BMIS 2010 Thematic Analyses Series

Health, Nutrition, Water, Sanitation & Hygiene

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Foreword

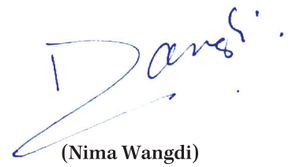
The Health Thematic Analysis Report is the outcome of partnership between the Ministry of Health, Royal Government of Bhutan (RGoB), UNICEF and UNFPA Bhutan Country Offices. The report presents an in-depth analysis of data on health, nutrition, water, sanitation and hygiene, collected in the BMIS which was carried out by the National Statistics Bureau (NSB) in 2010 with financial and technical support from UNICEF. The survey's main objective was to provide up-to-date information on the situation of children and women in Bhutan.

The BMIS 2010 Health Thematic Analysis (HTA) takes stock of the nation's overall health status, using universal indicators such as nutrition, child health, child mortality, reproductive health, maternal mortality, HIV and AIDS, water, sanitation and hygiene. These critical parameters were analysed with the purpose of identifying and highlighting the main problems affecting the health and wellbeing of the population, particularly women and children, and the causes thereof. Also to highlight inequities in the coverage, access and utilization of services, morbidity and mortality among the different demographic and socio-economic groups, those mostly affected and reasons for their vulnerability.

The report shows that considerable progress has been made in improving the health and nutrition of children, reducing under-five morbidity and mortality, improving maternal health and reducing maternal mortality, reducing transmission of HIV, improving drinking water supply, sanitation facilities and hygiene practices over the past twenty years but also highlights the need for renewed vigilance, better coordinated efforts, acceleration of interventions and provides policy recommendations for addressing the main issues highlighted including inequities, in order to sustain the significant gains made and to realize further improvements in the health and wellbeing of women and children.

The recommendations would not only strengthen primary health care services in Bhutan but also help keep Bhutan on track to achieving the related MDGs by 2015.

We believe that this report will be useful for all stakeholders including policy makers, development partners, programme officials, dzongkhag health managers and researchers.



(Nima Wangdi)
Secretary
Ministry of Health
Royal Government of Bhutan

List of abbreviations

AHB	Annual Health Bulletin
AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
APSSC	Asia - Pacific Shared Services Centre, a division of UNICEF
ARI	Acute Respiratory Infection
BHU	Basic Health Unit
BLSS	Bhutan Living Standard Survey
BMIS	Bhutan Multiple Indicator Survey
CDD	Control of Diarrhoeal Diseases
CPR	Contraceptive Prevalence Rate
DD	Diarrhoeal Diseases
DHS	Demographic and Health Survey
ECD	Early Childhood Development
ECDI	Early Childhood Development Index
EPI	Expanded Programme on Immunization
FBH	Full Birth History
FYP	Five Year Plan
GDP	Gross Domestic Product
GNH	Gross National Happiness
HCT	HIV counselling and testing
HIV	Human Immunodeficiency Virus
HTA	Health Thematic Analysis
ICD-10	International Classification of Diseases and Related Health Problems, 10th Revision, 1992
IMNCI	Integrated Management of Neonatal and Childhood Illnesses
IMR	Infant Mortality Rate
IUD	Intra-Uterine Device
IYCF	Infant and Young Child Feeding
JMP	Joint Monitoring Programme
LAM	Lactational Amenorrhea Method
LTR	Lifetime Risk of Maternal Death
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Surveys
MIS	Management Information System
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
MSM	Men who have sex with men
MSTF	Multi-Sectoral Task Force
MTCT	Mother-to-Child Transmission
NACP	National HIV and AIDS & Sexually Transmitted Infections Control Programme
NFE	Non-formal Education
NHS	National Health Surveys
NMR	Neonatal Mortality Rate
ORT	Oral Rehydration Therapy
ORS	Oral Rehydration Salts
PHCB	Population and Housing Census of Bhutan
PHED	Public Health Engineering Division
PLHIV	People Living with HIV
PMTCT	Prevention of Mother to Child Transmission
PNC	Postnatal Care
RGoB	Royal Government of Bhutan
RH	Reproductive Health
RTI	Reproductive Tract Infections
RWSS	Rural Water Supply and Sanitation
SBH	Summary Birth History
SEDI	Socio-Economic and Demographic Indicators
SNV	Netherlands Development Organization
STI	Sexually Transmitted Infections
TAG	Technical Advisory Group
TFR	Total Fertility Rate
U5MR	Under-five Mortality Rate
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
IGME	Inter-agency Group for Child Mortality Estimation
VHW	Village Health Worker
WHO	World Health Organization

