsia and eclampsia are conditions that occur among pregnant women. Preeclampsia defines as new onset of hypertension and proteinuria after 20 weeks of gestation in a previously normotensive woman. Preeclampsia is considered a frequent illness among pregnant women with an incidence of 2-8% worldwide. Eclampsia implies epileptic seizures in a woman with gestational hypertension or preeclampsia. Altogether, preeclampsia and eclampsia accounts for at least 50 000 deaths worldwide annually with a higher rate in developing countries due to lack in prenatal care and access to proper health care.

Preeclampsia and eclampsia might lead to other complications than death, both acute and long-term, such as stroke, acute renal failure, diabetes mellitus and neurologic deficit.

Preeclampsia and eclampsia are highly avoidable with prenatal check-ups, early identification of hypertension and accurate treatment protocols.(47)

Infections

Endometritis

Endometritis is an inflammation in the endometrium of the uterus. It is present in both acute and chronic forms, where the acute form occurs after childbirth and after abortion and is characterized by colonization of bacteria where streptococcus is the most common. The chronic form is most common after menopause. The postpartum endometritis is diagnosed by the presence of fever in the first 10 days after delivery, often accompanied by a lower abdominal pain and leucocytosis, and is 10 times more common after caesarean section.(48)

Due to the fact that many of births in Nepal and other low-income countries are performed in the home, the prevalence of endometritis in these settings is difficult to investigate but a meta-analysis conducted in 2019 claims that infections are more common in low-resource settings such as Nepal.(49)

Tetanus

Tetanus is a disease caused by potent neurotoxin produced by the bacteria *Clostridium tetani*. *C tetani* is a spore-forming bacteria, and the spores are widely spread in the environment and often occurs in soil. *C tetani* increases in soil after typhoons and flooding, which make countries prone to natural disasters such as Nepal vulnerable. Catastrophes additionally might stall vaccination programmes and increase the number of wounds where *C Tetani* might infect. The diagnosis is clinical, where signs of spasm and hypertonus in skeletal muscles is visible. The condition leads to autonomic dysfunction, and intensive care is needed in most cases. Without proper hospital care including antibiotics, antitoxin, and supportive care, the

death number is close to 100%. Most of deaths due to tetanus occur in remote areas where advanced care is out of reach. (50) It is difficult to estimate the true burden of tetanus, most of cases occur in countries with limited surveillance systems. An estimated 80% of deaths as of 2015 are presented to occur in South-Asia and sub-Saharan Africa. (51)

Since *C tetani* is widely spread, eradication is not possible. However, elimination is possible with vaccinations. World Health Assembly had an aim to eliminate tetanus world-wide by the year 2000. Elimination refers to fewer than one case per 1000 livebirths. By 1999 many countries still had not reached the goal of elimination, including Nepal, whereas the work was prolonged until 2005. (50) The elimination initiative comprises of three main subjects: “*clean birth provision, enhanced surveillance, and vaccination*”(52).

Pregnant women and new-borns are vulnerable to tetanus. Maternal tetanus occurs after abortion, both spontaneous and induced, and unhygienic delivery practices. Neonatal tetanus is related to maternal tetanus, where infection often occurs through the umbilical stump after delivery. Low birthweight is a predictor of adverse outcome for neonate tetanus. The vaccination contains tetanus toxoid that induces IgG antibodies. IgG enters the placenta and protects new-borns from neonate tetanus. Immunisation of pregnant women reduces the neonatal tetanus by 94%. Un-vaccinated pregnant women are recommended to take two doses of vaccine with 4 weeks apart during pregnancy, to enhance the outcome after delivery for both mother and child. Five doses of vaccination are recommended to get a life-long protection.(50)

Sexually transmitted diseases

STDs are infections spread through sexual activity. Examples of STDs are *Human papillomavirus (HPV)*, *Chlamydia trachomatis (CT)*, *Neisseria gonorrhoeae (NG)*, Syphilis, *Herpes simplex virus (HSV)* and *Human immunodeficiency virus (HIV)*(53, 54). Undiagnosed and untreated STDs might lead to adverse events, and affected pregnant women can affect the child(55).

STDs have a higher prevalence among pregnant women, young women, and those with low socio-economic status(55). HPV can lead to cervical cancer, and girls aged 12 and up are recommended vaccination(53). Pregnant women infected with HIV, CT or NG are at great risk of affecting their children’s health. HIV can be transmitted to the child if accurate actions are not taken beforehand(54). Infections with CT or NG might lead to preterm labour, neonatal conjunctivitis and neonatal pneumonia(55). Untreated infections of CT or NG in

non-pregnant women might lead to adverse fertility outcomes such as infertility, miscarriage and ectopic pregnancy, a potential life-threatening condition(55).

Most of STDs are highly treatable or manageable with the right competence, but they all need to be diagnosed at an early stage to not affect the health. In Nepal, efforts have been put in to stagnate HIV-infections and STDs. The health facilities are prone to be more prepared for HVI testing and counselling, compared to other STDs. STD services are part of family planning services in Nepal, but social stigma might affect the utilisation. (56)

Contraceptive methods in general does not protect against STDs since many of them does not have a barrier-function, except condoms which are, if not 100% protective, cheap and easily accessible(57).

Abortion

Abortion classifies as safe or unsafe, where 97% of unsafe abortions occur in developing countries (26). In the year 2000 an estimate of 90% of deaths due to abortion would be avoided by use of contraception methods(22). The major barrier to access safe abortion is sociocultural attitude, especially among unmarried women(26).

In Nepal, legislation of abortions was executed in 2003. The legislation followed an increased dissatisfaction among public health and human rights organisations, both nationally and internationally, together with an increased knowledge about women dying from complications of abortion. Complications from abortions is the third most common cause of maternal deaths in Nepal (58). As of 2003, abortion is permitted at any time due to any circumstance up until 12th week of gestation, further, abortion is permitted until 18th week if the pregnancy is due to incest or rape, at any time if the pregnancy entails increased mental or physical health risks for the mother or if the foetus is deformed and will not live through a birth(59). The abortion is deemed to law to be carried out by skilled health personnel, and it is not permitted to abort a foetus of unwanted sex(59). Up until 2002, approximately a fifth of Nepalese women in prisons were charged because of illegal abortions, many of which were charged for murder(58). Many women do not know that abortion is legal, according to a study conducted in Nepal in 2010 a vast majority of 66% women presenting to hospitals did not know that abortion was legal(60).

Demographic and Health Surveys

To further investigate developing countries and to oversee nationally representative data of health and population, United States Agency for International Development (USAID) has funded Demographic and Health Surveys (DHS).(61) DHS has the aim to collect and disseminate accurate data in developing countries, and has an important role to investigate whether the policies and development programs are being maintained. DHS includes data concerning economy, education, population, reproductive health, maternal health, and child health and has grown into something beyond its original purpose. More recent DHS also include more feministic data such as female empowerment. The NFHS of 1996 is comparable to DHS in other developing countries and was implemented by the organisation New ERA. New ERA is a private research firm based in Nepal and has conducted all the current available NFHS/DHS since 1996, one published each fifth year. Both the 1996 NFHS and the 2011 DHS has been funded by USAID. (1, 5)

1996 NFHS and 2011 DHS Nepal

The primary objectives of both the 1996 NFHS and the 2011 NDHS is similar stating “*The primary objective of the Nepal Family Health Survey (NFHS) is to provide national level estimates of fertility and child mortality. The survey also provides information on nuptiality, contraceptive knowledge and behaviour, the potential demand for contraception, other proximate determinants of fertility, family size preferences, utilization of antenatal services, breastfeeding and food supplementation practices, child nutrition and health, immunizations, and knowledge about Acquired Immune Deficiency Syndrome (AIDS)*” (1996 NFHS)(5) and “*The principal objective of the 2011 Nepal Demographic and Health Survey (NDHS) is to provide current and reliable data on fertility and family planning, child mortality, children’s nutritional status, utilization of maternal and child health services, domestic violence, and knowledge of HIV/AIDS.*” (2011 NDHS) respectively. Both are conducted under the supervision of the Ministry of Health, Nepal(1).

Methodology of 1996 NFHS and DHS 2011 Nepal

Sample design and study population of 1996 NFHS and 2011 DHS Nepal

Sample design in both surveys were based on the Population Census from 1991 and 2001 respectively and designed to assemble indicators representative for the people of Nepal as a whole, as well for urban and rural areas, for the three ecological zones and for each of the 13 domains. The 13 domains are formed by the three horizontal ecological zones and the five development regions (Eastern, Central, Western, Mid-Western and Far-Western) by cross-

classifying these. Due to a small population in the Western, Mid-Western and Far-Western these were combined to one. Due to the time gap between 2001 and 2011 an update to the Population Census of 2001 was necessitate to account both population growth and mass internal and external migration due to the 10-year conflict between 1996 and 2006. Both studies used wards as measure, where urban wards due to their size were divided into sub-wards and rural wards were grouped due to their small size when necessary. In the 2011 survey they refer wards and sub-wards to enumeration areas (EA), and in the 1996 survey they refer wards and sub-wards to primary sampling units (PSU). Since Nepal is predominantly rural, urban areas were oversampled to provide national urban estimates. (1, 5)

With consideration to the population census of 1991 and the modified population census of 2001, 253 PSUs were chosen in the 1996 survey (219 rural and 24 urban) and 289 EAs in the 2011 survey (194 rural and 94 urban). Samples of both studies were two-stage stratified. The first stage of sampling included selecting wards (or sub-wards) using a probability-proportional-to-size strategy. The second stage of sampling was performed within each selected ward (or sub-ward) where households were selected to maintain a self-weighting sample. Since urban areas were oversampled, the total sample was weighted due to improve the national estimate. (1, 5)

In 1996 a total number of 8,500 households were visited, with 8,082 households correctly interviewed. In 2011 the total targeted sample size of households was 11,095 and interviews were conducted correctly in 10,826 of these. The study population consists of women aged 15-49 in both studies, in 1996 there are 8,429 ever-married women and in 2011 there are 12,674 women independent of marriage. The 2011 study also include men, in total 4,121 from every second household.(1, 5)