Executive summary

This report is the result of an analysis of data collected in the 2010 Bhutan Multiple Indicator Survey (BMIS), carried out by the National Statistics Bureau (NSB). To provide estimates at the national and the dzongkhag level, data from 15,400 households were sampled in both urban and rural areas. Data were collected on universal health indicators such as nutrition, child health, child mortality, reproductive health, maternal mortality, HIV and AIDS, and water and sanitation.

In recent decades, Bhutan has made considerable progress regarding health indicators. Below are some examples where Bhutan has realised good achievements:

- Infant mortality rate and under-five mortality rate have both been reduced by 50 per cent between 1990 and 2010. Millennium Development Goal 4 calls for a reduction by two thirds by 2015. Trend-analysis indicates that Bhutan will manage to reach this target.
- Maternal mortality has declined by 79 per cent between 1990 and the period 2006-2010 from an estimated 900 per 100,000 women to 146 per 100,000 women, an achievement that makes Bhutan a world leader in reducing Maternal Mortality Ratio and early achievement of Millennium Development Goal 5.
- Bhutan has made tremendous progress in supplying safe drinking water to its population. The proportion of the Bhutanese without access to safe drinking water declined from 55 per cent in 1990 to only 4 per cent in 2010.
- Improved water and sanitation facilities, infant and young child feeding practices, and hygienic practices have brought about a significant decrease of 39 per cent in the incidence of diarrhoea among children under the age of five between 2005 and 2010.

However, public health challenges remain. Some of the more urgent issues affecting Bhutan are noted below:

- Malnutrition occurs in a considerable proportion of the children in Bhutan. Especially the high prevalence of stunting (low height for age) is a reason for concern. Its prevalence increases from the time of birth to the age of two years, when it reaches 36 per cent. Stunting is associated with poverty, inadequate knowledge on maternal health and nutrition, food insecurity, and insufficient antenatal care.
- Diarrhoea and acute respiratory Infections (ARI) continue to affect many children in Bhutan. Diarrhoea occurs in 25 per cent, and ARI in at least seven per cent. Both causes are also responsible for a considerable portion of the under-five mortality. Although, ARI is caused by virus and bacteria, it is aggravated by air pollution due to indoor use of solid fuel. 56 per cent of the rural population lives in households that use solid fuel for cooking.
- The percentage of women giving birth in an institution, receiving skilled birth assistance and postnatal care is above 60 per cent, but differs strongly among demographic groups. These health services are essential for successful delivery, reducing infant mortality, and assuring a normal physical development of the baby. Therefore, it is imperative to increase this percentage, as well as to improve the quality of antenatal and postnatal care. Antenatal care appears to be a key factor for pregnant women to avail of the other health services mentioned.
- The use of contraceptives in Bhutan is low, particularly among young, unmarried women. This is a serious reason for concern as it impedes efforts to combat the spread of HIV and AIDS and to reduce the number of adolescent pregnancies.

In addition, as the health system progresses in Bhutan, data indicate large inequities in health outcomes across different demographic groups. Substantial disparities exist between the urban and rural populations, the wealthy and the poor, and those with secondary level education and those who have no formal education. Women from rural areas, from the poorest households, and those with no formal education invariably fare considerably worse than their urban, wealthy and well-educated counterparts. For

example, rural children are twice as likely to die before the age of five as urban children. A child born in the poorest households is nearly three times as likely to die by the age of five as a child from the wealthiest households. A child whose mother has no education is two and a half times as likely to die before the age of five as a child whose mother has secondary level education.

Poverty alleviation and education clearly emerge as the two key mechanisms through which Bhutan can improve health outcomes and mitigate healthcare inequities. An individual's health involves issues that encompass every Ministry of Health section and programme. A concerted effort is required to allocate resources and design programmes that recognize this inter-relationship. An 11th FYP that integrates a synergistic approach to healthcare with special focus on reaching the most marginalised and vulnerable segments of society will facilitate the most rapid and equitable improvements in healthcare for the Bhutanese people.