Questionnaires

Both surveys conducted questionnaires, in 1996 two types: the Household Questionnaire and the Individual Questionnaire, both based on the DHS Model B questionnaire, specifically developed for countries with low contraceptive prevalence. The 2011 DHS Nepal conducted three types of questionnaires: the Household Questionnaire, the Woman's Questionnaire, and the Man's Questionnaire, all of which are based on standard DHS6 questionnaires. (1, 5)

The Household Questionnaire contains information regarding residents and visitors of the selected households, including characteristics such as age, sex, education, and connection to the head of the household. Further, the Household Questionnaire contributed with information

regarding sanitation, building materials of the house and food security. The main purpose with the Household Questionnaire was to identify women (and men in 2011) eligible for the individual interview. In addition, both surveys collected information about iodine testing of salt which was listed in the Household Questionnaire. In 2011, the survey included height and weight measurements and prevalence of anaemia, all indicators of which were recorded in the Household Questionnaire. (1, 5)

The Individual Questionnaire of 1996 is comparable to the Woman's Questionnaire of 2011 and collects information regarding background characteristics, pregnancies, family planning, care during, before and after delivery, general health and vaccinations of children and knowledge of HIV-disease. In addition, the 2011 survey includes marriage and sexual activity, other sexually transmitted infections, and domestic violence. Women eligible for the 2011 survey concerning domestic violence were identified through the Household Questionnaire. The Man's Questionnaire is approximately the same, but without questions concerning fertility, children, and domestic violence. (1, 5)

Questionnaires from both surveys were adapted to reflect population and health issues relevant to Nepal in conjunction with government ministries, non-governmental organisations, international organisations, and external development partners. The questionnaires were translated from English to the three main local languages of Nepal – Nepali, Maithali and Bhojpuri and pretested in all three languages with adjustments being made to clarify questions for the respondents. (1, 5)

The questionnaires were executed by interviewees who had been trained for a month, focusing on interviewing techniques and the construction of the questionnaires, mainly to minimize the risk of non-sampling errors. The interviewers were initially chosen with consideration to their language skill, and further their ability and skill during training. 2011 marks the first year of using PC tablets, which they learned to handle during the one month-training. Finally, the fieldwork was brought out by field teams, 12 field teams during 1996 and 16 field teams during 2011. The teams in both surveys consisted of three female interviewers and one male interviewer. In 1996 the field team additionally consisted of a female field editor and a male or female field supervisor, in 2011 the team consisted of a male supervisor. Both surveys conducted their fieldwork from mid-January till mid-June. The work was supervised by senior members of New ERA in both studies as well as the Family Health

Division and Macro International in 1996 and the Ministry of Health and Population and USAID/Nepal in 2011. (1, 5)

Data processing

The data of both 1996 NFHS and 2011 DHS Nepal were processed through the New ERA office located in Kathmandu. In 2011 the PC tablets used wireless techniques to transfer the data. Both surveys used processing and editing approaches developed for DHS surveys, and the data was finalized by the end of June in both surveys. The strategies to analyse the post-survey data were similar between the 1996 NFHS and 2011 DHS Nepal, were Taylor Linearization or Jackknife repeated replication were the methods used. (1, 5)

Aim

The aim of this study was to elucidate the development with regards to maternal and reproductive health among women in Nepal; has there been any advancement concerning the Millennium Development Goal no 5 “*To improve maternal health*”, by comparing Demographic and Health Surveys of Nepal conducted in the years 1996 and 2011.

Research questions

- What is the trend of fertility between 1996-2011?
- Has there been an increase concerning contraceptive usage and family planning between 1996-2011?
- Has there been a decrease in adolescent pregnancies between 1996-2011?
- Has the antenatal care coverage increased between 1996-2011?
- Has there been an increase concerning assisted delivery between 1996-2011?
- Has there been any changes regarding place of delivery between 1996-2011?

Material and Methods

Study design

A retrospective study of women’s health in Nepal by comparing aggregated datasets of DHS conducted in the years 1996 and 2011.

Study population

The population studied were women in Nepal participating in the DHS surveys, in 1996 8,429 ever-married women aged 15-49 conducted in the study, and in 2011 12,674 women aged 15-49 conducted in the study, independently to marriage.

Data collection procedure

In total two DHSs were used, one from 1996 (NFHS) and one from 2011 (DHS). The 1996 survey served as base of the study, were an initial exclusion of chapters considered not relevant to the study were excluded (chapter 1, 2 and 11). After this, a more thorough review of the tables was performed. In this stage tables of the 1996 survey were extracted from .pdf-files to Excel. These tables were matched with tables of the 2011 survey, and tables or chapters found not comparable, with lack of data or not relevant to the study were excluded. Lack of data includes means, medians, and rates without CI. Not comparable tables were

differing in their entity, lacked subcategories which made modifying difficult or contained different age spans. The tables content was limited to ecological zone (mountain, hill, terai) and resident (urban, rural) and national totals.

Comparable tables were sometimes modified to facilitate statistical analysis, these modifications are specified on the specific tables in the results and appendices. See table A1 in the appendices for a compilation over modifications and exclusions.

The variables studied were ultimately subdivided into sub-categories named “Care during pregnancy and delivery”, “Fertility and family planning” and “High-risk fertility behaviours”.

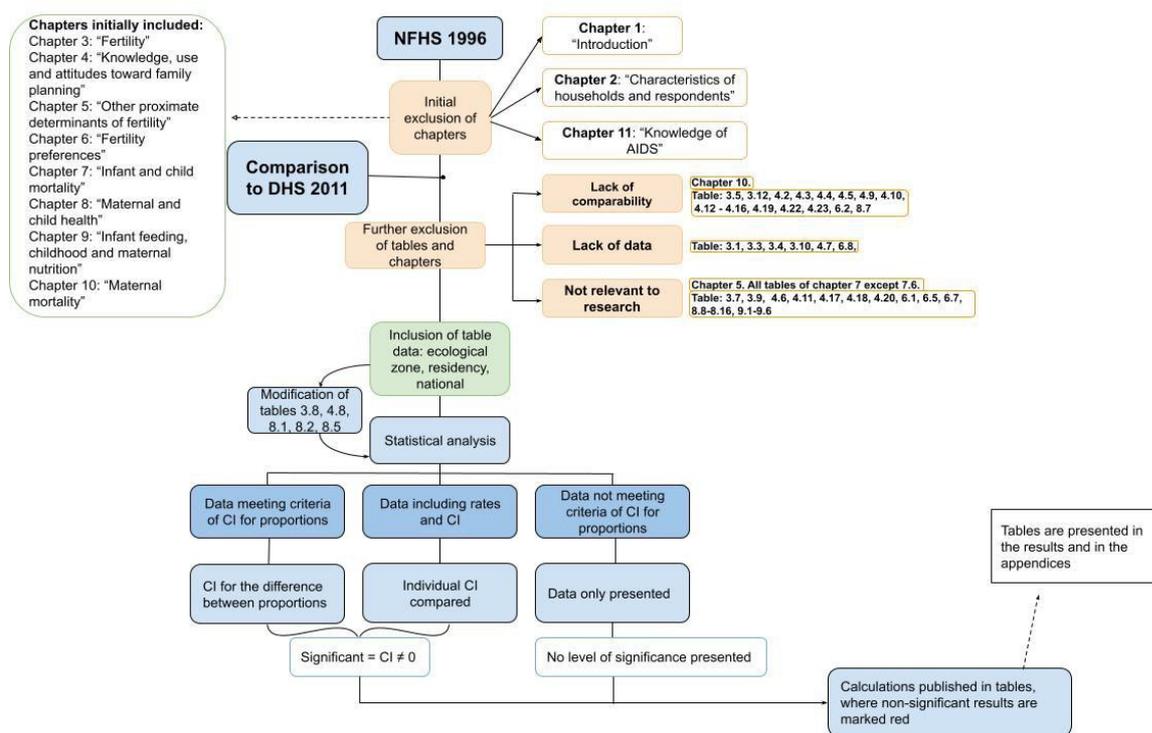


Figure 2: A flowchart over the study design from start to finish – starting at the top with the NFHS 1996. Exclusions are in orange boxes. All other chapters and tables are included. Inclusions in green colours. NFHS – Nepal Family and Health Survey, DHS - Demographic and Health Survey, CI – Confidence Interval

Variables studied

Variables associated to maternal and reproductive health concerning the Millennium Development Goal number 5 included in the 1996 NFHS were assisted delivery by skilled health personnel, contraceptive prevalence rate, antenatal care coverage, adolescent pregnancies, and unmet need for family planning.

The “**Fertility and family planning**” variables are “Total fertility rate”, “Unmet need for family planning”, “Current use of contraception methods”, “Ideal number of children” and “Contact of non-users with family planning providers”.

The “**High-risk fertility behaviours**” variables are “Birth intervals”, “adolescent pregnancy and motherhood” and “Nutritional status of women”.

The “**Care during pregnancy and delivery**” variables are “Assisted delivery from a professional health worker”, “Place of delivery”, “Number of ANC-visits”, “Antenatal care provider”, “Pregnancy outcome”, “Tetanus toxoid injections” and “Clean delivery kit”.

Ethics

The Nepal Family and Health Survey 1996 and the Nepal Demographic Health Survey 2011 are both available for public use. The participators of the survey 2011 gave their consent during interviews. All information presented in both studies is anonymised. No further ethical approvals are required for publicly available reports.

Data analysis/statistical analyses

The analysis most frequently used was “individual confidence interval (CI) for the difference between proportions”. CI for the difference between proportions indicates significance when the CI does not pass 0. In cases not fulfilling the criteria ($n\hat{p} < 10$, $n(1-\hat{p}) < 10$), e.g., meaning variables close to either 0%, 100% or within small sample sizes, calculations were not made and marked with (**) in the tables. Calculations were performed using the webpage Mathcracker(62).