The demographic profile

In 2005 the total population of Bhutan was 634,982 people and the median age of the Bhutanese population was 22 years, which increased to 24 years in 2010 (BMIS 2010). The population growth rate decreased from 3.1 per cent per annum in the 1990s to 1.8 per cent in 2005-2010[1]. The Total Fertility Rate (TFR) decreased from over six children per woman during the 1980s to 2.6 in 2010. The TFR in Bhutan is nearing the replacement level but the population is expected to keep increasing for a few decades because of population growth momentum.

Nutrition

Poor nutrition has serious consequences for the development of a child, such as slow physical and mental growth, low academic performance, and high morbidity and mortality rates. Malnutrition is monitored by three indicators: the percentage of children who are underweight (low weight for age), stunted (low height for age), and wasted (low weight for height). Of children under the age of five, 13 per cent are underweight, 34 per cent are stunted, and 6 per cent are wasted. Alarmingly, children's nutritional status typically declines from six months after their birth and persists until the age of two to three years. This calls for extra attention for these age groups.

Poverty, illiteracy, inadequate knowledge on maternal health and nutrition, food insecurity, and insufficient antenatal care are all associated with poor nutritional status of children under the age of five. Food insecurity affects one in ten Bhutanese households for almost 25 per cent of the year. This figure should raise concern, especially as it is related to higher incidence of malnutrition among children. Better education for women, in particular health-related, should be a priority for health policy makers, as well as improving antenatal and postnatal care for the most affected groups. This should include stressing the need for exclusive breastfeeding under the age of six months, proper complementary feeding after six months, as well as proper sanitation and hygiene. Addressing these areas at a policy making level will require collaboration amongst concerned sectors, including agriculture, economics, public health, education, media, and medical services.

Child health

Acute Respiratory Infections (ARI) and diarrhoea cause nearly half of all under-five deaths[2] and considerable morbidity. Reducing the prevalence of ARI and diarrhoea is essential if Bhutan is to achieve Millennium Development Goal (MDG) 4, which calls for a reduction by two thirds of the under-five mortality rate by 2015, as compared with the 1990 baseline.

Acute Respiratory Infection is aggravated by indoor air pollution caused by high use of solid fuels for heating and cooking in Bhutanese homes. This predominantly affects children from rural areas, the poorest households, and those whose parents or caretakers are not literate. This can only be addressed by improving the quality of rural households' energy sources or introducing improved systems for smoke-free combustion. Regarding treatment of ARI in children, more attention is required for older children (48-59 months) who suffer higher rates of pneumonia than younger children.

Diarrhoea affects 25 per cent of children under-five years of age, with the highest incidence among the youngest children. More than one out of three children younger than 6 months of age with diarrhoea do not receive proper treatment. Improving community level health education for the poorest women and those who are not literate needs to be an immediate focus.

Child mortality

Child mortality is a key indicator of the overall socio-economic development of a country. Bhutan is committed to reaching MDG 4, which calls for reducing the under-five mortality rate (U5MR) by two thirds between 1990 and 2015. Acknowledging the challenges of obtaining reliable data on child mortality or its trend analysis of the BMIS 2010 data indicated that Bhutan's U5MR in 2006 stood at 69 deaths per 1,000 live births.

The Inter-agency Group on Child Mortality (IGME) combines surveys, censuses, and other data sources to produce cross-country comparable estimates. According to the IGME, Bhutan has reduced its U5MR by nearly 60 per cent from 139 to 56 between 1990 and 2010. This is the positive effect of Bhutan's achievements over the past two decades, which include an improvement in household incomes and living conditions, better child and maternal nutrition, and greater access to healthcare and education. Extrapolation of this trend indicates that Bhutan will manage to reach the target of MDG 4 for 2015.

However, in comparison with selected neighbouring countries, Bhutan does not perform well, given that only India and Myanmar have higher under-five mortality rates. Furthermore, strong disparities between demographic groups remain. Besides ARI and diarrhoea, lack of natal care is the main cause of under-five mortality, which can be addressed by programmes that strengthen antenatal and postnatal healthcare.