The tests were performed with a 99% CI, meaning that the true difference in 99% of cases lies within the CI. As tests were performed, approximately 2 significant results are falsely significant. Post-hoc power analysis was performed to determine the power of the analysis, meaning if a non-significant result is due to a small sample size(63).

In two cases, variables of ideal number of children and fertility rate, proportions were not available. These variables were considered important in the study and were therefore included. These variables contained individual 95% CI that were compared to each other to estimate whether a true difference existed. CIs not overlapping are considered significant, whereas overlapping CIs does not implicate non-significance but adds to the discussion.

$$CI = \left(\hat{p}_1 - \hat{p}_2 - z_c \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{N_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{N_2}}, \hat{p}_1 - \hat{p}_2 + z_c \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{N_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{N_2}} \right)$$

$$CI(\text{Proportion}) = \left(\hat{p} - z_c \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}, \hat{p} + z_c \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} \right)$$

$$Power = \Phi \left\{ \frac{\Delta}{\sqrt{p_1 q_1 / n_1 + p_2 q_2 / n_2}} - z_{1-\alpha/2} * \frac{\sqrt{\bar{p}\bar{q}(1/n_1 + 1/n_2)}}{\sqrt{p_1 q_1 / n_1 + p_2 q_2 / n_2}} \right\}$$

Student's contribution

Compiling data from existing NFHS/DHS aggregated datasets. Further including adequate data. Analysing these confirming significance or not and present the results in tables.

Results

Fertility and family planning

Total fertility rate

The total fertility rate (number of children per woman) has decreased significantly in all study populations, with a total national estimated decrease at 43%, from a rate at 4.64 to 2.6 (table 1.1).

Table 1.1 Total fertility rate

Total fertility rate (number of children per woman) by ecological zone, residential area, and national total. Significance is seen in cases where the interval does not overlap, in this table all its content is significant.

Exclusions: "Currently pregnant", "Mean number of children ever born to women aged 40-49"

NFHS/DHS source: Table 3.2, 1996. Table 5.2, 2011.

Fertility rate	Total fertility rate		n		Total fertility rate, [95% CI]
	1996	2011	1996	2011	
Mountain	5.6	3.4	1897	16086	CI 1996 [5.181, 6.021] CI 2011 [2.910, 3.980]
Hill	4.5	2.6	12650	14220	CI 1996 [4.211, 4.786] CI 2011 [2.310, 2.806]
Terai	4.64	2.5	13613	18578	CI 1996 [4.364, 4.922] CI 2011 [2.222, 2.862]
Urban	2.85	1.6	2698	36192	CI 1996 [2.456, 3.251] CI 2011 [1.374, 1.782]
Rural	4.83	2.8	25606	212377	CI 1996 [4.639, 5.022] CI 2011 [2.557, 3.007]
Total	4.64	2.6	28178	249357	CI 1996 [4.451, 4.831] CI 2011 [2.404, 2.804]

CI=confidence interval, pp=percentage points, n=sample size, NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Unmet need for family planning

The proportion of women satisfied with their need for family planning has increased significantly in all studied populations, with a national total increase of 17.4 percentage points (pp) (CI 99%, +15.5, +19.3) (table 1.2). The unmet need for spacing and total (both spacing and limiting) has decreased significantly in all studied populations except urban, with a national total decrease of -4.7pp (CI 99%, -6.0, -3.4) (table A2 in the appendices) and -4.4pp

(CI 99%, -6.2, -2.6) (table 1.2) respectively. The unmet need for limiting is insignificant in all study populations (table A2 in the appendices).

Table 1.2. Unmet need for family planning

Percentage of women having an unmet need for spacing and limiting in total, as well as the percentage of satisfied women by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: “Met need for family planning (currently using)”, “Total demand for family planning”

Complete table is found in appendices, table A2.

NFHS/DHS sources: Table 6.4, 1996. Table 7.12, 2011.

Unmet need for family planning	%Total		%Satisfied		n		Difference, total [CI 99%]	P%	Difference, satisfied [CI 99%]	P%
	1996	2011	1996	2011	1996	2011				
Mountain	34.2	24.3	34.2	67.0	538	630	-9.9pp [-16.8, -3.0]	100	+32.8pp [+25.7, +39.9]	100
Hill	33.1	29.7	47.2	62.1	3363	3784	-3.4pp [-6.2, -0.6]	87.1	+14.9pp [+11.9, +17.9]	96.7
Terai	29.6	25.3	49.5	66.9	4082	5193	-4.3pp [-6.7, -1.9]	97.9	+17.4pp [+14.8, +20.0]	100
Urban	21.7	19.6	69.8	75.5	668	1261	-2.1pp [-7.1, +2.9]	7.1	+5.7pp [+0.2, +11.2]	54.8
Rural	32.3	28.1	45.1	63.4	7314	8346	-4.2pp [-6.1, -2.3]	96.4	+18.3pp [+16.3, +20.3]	100
Total	31.4	27.0	47.6	65.0	7982	9608	-4.4pp [-6.2, -2.6]	100	+17.4pp [+15.5, +19.3]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc Power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Contraceptive prevalence and methods

The percentage of women using any contraceptive method has increased significantly in all study populations, with a national total increase of 21.2pp (CI 99%, +19.4, +23) (table 1.3).

The percentage of women using any modern contraceptive method has increased significantly in all study populations but urban, with a national total increase of 17.2pp (CI 99%, +15.4, +19.0) (table 1.3). The difference in traditional methods has increased significantly in all study populations but in the mountain region, with a national total increase of 4pp (CI 99%, +3.2, +4.8) (table 1.3).

Table 1.3. Current use of contraception methods.

Percentage distribution of women using any method, any modern method or any traditional method by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "Pill", "IUD", "Injectables", "Diaphragm/Foam/Jelly", "Condom", "Norplant", "Female sterilization", "Male sterilization", "Periodic abstinence", "Withdrawal", "Other methods", "Not currently using"

NFHS/DHS source: Table 4.8, 1996. Table 7.3, 2011.

Current use of contraception methods	%1996	%2011	n		Difference [CI 99%]	P%
			1996	2011		
%Any method						
Mountain	17.8	48.3	538	630	+30.5pp [+23.8, +37.2]	100
Hill	29.6	48.2	3363	3784	+18.6pp [+15.7, +21.5]	100
Terai	29.0	51.0	4082	5193	+22pp [+19.4, +24.6]	100
Urban	50.1	59.6	668	1261	+9.5pp [+3.4, +15.6]	92.3
Rural	26.5	48.2	7314	8346	+21.7pp [+19.8, +23.6]	100
Total	28.5	49.7	7982	9608	+21.2pp [+19.4, +23.0]	100
%Any modern method						
Mountain	16.0	43.1	538	630	+27.1pp [+20.6, +33.6]	100
Hill	26.9	40.6	3363	3784	+13.7pp [+10.9, +16.5]	100
Terai	26.6	45.0	4082	5193	+18.4pp [+15.9, +20.9]	100
Urban	45.1	49.8	668	1261	+4.7pp [-1.4, +10.8]	27
Rural	24.3	42.1	7314	8346	+17.8pp [+15.9, +19.7]	100
Total	26.0	43.2	7982	9608	+17.2pp [+15.4, +19.0]	100
%Any traditional method						
Mountain	1.8	5.3	538	630	**	**
Hill	2.6	7.6	3363	3784	+5.0pp [+3.7, +6.3]	100
Terai	2.4	5.9	4082	5193	+3.5pp [+2.5, +4.5]	100
Urban	5.0	9.8	668	1261	+4.8pp [+1.7, +7.9]	88.6
Rural	2.2	6.0	7314	8346	+3.8pp [+3.0, +4.6]	100
Total	2.5	6.5	7982	9608	+4.0pp [+3.2, +4.8]	100

** = Presented data did not fulfil criteria for using individual confidence interval for the difference between proportions. CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc Power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

The most used contraceptive method is female sterilization in both 1996 and 2011 (12.1% and 15.2% respectively), with a significant increase of 3.1pp (CI 99% +1.8, +4.4) (table 1.4). IUD is the least used in both 1996 and 2011 (0.3% and 1.3% respectively), although with a

significant increase of 1pp (CI 99%, +0.07, +1.3) (table 12.2). The biggest increase is seen in the use of injectables which increased significantly by 4.7pp (CI 99%, +3.7, +5.7) (table 1.4).

Table 1.2. Current use of contraceptive methods detailed.

Percentage distribution of detailed methods by national total. Detailed methods in the left column, national total in the rows. Exclusions: "Diaphragm/Foam/Jelly", "Norplant", "Periodic abstinence", "Withdrawal", "Other methods", "Not currently using"
NFHS/DHS source: Table 4.8, 1996. Table 7.3, 2011.

Current use of contraceptive methods	1996, total %	2011, total %	n		Difference [99% CI]	P%
			1996	2011		
Any method	28.5	49.7	7982	9608	+21.2pp [+19.4, +23.0]	100
Any modern method	26.0	43.2	7982	9608	+17.2pp [+15.4, +19.0]	100
Any traditional method	2.5	6.5	7982	9608	+4pp [+3.2, +4.8]	100
Pill	1.4	4.1	7982	9608	+2.7pp [+2.1, +3.3]	100
IUD	0.3	1.3	7982	9608	+1.0pp [+0.07, +1.3]	100
Injectable	4.5	9.2	7982	9608	+4.7pp [+3.7, +5.7]	100
Condom	1.9	4.3	7982	9608	+2.4pp [+1.7, +3.1]	100
Female sterilization	12.1	15.2	7982	9608	+3.1pp [+1.8, +4.4]	100
Male sterilization	5.4	7.8	7982	9608	+2.4pp [+1.4, +3.4]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc Power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

The contact of non-users of contraceptive methods with family planning providers decreased with a significant national total of 2.2pp (CI 99% -3.6, -0.8) (table A4 in appendices). An increase (2.2pp) was seen among the urban population; however, this was insignificant (CI 99%, -2.7, +7.1) (table A4 in appendices).

High-risk fertility behaviours

The avoidable high-risk fertility behaviours decreased significantly in the national total by 17.1pp (CI 99%, -19.4, -14.8) (table A5 in appendices). The percentage of women with no high-risk fertility behaviour increased in national total by 6.3pp (CI 99%, +4.2, +8.4) (table A5 in appendices). The number of women with birth intervals under 24 months decreased insignificantly by 0.9pp (CI 99%, -2.2, +0.4) (table A5 in appendices).

Birth intervals

In general, most women have a birth interval between 24-35 months during both 1996 and 2011 (35.4% and 28.6% respectively) (table A7 in appendices). In this interval the decrease has been significant in all study populations except in the mountain region, with a national decrease of 7.8pp (CI 99%, -10.4, -5.2) (table A7 in appendices). The decrease is insignificant among all studied populations in both intervals of 18-23 months and 36-47 months. The birth interval of 48+ months have increased significantly in all study populations except the mountains with a total national increase at 12.8pp (CI 99%, +10.4, +15.2) (table A7 in appendices).

Adolescent pregnancy

The percentage of women who begun childbearing while still adolescents decreased significantly except for the Mountain and Hill regions with a national total decrease of 7.2pp (CI 99% -10.2, +4.2) (table 2.1).

Table 2.1. Adolescent pregnancy and motherhood

Percentage of women aged 15-19, with a live birth or currently pregnant with their first child by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "Mothers", "Pregnant with first child"

NFHS/DHS source: Table 3.11, 1996. Table 5.11, 2011.

Adolescent pregnancy and motherhood	% Begun childbearing		n		Difference [CI 99%]	P%
	1996	2011	1996	2011		
Mountain	20.4	17.1	148	182	-3.3pp [-14.5, +7.9]	3.6
Hill	16.9	15.5	1036	1086	-1.4pp [-5.5, +2.7]	4.5
Terai	31.1	17.5	1052	1485	-13.6pp [-18.1, -9.1]	100
Urban	19.7	9.3	173	367	-10.4pp [-19.1, -1.7]	77.1
Rural	24.3	17.8	2054	2386	-6.5pp [-9.7, -3.3]	99.7
Total	23.9	16.7	2229	2753	-7.2pp [-10.2, -4.2]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Nutritional status of women

The percentage of women below 145 cm have generally decreased, with a national total significant decrease of 3.2pp (CI 99%, -5.1, -1.3) (table A6 in appendices). The percentage of women with a BMI below 18.5 (kg/m²) has decreased significantly in all study population groups except in the Mountain region where an insignificant increase of 2.9pp (CI 99%, -4.6,

+10.4) (table A6 in appendices) is seen. The national total decrease is 10.1pp (CI 99%, -12.5, -7.7) (table A6 in appendices).

Care during pregnancy and delivery

Delivery

The percentage of women with deliveries assisted by a professional health worker has increased significantly in all studied populations. The total national increase is 26 pp (CI 99%, +23.9, +28.1), which has gone from 10.1% to 36.1% (table 3.1). The urban study population had the highest percentage of delivery assisted by a professional health worker during both 1996 and 2011. Complying to this the total percentage with no assist during delivery has decreased by 7.8pp (CI 99%, -9.2, -6.4), from 10.9% to 3.1% (table 3.1).

Table 3.1. Assisted delivery

Percentage of women receiving professional assist (doctor, nurse, midwife) or no assist during their delivery by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "MCH worker", "Other health professional", "TBA", "Friend/relative", "Missing"

Modifications: "Midwife", "Nurse", and "Doctor" were added in the NFHS 1996 to meet the criteria of professional health workers.

NFHS/DHS source: Table 8.5, 1996. Table 9.7, 2011.

Assisted delivery	1996%	2011%	n		Difference [CI 99%]	P%
			1996	2011		
%Assisted delivery from a professional health worker						
Mountain	2.9	18.9	337	428	+16.0pp [+10.6, +21.4]	100
Hill	11	30.4	1862	2130	+19.4pp [+16.2, +22.6]	100
Terai	10.5	42.8	2176	2833	+32.3pp [+29.4, +35.2]	100
Urban	46.5	72.7	278	503	+26.2pp [+17.0, +35.4]	100
Rural	7.6	32.3	4097	4888	+24.7pp [+22.7, +26.7]	100
Total	10.1	36.1	4375	5391	+26.0pp [+23.9, +28.1]	100
% With no assist during delivery						
Mountain	8.6	5.9	337	428	-2.7pp [-7.6, +2.2]	13.4
Hill	17.0	5.5	1862	2130	-11.5pp [-14.1, -8.9]	100
Terai	5.9	1.0	2176	2833	-4.9pp [-6.3, -3.5]	100
Urban	4.1	1.5	278	503	-2.6pp [-6.0, +0.8]	39.1
Rural	11.3	3.3	4097	4888	-8.0pp [-9.4, -6.6]	100
Total	10.9	3.1	4375	5391	-7.8pp [-9.2, -6.4]	100

MCH=maternal and child health, TBA=Traditional Birth Attendant, CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

The percentage of women giving birth at a health facility has increased significantly in all studied populations, with a total national increase at 27.7pp (CI 99%, 25.7, 29.7) (table 3.2). The highest increase at 33.7pp is seen in the Terai. The total number of women giving birth at

home have decreased significantly by 28.6pp (CI 99%, -30.6, -26.6) from 91.7% in 1996 to 63.1% in 2011 (table 3.2).

The number of women having a clean delivery kit whilst giving birth at home has increased significantly in all studied populations except in the urban study population. The total national increase is 12.3pp (CI 99%, +9.6, +15.0) (table A9 in the appendices).

Table 3.2. Place of delivery

Percentage of women giving birth at home or at a health facility by ecological zone, residential area, and national total.

Unsignificant results are marked in red.

Exclusions: "Don't know/missing"

NFHS/DHS source: Table 8.4, 1996. Table 9.4, 2011.

Table 2 Place of delivery	% At home		% At health facility		n		Difference [99%CI], home birth	P%	Difference [99%CI], health facility birth	P%
	1996	2011	1996	2011	1996	2011				
Mountain	96.3	79.4	2.0	18.8	337	428	-16.9pp [-22.6, -11.2]	100	+16.8pp [+11.6, +22.0]	100
Hill	90	66.4	9.0	31.3	1862	2130	-23.6pp [-26.8, -20.4]	100	+22.3pp [+19.2, +25.4]	100
Terai	92.4	58.1	7.2	40.9	2176	2833	-34.3pp [-37.1, -31.5]	100	+33.7pp [+30.9, +36.5]	100
Urban	56.2	27.9	43.8	71.3	278	503	-28.3pp [-37.5, -19.1]	100	+27.5pp [+18.2, +36.8]	100
Rural	94.1	66.7	5.1	31.6	4097	4888	-27.4pp [-29.4, -25.4]	100	+26.5pp [+24.6, +28.4]	100
Total	91.7	63.1	7.6	35.3	4375	5391	-28.6pp [-30.6, -26.6]	100	+27.7pp [+25.7, +29.7]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Antenatal care

The number of women receiving the recommended number of ANC visits (4+) have nationally increased significantly with 41.3pp (CI 99%, +39.0, +43.6) (table 3.3).

Table 3.3. Number of ANC visits

The percentage of women who had none, 1, 2-3, or 4+ ANC visits by national total. The recommended number of ANC visits is according to WHO 4+ visits.

Exclusions: "Number of months pregnant at time of first visit"

Modifications: In table 8.2, 1996, 2 and 3 visits were separated but, in this table, added to be comparable to the data of table 9.2, 2011.

NFHS/DHS source: Table 8.2, 1996. Table 9.2, 2011.

Number of ANC visits	1996	2011	1996	2011	n		Difference in pp, [CI99%]		P%
	% None		% 4+ visits		1996	2011	None	4+	
Total	55.7	15.2	8.8	50.1	4375	4148	-40.5[-42.9, -38.1]	+41.3[+39.0, +43.6]	100
	% 1 visit		% 2-3 visits				1	-4.6 [-6.1, -3.1]	100
Total	10.7	6.1	22.1	28.6	4375	4148	2-3	+6.5[+4.1, +8.9]	100

ANC=antenatal care, WHO=World Health Organization, CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

The number of women obtaining from ANC visits have decreased significantly in all studied populations, with a total national decrease at 40.5pp (CI 99%, -42.9, -38,1) (table 3.4). ANC given by a skilled provider has increased significantly in all studied populations, with a national total increase at 34.7pp (CI 99%, +32.1, +37.3) (table 3.4).

Table 3.4. Antenatal care provider

Percentage of women who have received ANC by a skilled provider (doctor, nurse, or midwife), or have not received ANC by ecological zone, residential area, and national total.

Exclusions: "Age of woman"

NFHS/DHS source: Table 8.1, 1996. Table 9.1, 2011.

Table 4 Antenatal care provider	%Skilled provider		% No ANC		n		Difference, skilled provider [99%CI]	P%	Difference, no ANC [99% CI]	P%
	1996	2011	1996	2011	1996	2011				
Mountain	16.3	52.1	74.3	22.6	337	306	+35.8pp [26.8, 44.8]	100	-51.7pp [-60.4, -43.0]	100
Hill	24.3	53.2	60.0	20.4	1862	1669	+28.9pp [24.8, 33.0]	100	-39.6pp [-43.5, -35.7]	100
Terai	24.1	63.0	49.0	10.1	2176	2174	+38.9pp [35.3, 42.5]	100	-38.9pp [-42.1, -35.7]	100
Urban	66.2	87.9	32.6	6.3	278	418	+21.7pp [13.3, 30.1]	100	-26.3pp [-34.2, -18.4]	100
Rural	20.7	54.9	57.2	16.1	4097	3730	+34.2pp [31.5, 36.9]	100	-41.1pp [-43.6, -38.6]	100
Total	23.6	58.3	55.7	15.2	4375	4148	+34.7pp [32.1, 37.3]	100	-40.5pp [-42.9, -38.1]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Mothers with sufficient protection against tetanus (at least two doses) has increased significantly in all studied populations, with a total national increase of 37.1pp (CI 99%, +34.5, +39.7) (table A8 in the appendices).