Reproductive health

With respect to reproductive health, Bhutan has made notable progress. With regard to family planning, it appears that most Bhutanese women do not want large families. Though 84 per cent of the women who gave birth in the two years preceding the survey stated that the pregnancy was wanted, most married women (74 per cent) want to limit childbearing after having a second child. This indicates that sustainable population growth is supported by most women's stated preferences. Contraceptives are mainly used as a means for family planning, evidenced by the fact that the contraceptive use increases dramatically after women have had one or two children.

In 2010, 97 per cent of pregnant women received at least one antenatal care visit compared with 51 per cent in 2000. The percentage of women receiving the recommended four or more visits was 77 per cent. However, this figure varies considerably among demographic groups.

Giving birth in a health institution, receiving skilled birth assistance and postnatal care are considered critical for reducing both maternal and newborn mortality. While the Royal Government of Bhutan strives for 100 per cent institutional delivery, the actual figure is only 63 per cent. The percentage of women who receive skilled birth assistance and postnatal care is similar (65 per cent and 61 per cent, respectively). Giving birth in a health facility is no guarantee for skilled postnatal care, however. Among institutional deliveries, skilled postnatal care was given too late (after two days) in 44 per cent of cases, and not at all in seven per cent of cases. This situation requires further attention from the Ministry of Health.

The main finding here is that there are significant differences in accessing reproductive health services between demographic groups. Rural women, those from the poorest households, and the non-literate are much less likely to receive antenatal and postnatal services than urban women, those from wealthier households, and those with secondary level education. Among women who do not receive any antenatal care, the difference in the percentage of women having institutional delivery, skilled birth assistance and postnatal care between these groups of women is at least 40 percentage points for each of these services.

The single most efficient measure that can be taken, in this respect is to improve coverage and quality of antenatal care for the rural, poor, and non-literate women. Antenatal care is a critical entry point for women, as it ensures a better healthcare utilization during and after childbirth. The data show that when these groups receive four or more antenatal visits, the disparities in the uptake of institutional delivery, skilled birth assistance, and postnatal care are reduced. Policy makers should make further efforts to ensure that rural, poor, and non-literate women receive the recommended number of quality antenatal care visits.

Maternal mortality

BMIS 2010 estimates suggests that maternal mortality ratio (MMR) in Bhutan was 146 deaths per 100,000 women for the period 2006-2010, which is close to the MDG 5 target of 140 for 2015. Assuming a continuous rate of logarithmic decline,

[1] Population Projections Bhutan 2005-2030, National Statistics Bureau, 2007, p10

[2] Child Epidemiology Reference Group, WHO 2006.

the analysis forecasts a decrease in MMR to 105 deaths per 100,000 live births for the period 2011-2015. Furthermore, a recent report by WHO, UNICEF, UNFPA, and the World Bank[3] notes that Bhutan, having reduced its MMR by an estimated rate of 8.6 per cent per year between 1990 and 2008, has the fourth most rapid decline in maternal mortality out of a sample of 172 countries.

Maternal mortality is likely to be highest among women with inadequate reproductive healthcare. These are generally women from the poorest households, rural areas, and without formal education. Further reductions in maternal mortality will be most effectively realised by improving reproductive health care for these groups, in particular by guaranteeing the recommended level of antenatal care, institutional delivery, skilled birth assistance, skilled postnatal care, access to improved water and sanitation facilities, improved hygiene practices and proper nutrition for the mother and child[4]. Also of importance is improving education, including non-formal education and ensuring that health issues are addressed through the latter.

HIV and AIDS

There are 270 reported cases of HIV and AIDS in Bhutan, including 22 children. However, UNAIDS estimates the total number to be much larger, at 1000 infected individuals. Since 1982, the Royal Government of Bhutan has given high priority to combating the spread of HIV.

This analysis explores the relationship between knowledge required to prevent transmission of HIV and other demographic characteristics. The data reveal that more than four out of five women aged 15-49 have heard of HIV. However, only 51 per cent know the two main ways to prevent HIV transmission while 18 per cent have comprehensive knowledge of HIV transmission. A large majority of women (80 per cent) is aware of the possibility of mother-to-child transmission. The knowledge of how to prevent this varies with age, with women between the age of 25 and 29 having the best understanding of mother-to-child transmission (60 per cent). Slightly more than half of the women (55 per cent) know where to get tested for HIV and 26 per cent have been tested.