Pregnancy outcome

The number of abortions has increased significantly in the studied populations, with a total national increase at 7.1pp (CI 99%, +6.2, +8.0) (table 5 in the appendices). The number of still and live births have decreased significantly in the studied populations, with a total national estimated decrease at 1.0pp (CI 99%, -1.4, -0.6) and 8pp (CI 99%, -9.2, -6.8) (table A10 in the appendices) respectively.

A figure of summarized results connected to the MDGs are illustrated in figure 3.

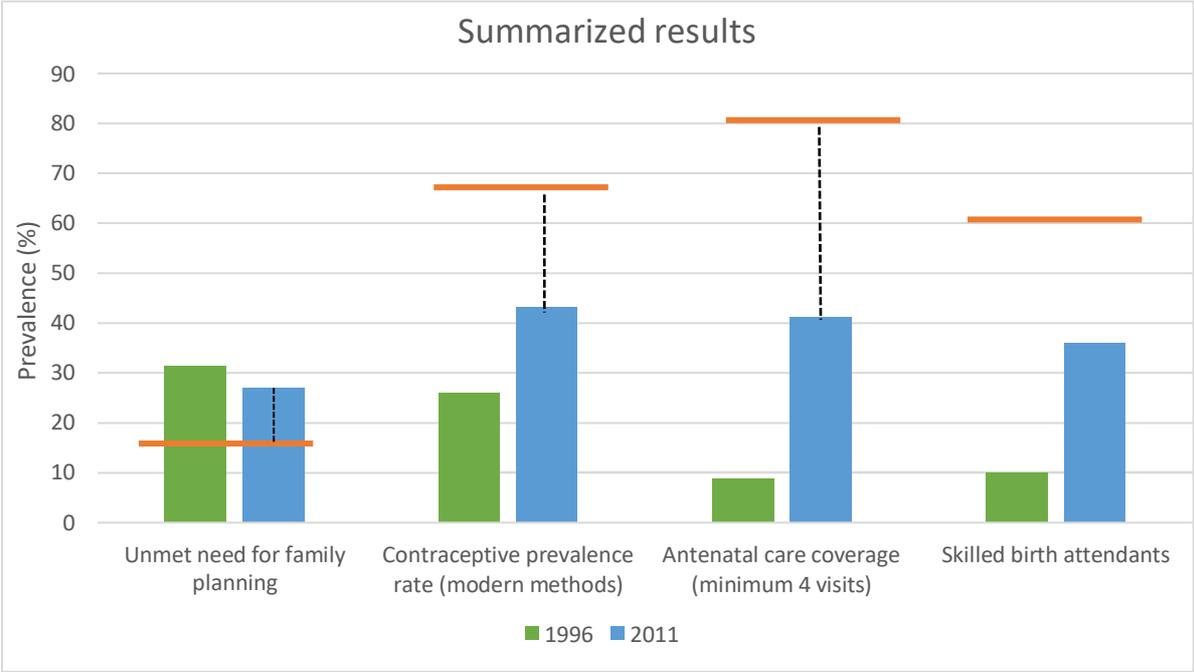


Figure 3 A summarizing of results connected to Millennium Development Goal no 5, in the years 1996 and 2011 respectively in percentages, with an orange line indicating the goal of 2015 for each of categories. The dashed line indicates the difference between the results of 2011 and the goal of 2015.

Discussion

This is a trial comparing Demographic and Health Surveys from Nepal between the years 1996 and 2011. The statistical analysis is mainly “Confidence Interval for the difference between proportions”, often used to compare aggregated datasets in epidemiological studies. Overall, the results points towards a great improvement being made regarding maternal and

reproductive health care. More women give birth in health facilities and with a SBA, and women are more prone to ANC visits than before. The family planning services are increasing among Nepali women, with a fertility rate being lower than before and an increasing contraceptive prevalence rate. A negative tendency is seen in contact of non-users of family planning services, as well as in live birth pregnancies.

Fertility and family planning

Family planning programs has put a lot of effort in spreading information about family planning, with the aim to decrease the fertility rate. The total fertility rate is declining in Nepal, as well as in other countries worldwide(64).

Women are in general more satisfied concerning their unmet need for family planning 2011 compared to 1996, this even though non-users of family planning are less likely to be contacted by family planning providers in 2011 compared to 1996. The fact that visits by family planning providers has decreased might be because numbers up until 2011 were looking great, and less effort being put in spreading information about family planning. Later studies show a stagnation of contraceptive usage from the years 2006 and forward, which might be because of a lack of funds and shrinking governmental interest(26, 65). Urban areas had a high number of women using any contraceptive methods already in the 1996 NFHS (50.1%), a number larger than that of 2011 for Mountain, Hill and rural areas which points to a problem of availability in more remote areas.

The unmet need for family planning is globally higher among the poor than the wealthy, which has led to a rapid growth in population leading to poorer countries becoming even poorer(22). To some measures this depends on economics, but the lack of knowledge about contraceptive methods, fear of social disapproval and health concerns are major obstacles. Furthermore, women's perceptions of husband's opinions and probable opposition against family planning stalls family planning in families. (66-68) The perception of men's disapproval towards family planning appear to derive from the lack of discussion between couples rather than men's actual opinion(69, 70).

Nepal is currently ranked 142nd in the world (out of 189 countries) on the Gender Inequality Index. (71) The Gender Inequality Index is based on female reproductive health index, female empowerment index and female labour market index, which are in comparison and harmonized to men's index. The index varies between 0 to 1, were 0 indicates total equality between men and women and 1 indicates the utmost inequity.(72) Nepal has an index value of

0,452. (71) The fact that Nepal is an unequal country might contribute to the fact that women perceive their husbands to be opposite to contraceptives, and a more equal society could lead to more women discussing contraceptive methods and fertility with their husband.

Overall, the knowledge about fertile periods and the menstruation cycle is limited, even if the knowledge about contraceptive methods is high in both years studied. Only 25% of women conducting in the 2011 DHS could correctly report the period of the cycle when they are fertile(1). This identifies issues concerning reproductive health education and thereby knowledge about effectiveness of contraceptive methods, and points at the importance of education – both in general and aimed at health specifically.

The MDG target concerning contraceptive prevalence rate (modern methods) and unmet need for family planning in Nepal were set to 67% and 15% respectively to be achieved by 2015(73), and in 2011 these figures were 43.2% and 27% respectively. This meaning that Nepal is by the year 2011 rather far from achieving these goals in the MDG as of 2015, implying that more effort needs to be put in to increase the use of contraceptives and family planning.

High-risk fertility behaviours

The family planning programs had obvious success with the fertility rate, and it appears to have affected the birth intervals as well, especially the birth intervals exceeding 48 months. Most women still give birth in the interval 24-35 months. The WHO recommendation is 24 months(1). Giving birth within a 24-month interval had not decreased significantly in 2011, which might be due to lack of family planning-information concerning contraceptive methods and how contraceptives might be used. Adding to this, most of results between 7-17 months as well as 18-23 months were insignificant with generally low post-hoc power speaking of low variance and small study population groups.

Adolescent pregnancy

Young people in Nepal have low access to sexual and reproductive health services, and education about sexual behaviour and its potential consequences are rarely discussed at home or at school. Adding to this, unmarried young people have issues accessing family planning services due to communities' lack of acceptance. (34)

Adolescent pregnancies are less common in 2011 compared to 1996, despite no actions being directed straight against teenage pregnancies(32). With teenage pregnancies affecting the

most vulnerable adolescents, it is an issue that needs more focus. With marriage being delayed, more adolescent women will get pregnant outside of marriage(34). This leading to already vulnerable girls being more vulnerable, and at risk of social discrimination and more isolation from the modern society and opportunities, such as education. Young women still have a lower percentage of literacy compared to young men(34), which shows that there is still much to be done concerning more basic equality and to give even less fortunate girls a chance of decent life. Since young people are such a big part of Nepal's population, it is important to aim policies and actions towards them to ensure a healthy development.

The adolescent birth rate was not included in either the 1996 NFHS or the 2011 DHS, it being difficult to determine if they made any progress to the MDG indicator of 70/1000 adolescent births(73). However, a decrease by 30% (or 7.2 pp) is seen in this study, indicating that they are on the right track. More recent numbers imply an adolescent birth rate at 71/1000 in 2014(73), supporting the results from this study and that adolescent birth rates were on the right track in 2011.

Care during pregnancy and delivery

Delivery

The levels of women giving birth at a health facility and with the assistance from a skilled professional health worker had increased significantly in all studied populations. This reflects the work put in to utilize delivery care for Nepalese women, especially by the Aama Programme introduced in 2005 (11). However, all Nepalese women were not included in the Aama Programme until 2009, two years preceding this study, meaning that women giving birth before 2009 were not automatically included in the Aama programme. This implicates that policies and programs launched to improve maternity health services such as The Safe Motherhood Policy, introduced in 1998, and Five-Years Plans following 1996 had succession in safer delivery practices.

Women residing in rural areas has a lower percentage and a lower increase in giving birth at health facilities and receiving professional assistance while giving birth compared to urban residents, which shows that utilization of safe delivery care practices has failed to reach rural areas in desired extent. The main reason for women not seeking SBA care during delivery is the accessibility to health facilities, which is low in parts of Nepal due to long distances, poor road conditions and inadequate transportation, despite Nepal's effort in utilizing maternal health care by introducing financial relief (16, 74). The maximum economical compensation

is NRP (Nepalese rupee) 1,500 for women delivering babies at a health facility, at the same time as the cost of transportation to health facilities in remote areas easily can exceed NRP 4,000. Thus, less fortunate families are unable to afford delivery care at health institutions and deliver at home instead(75). A study conducted in Nepal 2013 showed that nearly a third of women conducting in the study had to travel a minimum of 30 minutes to nearest health facility, and that these women were in majority of not receiving SBA(16). Long distance is found in other studies conducted in Bangladesh and Afghanistan, other low-resource settings, to negatively affect the number of women receiving SBA(76, 77).