Education and wealth affect knowledge of HIV transmission. Comprehensive knowledge of HIV is three times greater among literate women than among non-literate women, and five times greater among women from the richest households than among women from the poorest households. Still, no single group has more than 35 per cent comprehensive knowledge. Among female youth between 15 and 18 years of age HIV knowledge is positively correlated with school participation. Education, knowledge of HIV transmission, school attendance and having been tested for HIV all positively influence the acceptance of people living with HIV.

In general, knowledge of HIV transmission among Bhutanese women doesn't seem to affect the use of contraceptives, though it is related to a shift towards the use of condoms in a small proportion of women. A serious concern for policy makers should be the fact that only 26 per cent of sexually active, unmarried women use contraceptives, and only one out of six in this group use condoms. Schoolgirls and boys can be targeted through comprehensive school health programmes and young uneducated women and youth out-of-school can be targeted through NFE programmes in collaboration with Ministry of Education.

Water, sanitation and hygiene

Access to safe drinking water is a key factor in healthcare, especially in relation to the incidence of diarrhoea among children. The proportion of the population with access to safe drinking water has increased between 1990 and 2010 from 45 per cent to 96 per cent.[5] The data clearly show that children living in homes with an improved water source are about 30 per cent less likely to have diarrhoea than children living in households with unimproved water sources. Appropriate treatment of water from unimproved sources has a similarly positive effect.

However, access to a safe water source doesn't guarantee safe water consumption, as water is often contaminated during transportation and storage. Households with an on-premises water source show a lower incidence of diarrhoea than those of households with off-premises sources. This indicates that continued efforts to provide a piped water supply to households will contribute to a reduction in the incidence of diarrhoeal and other water-related illnesses. Further, the data suggest that off-premises water sources closer to home (within 30 minutes walking distance) are more susceptible to contamination from human sources than sources further from home, as they are associated with a higher incidence of diarrhoea among children.

Unsafe disposal of child faeces increases the risk of diarrhoeal disease for children under-three by 30 per cent. Regarding access to improved sanitation facilities, Bhutan's progress is considered insufficient by JMP standards, which excludes pit latrines without slabs and shared toilets. However, the data show no significant difference in incidence of diarrhoea among children under the age of five between improved sanitation facilities, unimproved sanitation facilities and open defecation, indicating that improved sanitation facilities alone cannot reduce diarrhoeal incidence.

Though the use of soap is considered critical for the prevention of diarrhoea, it's presence in the household alone has no measurable effect. The data show a reduction in the incidence of diarrhoea only when both soap and water are available in the house. This again underlines the importance of providing piped water to households, and promoting proper hygiene practices.

[3] WHO, UNICEF, UNFPA, The World Bank (2010). Trends in Maternal Mortality: 1990 to 2008.

[4] WHO, UNICEF, UNFPA, The World Bank (2010). Trends in Maternal Mortality: 1990 to 2008.

[5] Administrative data, Ministry of Health

1. Introduction

Bhutan has a relatively young population with a median age of 24 years (BMIS 2010). This indicates that half of the population was 24 years or younger in 2010. Because such a large proportion of the population has yet to enter prime childbearing years, these data imply that the population of Bhutan will experience a natural increase for decades to come. This increase will occur despite a decrease in the population growth rate from 3.1 per cent per annum in the 1990s to 1.8 per cent in 2005-2010, and a decrease in the Total Fertility Rate (TFR) from over six children per woman in the 1980s to 2.6 in 2010. Due to improved healthcare services, not only has Bhutan's life expectancy increased from 47.5 years in 1984 to 66.3 years in 2005 but the Infant Mortality Rate (IMR) also shows a significant decrease from 102 deaths per 1000 live-births in 1984 to 47 per 1000 live-births in 2010.