Despite the long distance, the transportation is named a major barrier to SBA in various studies and countries(75, 78, 79). Poor roads and low accessibility to safe vehicles complicates the event, in remote areas of Nepal the transportation commonly consists of bull cart or carrying of the pregnant woman. However, FCHVs are in an article conducted in Nepal in 2014 named to be important by arranging transport for pregnant women, especially for the many women with husbands who yearly migrates to India for work and are not present around birth (75).

While home birth without surveillance is less common in 2011 compared to 1996, home birth is still more common in Nepal compared to Sri Lanka, another South-Asian country, where approximately 98% of women in 2006 gave birth in a health facility, compared to 35.5% in Nepal 2011. Important note is, concerning educations impact on health outcomes, that Sri Lanka has reached further with a higher percentage of women attending school. Only 4% of women conducting in the Sri Lanka DHS of 2006 has no education, compared to 41.4% of women in the Nepal DHS of 2011 (1, 44). This could demonstrate that interventions other than those directly aimed to motherhood and safe delivery might affect the numbers of mothers giving birth at health facilities and with assistance from professional health workers. This is supported by a study from Nepal in 2007, claiming that it might not be education itself, rather than what education brings in forms of confidence and new insights in modern society and health care, that makes pregnant women independently seek out health care for themselves(80).

The use of clean delivery kits has nationally significantly increased in all but the urban population, this might be because fewer percentage of urban residents give birth at home compared to rural residents. The number of clean delivery kits used is although still relatively small (14.1% nationally in 2011), a confound factor might be education. Women giving birth

at home tend to be less educated (1), and are therefore at risk to not seek ANC(16) which might affect the knowledge about clean delivery practices.

Concerning the MDG target of 60% of births in Nepal attended by SBAs(73), Nepal has still a rather long way to go with 36.1% of births being attended by SBAs in 2011. However, the increase is more than three-times folded compared to the percentage of 1996, meaning that their efforts might be sufficient to reach the MDG of 2015.

Antenatal care

The number of women receiving their recommended 4+ ANC visits has drastically improved since 1996. The increase is in total 41.3 pp, with narrow CI ranging from 39 to 43.6 which indicates a great improvement even in the lower CI. The MIS, later called the Aama programme, has substantially contributed to these numbers. A study made in Nepal 2018 suggests that women becoming pregnant after the implementation of the MIS in 2005 are three times more likely to have attended the recommended four ANC visits, and women becoming pregnant after implementation of the Aama programme in 2009 are six times more likely to have attended four ANC visits(74). FCHVs have most likely contributed a lot to these numbers by educating pregnant women and referring them to ANC, and their growing participation in health work(12, 80). Studies conducted in Nepal 2013 and 2007 respectively, suggests that the major barrier for women seeking maternal health care is the geographical access and cost, where a major part of the cost is transportation. Both studies also implies that education is the most important factor for women seeking ANC. The 2013 study claims that women who have attended secondary-level or higher education are twice as likely to seek ANC than illiterate women (16, 80).

A study conducted in India in 2008 is implying that the utilisation of ANC is dependent of the quality, claiming that women who perceived the ANC poor are less likely to utilise ANC and that less fortunate women are receiving poorer care compared to women more well-off(81). Unfortunately, quality of care was not presented in the 1996 NFHS and therefore not included in the study, however data of ANC quality is presented in the 2011 NDHS where it is found, similarly to the Indian study of 2008, that richer women with education are more likely to receive high-quality care compared to poor, not educated women(1). This might partly explain why educated women are more prone to seek ANC. The fact that poor, less educated women are receiving poor ANC might lead to a negative spiral-tendency, where less fortunate

women are receiving poor care leading to these women obtaining from ANC – a development important to stagnate to utilise care for all women.

Important note is that the difference between those with no ANC visit has significantly decreased alongside women having one visit, which shows that significantly more women have at least 2 ANC visits. Even if the recommended number of visits are 4, it would be interesting to see how much of an effect 2 ANC visits have on the maternal health status. A possible idea is that basic facts and knowledge are included, which helps expecting mothers to recognize danger signs, and that more health care including for example blood pressure measurements and blood samples are not sufficiently provided in cases with pregnant women not attending recommended ANC visits.

Unfortunately, number of ANC visits are not categorized into ecological zones in the 1996 NFHS, but according to table 3.4 in results, skilled provider is 1.6 times more common among urban residents compared to rural residents, which supports the theory that remote areas have difficulties accessing health care. In India, as well as in Nepal, rural residents are less likely to conduct ANC – especially when poor and outcast. The north of India, closest to Nepal, has the lowest percentages of women conducting ANC(81).

The MDG target of ANC coverage of minimum 4 visits is set to be 80%(73), this number is in 2011 50.1% which is nearly 6 times higher than the number of 1996, however still far from 80%.

Pregnancy outcome

Surprisingly, the number of live births has decreased between the years 1996-2011. This might be explained by the fact that abortion was prohibited by law up until 2003, thus leading to undocumented events of non-live births compared to 2011 due to social stigma. The legislation of abortion has led to a decrease in complications from abortions (58), however the facility-based deaths due from abortion increased (58) which may point to the fact that more women are willing to seek health care in despite of social stigma. The decrease in abortion complications most likely has to do with traditional methods to end a pregnancy such as inserting of herbs or manually use a tool to end the pregnancy (50) have been displaced by modern, safe methods such as pills or surgical abortions. Utilization of safe abortion practices for all Nepalese women have most likely had a substantial effect on the maternal mortality rate, with abortion being the third most common cause to maternal death in Nepal(58). A study conducted in 2013 in Nepal studies complications from abortions, claiming that two

thirds of women presenting to hospitals has used medical abortion rather than instrumental abortion. Most of these women were obtaining their medications from uncertified prescribers and did not know what sort of medications they have used, implicating that overdose and misuse are usual and that private prescribers and pharmacies have a big responsibility in this matter. The same study also discussed the fact that medical abortion is easier for women, especially in rural areas, to utilise, they do not need to visit a hospital and can avoid the social stigma an abortion can bring, highlighting that medical abortion needs to be improved and that private pharmacies play a significant role in providing safe abortion for women(60).

Maternal mortality

Unfortunately, maternal mortality was not presented in the 2011 DHS. Maternal mortality is an important measure on the wellbeing of a country and is a hard measure on the status of maternity services. However, numbers of MMR can be conducted from elsewhere, but it is important to be aware that those number are produced in different models and populations, hence cannot be fully compared.

Numbers from a maternal mortality and morbidity study conducted in 2008/2009 implies an MMR of 229/100 000(45), this is however based on a study conducted in only eight districts of Nepal, and might therefor not be representative numbers for all of Nepal. Numbers from the population census of 2010/2011 estimates a slightly higher MMR of 305/100 000 with a 95% CI (240, 388). The truth is probably somewhere in between since the MMR of 2016 DHS was estimated to 239/100 000 (82) and in the 2006 DHS estimated to 281/100 000, 95% CI (178, 384) (83). One conclusion possible to draw from these numbers is that the MMR probably is lower in 2011 compared to 1996. By using the MMR of 1996 DHS (539/100 000, 95% CI (392, 686)) it has been a decrease with 57.5% compared to the 2008/2009 study and a decrease by 43% compared to population census numbers of 2010/2011. By comparing the given CIs, it points to being significantly true. However, it is not certain that these number are significantly lower, but the decline is hard to ignore and speaks of an improved maternal health care.

DHS datasets, statistical awareness, and limitations to study

Some information in the DHS of 2011 were not available in the NFHS of 1996, and vice versa. The study of 2011 was more extensive in its execution by including more information regarding for example, anaemia, female empowerment, more sufficient data concerning ANC and PNC. All of which would have given this study more substance. However, the fact that

the 1996 NFHS does not conclude female empowerment is speaking. It shows that female rights and female liberation is taking more place in society as per 2011 compared to 1996, and even if numbers cannot be compared in this study it shows a shift of focus.

The study population differs from 2011 to 1996, in 2011 all women are included and in 1996 ever-married women and this may affect the result. A possible explanation to this might be the legislation of abortion in 2003 and the advancement of women rights after 1996. In addition, married women might answer more reliably to questions concerning sexual activities, pregnancies, and contraceptive methods due to the social stigma against unmarried women. All women conducted in the study are 15-49 years old, and an important note is that a higher percentage of women were married in 1996 compared to 2011, which might slightly even out the drop-out. Moreover, according to NFHS data sets, 16.6% of women between 15-49 in 1996(5) are never married and therefore not included in the study, meaning almost 17% of women are not represented. This might lead to wrongfully assumptions that e.g., contraception methods have not increased in the sense the study says, and moreover might have missed out on not reported adolescent pregnancies.

This report is based on aggregated databases, and not individual data, thus results could differ from reality. A further limitation to the study concerning the NFHS/DHS datasets is the validation. No studies comparable to the NFHS/DHS have ever been made, it being difficult to validate given data. However, the NFHS/DHSs are conducted with impact from national as well as international actors, making transparency more likely. It is important to have in mind that the most recent DHS used is from 2011, a decade from now, implicating developments not clarified in this report have been made. The cause of not using a more recent DHS is the administratively dividing of regions being made in 2015, complicating the comparability. Despite these limitations, this study is pointing out successes and development concerning maternal and reproductive health and might hopefully point out important further actions.

At last, both the 1996 NFHS and 2011 DHS are built on a massive collection of data from all of Nepal, and both studies are based on proven experience from similar DHS studies worldwide, implicating a verified method. A high statistical power is mainly presented, with exclusion for small populations in the Mountain and urban areas.

Conclusion and implications

Maternal and reproductive health has made progress towards the MDGs, but further considerations and actions needs to be taken to utilise health care in remote areas. Future

studies would benefit on having original NFHS/DHS-data to analyse, as well as a more recent study to compare with to be able to draw more accurate conclusions about present and future status of maternal and reproductive health care in Nepal.

Appendices

Table A 1. NFHS 1996, table exclusions and modifications.

In the left column, tables numbered as in the essay. Numbers for each table in respective NFHS/DHS is provided in the next column. Thereafter specified excluded options and modifications being made. In all tables conducted, background characteristics included were residency (urban/rural), ecological region (Mountain, Hill, Terai) and national total. In some cases, this was not possible, and only national total alone or together with residency could be included.

NFHS 1996 tables exclusions and modifications	DHS source		Excluded options (1996 NFHS)	Modified
	Table number in report	1996		
Table 1.1	Table 3.2	Table 5.2	“Currently pregnant”, “Mean number of children ever born to women age 40-49”	
Table 1.2	Table 6.4	Table 7.12	“Met need for family planning (currently using”, “Total demand for family planning”	
Table 1.3	Table 4.8	Table 7.3	“Pill”, “IUD”, “Injectables”, “Diaphragm/Foam/Jelly”, “Condom”, “Norplant”, “Female sterilization”, “Male sterilization”, “Periodic abstinence”, “Withdrawal”, “Other methods”, “Not currently using”	
Table 1.4	Table 4.8	Table 7.3	“Diaphragm/Foam/Jelly”, “Norplant”, “Periodic abstinence”, “Withdrawal”, “Other methods”, “Not currently using”	In table 12.2 the different methods are in the left column and national total in the rows.
Table 2.1	Table 3.11	Table 5.11	“Mothers”, “Pregnant with first child”	
Table 3.1	Table 8.5	Table 9.7	“MCH worker”, “Other health professional”, “TBA”, “friend/relative”, “missing”	In table 8.5 in the 1996 NFHS doctor, nurse and midwife were added to match the 2011 criteria of professional health worker.
Table 3.2	Table 8.4	Table 9.4	“Don’t know/missing”	
Table 3.3	Table 8.2	Table 9.2	“Number of months pregnant at time of first visit”	In table 8.2 in the 1996 NFHS 2 and 3 visits were separated but, in this table, added to be comparable to numbers of table 9.2, 2011.
Table 3.4	Table 8.1	Table 9.1	“VHW”, “MCH worker”, “other health professional”, “TBA”, “other”, “missing”	In table 8.1 in the 1996 NFHS doctor, nurse and midwife were added to match the 2011 criteria of skilled provider.
Table A2	Table 6.4	Table 7.12	“Met need for family planning (currently using”, “Total demand for family planning”	
Table A3	Table 6.6	Table 6.4	“Age of woman”	
Table A4	Table 4.21	Table 7.15	“Visited by family planning worker”, “Not visited by family planning worker”, “Missing”	
Table A5	Table 7.6	Table 8.5	“Unavoidable risk category”, “Mothers age <18”, “Mothers age >34”, “Birth order >3”, “Multiple high-risk category”	
Table A6	Table 9.7	Table 11.10	“Mean height”, “Mean BMI”	
Table A7	Table 3.8	Table 5.5		In table 5.5 in the 2011 DHS “48-59” and “60+” were added to match the criteria of “48+” in the 1996 NFHS.
Table A8	Table 8.3	Table 9.4	“None”, “one dose”, “don’t know/missing”	
Table A9	Table 8.6	Table 9.14		
Table A10	Table 3.6	Table 9.18	“Spontaneous abortion”	

Fertility and family planning

Table A 2. Unmet need for family planning

Percentage of women having an unmet need for spacing and limiting. The table also conducts information of total (meaning spacing and limiting altogether), as well as the percentage of satisfied women by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "Met need for family planning (currently using)", "Total demand for family planning"

NFHS/DHS source: Table 6.4, 1996. Table 7.12, 2011.

Table 11 Unmet need for family planning	%Satisfied		%Total		n		Difference, [CI 99%]	P%	Difference, [CI 99%]	P%
	1996	2011	1996	2011	1996	2011				
Mountain	34.2	58.4	34.2	19.6	538	630	+24.2pp [16.9, 31.5]	100	-14.6pp [-21.3, -7.9]	99.9
Hill	47.2	51.7	33.1	29.7	3363	3784	+4.5pp [1.5, 7.5]	88.9	-3.4pp [-6.2, -0.6]	69.8
Terai	49.5	58.8	29.6	25.3	4082	5193	+9.3pp [6.6, 12]	100	-4.3pp [-6.7, -1.9]	97.9
Urban	69.8	75.5	21.7	19.6	668	1261	+5.7pp [0.2, 11.2]	54.8	-2.1pp [-7.1, +2.9]	7.1
Rural	45.1	63.5	32.3	28.1	7314	8346	+18.4pp [16.4, 20.4]	100	-4.2pp [-6.1, -2.3]	99.9
Total	47.6	65	31.4	27	7982	9608	+17.4pp [15.5, 19.3]	100	-4.4pp [-6.2, -2.6]	100
	%For spacing		%For limiting							
Mountain	13.9	7.5	20.3	16.8	538	630	-6.4pp [-11.1, -1.7]	83.5	-3.5pp [-9.4, +2.4]	15.1
Hill	14.3	9.4	18.7	20.3	3363	3784	-4.9pp [-6.9, -2.9]	100	+1.6pp [-0.8, +4.0]	19.1
Terai	14.2	10.1	15.4	15.3	4082	5193	-4.1pp [-5.9, -2.3]	100	-0.1pp [-2.0, +1.8]	0.7
Urban	7.4	6.4	14.3	13.1	668	1261	-1.0pp [-4.2, +2.2]	4.4	-1.2pp [-5.5, +3.1]	3.4
Rural	14.9	10.1	17.4	18	7314	8346	-4.8pp [-6.2, -3.4]	100	+0.6pp [-1.0, +2.2]	5.5
Total	14.3	9.6	17.1	17.4	7982	9608	-4.7pp [-6, -3.4]	100	+0.3 pp [-1.2, +1.8]	2

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 3. Ideal number of children

Mean ideal number of children of women in Nepal, by ecological zone, residential area, and national total. Significance is seen in cases where the interval does not overlap, in this table all its content is significant.

NFHS/DHS source: Table 6.6, 1996. Table 6.4, 2011.

Table 9 Ideal number of children	Ideal number of children		n		Ideal number of children [95% CI]
	1996	2011	1996	2011	
Mountain	3.203	2.194	561	805	CI ₁₉₉₆ [3.075, 3.331] CI ₂₀₁₁ [2.128, 2.259]
Hill	2.817	2.043	3559	5064	CI ₁₉₉₆ [2.731, 2.903] CI ₂₀₁₁ [1.998, 2.088]
Terai	2.990	2.193	4094	6761	CI ₁₉₉₆ [2.889, 3.091] CI ₂₀₁₁ [2.093, 2.293]
Urban	2.446	1.896	707	1811	CI ₁₉₉₆ [2.332, 2.560] CI ₂₀₁₁ [1.846, 1.945]
Rural	2.975	2.173	7507	10819	CI ₁₉₉₆ [2.906, 3.044] CI ₂₀₁₁ [2.107, 2.238]
Total	2.929	2.133	8215	12630	CI ₁₉₉₆ [2.865, 2.994] CI ₂₀₁₁ [2.076, 2.190]

CI=confidence interval, n=sample size, NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 4. Contact of non-users with family planning providers

Percentage of non-users with no family planning services provided by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "Visited by family planning worker", "Not visited by family planning worker", "Missing"

NFHS/DHS source: Table 4.21, 1996. Table 7.15, 2011.

Contact of non-users with family planning providers	% No family planning services, or information provided		n		Difference [CI 99%]	P%
	1996	2011	1996	2011		
Mountain	90.2	86.3	442	499	-3.9pp [-9.3, 1.5]	23
Hill	91.4	87.3	2369	3243	-4.1pp [-6.2, -2.0]	99
Terai	89.1	88.5	2897	4095	-0.6pp [-2.6, 1.4]	3.6
Urban	89.4	91.6	333	1055	+2.2pp [-2.7, 7.1]	10.1
Rural	90.2	87.3	5375	6781	-2.9pp [-4.4, -1.4]	99.3
Total	90.1	87.9	5708	7837	-2.2pp [-3.6, -0.8]	92.8

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

High-risk fertility behaviour

Table A 5. *High risk fertility behaviour*

Percentage of women with a high-risk fertility behaviour (including age under 18, age over 34, at least three children before and birth interval under 24 months), no high-risk behaviour and birth interval under 24 months alone. Unsignificant results are marked in red.

Exclusions: "Unavoidable risk category", "Mothers age <18", "Mothers age >34", "Birth order >3", "Multiple high-risk category"

NFHS/DHS source: Table 7.6, 1996. Table 8.5, 2011.

High risk fertility behaviour	1996, total%	2011, total%	n		Difference [99% CI]	P%
			1996	2011		
%No high-risk fertility behaviour	27.3	33.6	7272	5391	+6.3pp [4.2, 8.4]	100
% Any avoidable high-risk fertility behaviour	56.1	39	7272	5391	-17.1pp [-19.4, -14.8]	100
% Birth interval <24 months	9.5	8.6	7272	5391	-0.9pp [-2.2, 0.4]	20

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 6. *Nutritional status of women*

Percentage distribution of women below 145 cm and BMI below 18.5 by ecological zone, residential area, and national total. Unsignificant results are marked in red.

Exclusions: "Mean height", "Mean BMI"

NFHS/DHS source: Table 9.7, 1996. Table 11.1, 2011.