The main objective of the Ministry of Health in the 10th Five Year Plan (FYP) is to achieve the Millennium Development Goals (MDGs). A critical factor for measuring progress is the collection of reliable data for important indicators such as infant mortality, maternal mortality and contraceptive prevalence. However, even when data exist, there remains an insufficient level of analysis required to link and coordinate various programmes to work together towards common goals. Poverty coupled with polluted and unhygienic living conditions, lack of safe drinking water and sanitation, improper nutrition, lack of essential health services, and an alarming lack of awareness about the availability of simple, safe and relatively inexpensive interventions such as immunization, nutrition reproductive health, safe drinking water and sanitation and proper hygiene practices are a few of the key challenges that people face. For this reason, interventions require programmes to work convergently to address people's multiple health vulnerabilities.

Reducing hunger by half between 1990 and 2015 is the United Nations Millennium Development Goal **(MDG) 1**. The Nutrition Programme focuses on particularly vulnerable populations; under-five children and pregnant and lactating women. For infants under the age of six months, exclusive breastfeeding provides proper nutrition. After the age of six months, appropriate, hygienically prepared complementary food needs to be introduced in adequate amounts and at appropriate intervals. The issues of obesity and chronic diseases that result from excessive or improper dietary habits is emerging as a problem in children and will have a larger role in the future as the country becomes wealthier. Currently, however, malnutrition from inadequate intake of food continues to be predominantly significant. According to BMIS 2010, 13 per cent of children under the age of five are underweight, 34 per cent are stunted, and 5.9 per cent are wasted. Nutrition support initiatives that aim to reach these children require more attention.

MDG 4 calls for a reduction by two thirds of the under-five mortality rate by 2015, compared with the 1990 baseline. Acute Respiratory Infections (ARI) and diarrhoea are the two leading causes of mortality in children worldwide.[6] Since 2009, the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) strategic approach has been implemented in a coordinated and planned manner to address main childhood illnesses. While Bhutan is currently on-track to achieving MDG 4, vigilance is still required, particularly with regard to neonatal mortality rate (NMR),

[6] Pneumonia: The Forgotten Killer of Children, UNICEF and WHO 2006

defined as death in the first 28 days of life, which currently constitutes the major proportion of infant mortality.

Bhutan is committed to achieving **MDG 5**, which aims for three-fourths reduction in maternal mortality by the year 2015 from the 1990 baseline. Despite remarkable progress, maternal mortality still remains high in Bhutan. The National Reproductive Health Strategy, which will be implemented from 2012 to 2017, focuses on maternal and newborn care, family planning, prevention of unsafe abortion, prevention of reproductive tract infections (RTI) and sexually transmitted infection (STI) including HIV, cervical cancer and gynaecological issues, adolescent sexual reproductive health, and sexual and reproductive needs of men.

MDG 6 aims to have halted and begun to reverse the spread of HIV and AIDS by 2015. The Ministry of Health established the National HIV and AIDS & Sexually Transmitted Infections Control Programme (NACP) in 1988 to prevent and control the spread of HIV and AIDS and STIs in Bhutan. Since then, the RGoB has accorded highest priority to combating this epidemic. 90 per cent of HIV cases are believed to occur through heterosexual sex. Hence, significant reduction in HIV will occur only if unprotected sex among this population is prevented. UNAIDS estimated that Bhutan had at least 1,000 cases of HIV by the end of 2010. However, as of 2012, only 270 cases have been reported, yielding a prevalence rate of 0.03 per cent. The finding from the HIV and AIDS General Population Survey conducted by MOH, Bhutan, in 2006, indicates that 19.2 per cent of both males and females, engaged in extramarital sex in the year preceding the survey. The Behaviour Surveillance Survey (BSS-2008) reports that 83.8 per cent of individuals used condoms in the preceding year, during the last sexual experience. However, in contrast to the high rate of condom use reported during the last sexual encounter, consistent condom use was found to be much lower. Condom use with one's spouse or regular sex partner(s) was only 22 per cent. Knowledge of PMTCT is not universal among the at-risk groups (girls and women working in *drayings*[7], and sex workers).

MDG 7 aims to halve the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015. According to the BMIS 2010, 96.1 per cent of the surveyed population had access to improved drinking water sources and only 58.4 per cent of the overall surveyed population lived in households with access to improved sanitation facilities. The long-term objective of the Rural Water and Sanitation Supply (RWSS) programme is to improve the health of the rural population by reducing the incidence of water borne and related diseases. This can be done effectively through ensuring the provision of safe drinking water and promoting improved sanitation facilities and practices. Specifically, the programme aims to provide access to safe drinking water to the whole population, to promote improved sanitary latrines and ensure their proper use, and finally, to ensure that more than 90 per cent of the rural water schemes are functioning with regular water quality monitoring systems.

Box 1. Background of the BMIS 2010

The Bhutan Multiple Indicator Survey (BMIS) was conducted by the National Statistics Bureau (NSB) between March and August 2010. The survey's main objective was to provide up-to-date information on the situation of children and women in Bhutan. The sample for the BMIS was designed to provide estimates at the national level, urban and rural areas, and the *dzongkhag* level. The sample design followed a two-stage cluster approach with a total sample size of 15,400 households. The BMIS was conducted with the technical support of UNICEF and UNFPA. To download the full BMIS report including datasets and to find out more about the survey methodology please visit: http://www.childinfo.org/mics4_surveys.html

According to the 2011 Annual Health Bulletin (AHB), the most common diseases among the total population include pneumonia, the common cold, diarrhoea and skin infections. The AHB cites diarrhoeal incidence for children under the age of five as 24 per cent for the year 2010. The BMIS confirms diarrhoeal incidence to be 25 per cent for the same year. BMIS 2010 data assesses the extent to which various populations have access to improved drinking water sources, improved sanitation facilities, and the means with which to practice proper hygiene. This report correlates these data with those related to diarrhoeal incidence. These findings enable the RWSS programme staff and the Royal Government planners to design the right set of interventions that are directed towards communities most in need, in order to meet programme objectives and improve the health and well-being of all people in Bhutan.

[7] Drayang is a legal entertainment establishment or bar where alcohol is sold and where adolescent females are known to dance and sing karaoke. *Drayangs* have strong association with transactional sex and are therefore identified as risky settings for young people, particularly adolescent females.

The BMIS Health Thematic Analysis (HTA) provides reliable data on important indicators required for programmes to conduct trend analyses and set realistic targets for the future. It also helps address programmatic data gaps and interventions that should scale up to achieve international performance indicators such as the MDGs. Trend analysis, addressing data gaps and scaling up interventions will take a concerted effort involving several ministries. The rewards of success are multiple and far-reaching, including improvements in the nutritional status of children, a reduction in under-five morbidity and mortality, improvements in maternal health and a reduction in maternal mortality, reduction in mother-to-child transmission of HIV, and improved drinking water supply and sanitation facilities.

2. Methodology

This report is the product of a partnership between the Royal Government of Bhutan, UNICEF Bhutan, and the National Statistics Bureau. More specifically, it is the output of the Ministry of Health with support from the UNICEF Bhutan Health Section and two international consultants.

2.1. Working group

This report is the output of a working group, convened and led by the Ministry of Health. The working group met regularly to determine the scope of analysis, interpret data, and write the report.

2.2. Statistical analysis

Consultations between working group members and the international consultant determined the scope of this report, which set a parameter to limit analysis to BMIS 2010 data. Principal activities included:

- Identification of health-related issues and policies;
- Selection of key indicators for quantitative analysis relevant to public health, covering areas such as nutrition, child and maternal health, reproductive health, HIV, and water and sanitation;
- Exploration of quantitative relationships between indicators and across sectors; and
- Design and writing of the report based on findings.

Statistical analysis was primarily undertaken by two international consultants with the support of the Bhutan National Statistics Bureau. Statistical analysis was largely restricted to standard background variable disaggregation[8] and indicator cross-tabulations.

2.3. Data limitations

This report is based on the BMIS 2010, which is a household survey that focuses primarily on women and children, and indicators related to their well-being. Therefore, the survey does not necessarily collect data on all issues relevant to the health status of people in Bhutan. Furthermore, data was only collected for certain modules relevant to Bhutan. For example, the BMIS did not include the immunization module. An additional constraint is that BMIS data for indicators were only collected for specific age groups. For example, nutritional data exist only for children under the age of 5, which does not allow for analysis of women's nutritional status.