Nutritional status of women	% Below 145 cm		% BMI below 18.5 (kg/m ²)		n		Difference, below 145 cm [CI 99%]	P%	Difference, BMI < 18.5 (kg/m ²) [CI 99%]	P%
	1996	2011	1996	2011	1996	2011				
Mountain	14.7	13.6	13.6	16.5	241	371	-1.1pp [-8.6, 6.4]	1.5	+2.9pp [-4.6, 10.4]	5.1
Hill	15.0	12.4	16.5	12.4	1377	2316	-2.6pp [-5.6, 0.4]	37.3	-4.1pp [-7.2, -1.0]	81
Terai	14.6	10.8	40.7	22.7	1599	3112	-3.8pp [-6.5, -1.1]	87.8	-18pp [-21.7, -14.3]	100
Urban	15.1	8.4	22.8	14.1	211	808	-6.7pp [-13.5, 0.1]	61.6	-8.7pp [-16.8, -0.6]	67.4
Rural	14.7	12.1	28.7	18.8	3006	4992	-2.6pp [-4.6, -0.6]	92.1	-9.9pp [-12.5, -7.3]	100
Total	14.8	11.6	28.3	18.2	3217	5800	-3.2pp [-5.1, -1.3]	95.9	-10.1pp [-12.5, -7.7]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 7. **Birth intervals**

Birth intervals in months from the five years preceding the surveys, first births are excluded. By ecological zone, residential area, and national total. Unsignificant results are marked in red. Modifications: In table 5.5 in the 2011 DHS "48-59" and "60+" were added to match the criteria of "48+" in the 1996 NFHS. NFHS/DHS source: Table 3.8, 1996. Table 5.5, 2011.

Table 10 Birth intervals	Birth intervals (%)										n		Inadequate birth interval			Adequate birth interval		
	%7-17 m		%18-23 m		%24-35 m		%36-47 m		%48+m				m	Difference in pp, CI [99%]	P%	m	Difference in pp, CI [99%]	P%
	1996	2011	1996	2011	1996	2011	1996	2011	1996	2011	1996	2011						
Mountain	11.4	8.3	14.1	13.9	34.1	33.1	22.5	20.9	17.9	23.7	464	311	7-17	-3.1 [-8.6, +2.4]	11.3	24-35	-1.0 [-9.9, +7.9]	1.1
													18-23	-0.2 [-6.7, +6.3]	0.6	36-47	-1.6 [-9.4, +6.2]	2.0
																48+	+5.8 [-1.9, +13.5]	7.6
Hill	8.5	6.7	14.5	12.3	36.4	30.7	21.9	19.0	18.7	31.4	2375	1424	7-17	-1.8 [-4.1, +0.5]	27.7	24-35	-5.7 [-9.7, -1.7]	84.6
													18-23	-2.2 [-5.1, +0.7]	24.9	36-47	-2.9 [-6.4, 0.6]	32.6
																48+	+12.7 [+8.9, +16.5]	100
Terai	9.8	7.7	14.9	14.5	36.8	26.1	23.1	22.2	15.4	29.5	2756	1816	7-17	-2.1[-4.3, +0.1]	44.2	24-35	-10.7 [-14.3, -7.1]	100
													18-23	-0.4 [-3.2, +2.4]	1.4	36-47	-0.9 [-4.2, +2.4]	3.1
																48+	+14.1[+10.8,+17.4]	100
Urban	8.8	6.5	15.7	11.4	33.3	23.5	19.5	17.6	22.6	41.6	316	290	7-17	-2.3 [-7.8, +3.2]	6.4	24-35	-9.8 [-19.2, -0.4]	53.7
													18-23	-4.3 [-11.4, +2.8]	14.8	36-47	-1.9 [-10, +6.2]	2.4
																48+	+19.0 [+9.4, +28.6]	99.3
Rural	9.4	7.4	14.6	13.8	36.6	29.0	22.7	21.1	16.7	28.7	5279	3262	7-17	-2.0 [-3.6, -0.4]	73.8	24-35	-7.6 [-10.3, -4.9]	100
													18-23	-0.8 [-2.8, +1.2]	6	36-47	-1.6 [-4.0, +0.8]	19.8
																48+	+12.0 [+9.6, +14.4]	100
Total	9.4	7.3	14.7	13.6	36.4	28.6	22.6	20.8	17.0	29.8	5595	3551	7-17	-2.1[-3.6, -0.6]	82.7	24-35	-7.8[-10.4, -5.2]	100
													18-23	-1.1 [-3.0, +0.8]	13.2	36-47	-1.8 [-4.1, +0.5]	29.1
																48+	+12.8[+10.4,+15.2]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Care during pregnancy and delivery

Table A 8. Tetanus toxoid injections.

Percentage of mothers that have received 2 doses of tetanus toxoid injections or more, by ecological zone, residential area, and national total.

Exclusions: "None", "One dose", "Don't know/missing"

NFHS/DHS source: Table 8.3, 1996. Table 9.4, 2011.

Table 6 Tetanus toxoid injections	% Two doses or more		n		Difference [CI 99%]	P%
	1996	2011	1996	2011		
Mountain	13.8	60.9	337	306	+47.1pp [+38.4, +55.8]	100
Hill	26.7	62.4	1862	1669	+35.7pp [+31.7, +39.7]	100
Terai	40.6	76.5	2176	2174	+35.9pp [+32.3, +39.5]	100
Urban	48.3	80.7	278	418	+32.4pp [+23.2, +41.6]	100
Rural	31.5	68.5	4097	3730	+37pp [+34.3, +39.7]	100
Total	32.6	69.7	4375	4148	+37.1pp [+34.5, +39.7]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Posthoc-Power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 9. Clean delivery kit

Percentage of women using clean delivery kits during home delivery by ecological zone, residential area, and national total.

NFHS/DHS source: Table 8.6, 1996. Table 9.14, 2011.

Clean delivery kit	% Used clean delivery kit		n		Difference [CI 99%]	P%
	1996	2011	1996	2011		
Mountain	1.0	10.2	325	120	**	**
Hill	1.3	15.3	1675	487	+14pp [+9.7, +18.3]	100
Terai	2.4	13.8	2010	536	+11.4pp [+7.5, +15.3]	100
Urban	4.1	19.0	156	39	**	**
Rural	1.7	13.9	3854	1103	+12.2pp [+9.5, +14.9]	100
Total	1.8	14.1	4010	1143	+12.3pp [+9.6, +15.0]	100

** = Presented data did not fulfil criteria for using individual confidence interval for the difference between proportions.

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Table A 10. Pregnancy outcome.

Pregnancy outcome in percentage by residential area and national total.

Exclusions: "Spontaneous abort"

NFHS/DHS source: Table 3.6, 1996. Table 9.18, 2011.

Table 5 Pregnancy Outcome			n		Difference, [CI 99%]	P%
	1996%	2011%	1996	2011		
Abortion						
Urban	2	14.7	1498	658	+12.7pp [+10.0, +15.4]	100
Rural	0.3	6.7	22726	5698	+6.4pp [+5.5, +7.3]	100
Total	0.4	7.5	24224	6356	+7.1pp [+6.2, +8.0]	100
Still birth						
Urban	2.3	0.5	1498	658	-1.8pp [-3.4, -0.2]	67.8
Rural	4.7	1.0	22726	5698	-3.7pp [-4.2, -3.2]	100
Total	1.9	0.9	24224	6356	-1.0pp [-1.4, -0.6]	100
Live birth						
Urban	91.8	76.5	1498	658	-15.3pp [-19.2, -11.4]	100
Rural	92.9	85.8	22726	5698	-7.1pp [-8.4, -5.8]	100
Total	92.8	84.8	24224	6356	-8.0pp [-9.2, -6.8]	100

CI=confidence interval, pp=percentage points, n=sample size, P%=Post-hoc power (retrospective power), NFHS=Nepal Family Health Survey, DHS=Demographic Health Survey

Populärvetenskaplig sammanfattning

Mödrahälsovård i Nepal – en framgångssaga

Författare:	Matilda Bergendahl
Examensarbete:	30 hp
Program:	Läkarprogrammet
År:	2022
Handledare:	Prof. Göran Kurlberg
Nyckelord:	Maternal, Reproductive, Health, Demographic and Health Survey, Nepal

Mödrahälsovård och kvinnors möjlighet till vård är ett aktuellt ämne, både i Sverige och i världen. Globalt stöter mödrahälsovård och kvinnor på andra problem än de vi möter i Sverige. Mödradödligheten är fortsatt relativt hög i utvecklingsländer, och så även i Nepal.

I Nepal beror en stor del av mödradödligheten på undermålig mödrahälsovård i form av få eller inga hälsovårdsbesök under graviditeten och att många födselar sker utan utbildad hälsovårdspersonal, ofta i hemmet. Detta till stor del på grund av att Nepal är ett land där många är bosatta på landsbygden, utan ordentlig infrastruktur. Även användandet av preventivmedel i Nepal är lågt, vilket leder till fler oönskade graviditeter, där avbrytande av graviditet innebär en större risk än i mer utvecklade länder.

Studien är baserad på enkätstudier gjorda i Nepal under 1996 och 2011, där dessa jämförts för att se om förbättring skett. Dessa studier går under namnet ”Demographic and Health Surveys”, och utförs världen över, framför allt i utvecklingsländer, för att kartlägga svårigheten av olika problem som länder har. De är särskilt inriktade på barn-, och mödrahälsa samt preventivmedelsanvändning.

Resultaten visar anmärkningsvärd förbättring gällande i princip alla områden som studerats. Fler kvinnor föder barn med utbildad hälsovårdspersonal, fler kvinnor går på mödrahälsovårdsbesök, fler kvinnor använder preventivmedel, och antalet tonårsgraviditeter har minskat. Dock pekar studien på en viktig aspekt, nämligen att kvinnor bosatta i mer avlägsna områden tenderar att i mindre utsträckning använda preventivmedel, gå på rekommenderade mödrahälsovårdsbesök samt föda barn med utbildad hälsovårdspersonal. Detta är något man funnit i flertalet studier – att sjukvården i Nepal är ojämlik, vilket särskilt drabbar de utbildade, fattiga och de som bor i avlägsna områden.

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