The statistical analysis in this report investigates correlations between outcome indicators associated with well-being and background demographic characteristics as well as correlations between different outcome indicators. Correlation analysis only reveals "associations" or relationships between variables and does not, under any circumstances, imply causality. Further rigorous, original research with primary data will be required to determine causal relationships between independent variables such as demographic characteristics and outcome indicators.

[8] Standard background variable categories include: age group, sex, area of residence (urban/rural), *dzongkhag*, educational attainment, wealth quintile, and marital status.

2.4. Technical notes

The following apply to the entire data analysis in this report:

Data in brackets indicate that the percentage is based on only 25-49 unweighted cases[9] in the sample.

A***n asterisk (*) indicates*** that the percentage is calculated on fewer than 25 unweighted cases.

Statistical significance refers to the 95 per cent significance level unless otherwise stated. Statistical significance means that, on average, the true means of the two groups being compared will be different in 95 per cent of the samples. It refers to whether the critical value of the t-test of independent samples is greater than 1.96 and the p-value is less than 0.05. The p-value represents the probability of observing a difference equal to or greater than the observed difference given that the null hypothesis that the difference is zero is true.

In statistics, ***practical significance*** can be tested by evaluating the effect-size of an observed difference. In this report, practical significance refers only to a qualitative assessment of whether the observed difference has a meaningful policy or programming impact.

Data is disaggregated by the demographic characteristics of sex; dzongkhag; residence; age; education; and wealth.

[9] The number of unweighted cases in the sample is the actual number of observations for which there are data. Estimates presented in this report weight observations in order to adjust for over- or under-representation of any particular group and to produce population-wide representative estimates.

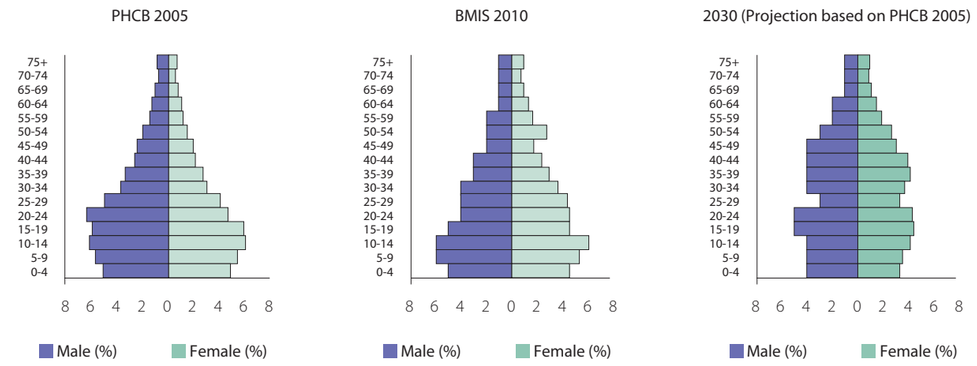
3. The demographic profile

3.1. General demography

In 2005, Bhutan conducted its first ever Population and Housing Census of Bhutan (PHCB 2005) and in 2010, the Bhutan Multiple Indicators Survey (BMIS 2010) was conducted. According to PHCB 2005, the total population of Bhutan was 634,982 people in 2005, and the median age of the Bhutanese population was 22 years. According to BMIS 2010, the median age of the Bhutanese population was 24 years in 2010. Because such a large proportion of the population has yet to enter prime childbearing years, the population of Bhutan will experience a natural increase for decades to come. This increase is predicted despite a decrease in the population growth rate from 3.1 per cent per annum in the 1990s to 1.8 per cent in 2005-2010 and a decrease in the total fertility rate (TFR) from over six children per woman during 1980s to 2.6 in 2010. Both PHCB 2005 and BMIS 2010 estimate an average household size of 4.6 in Bhutan. The Infant Mortality Rate (IMR) in Bhutan has decreased from 102 deaths per 1000 live-births in 1984 to 40.1 per 1000 live-births in 2005 and life expectancy has increased from 47.5 years in 1984 to 66.3 years in 2005. As Bhutan continues to move through this phase of demographic transition in which child and adult mortality decrease and life expectancy increases, the country's natural population growth will continue.

Figure 1 illustrates the population structure of Bhutan over time. These figures are referred to as population

Figure 1. Population pyramids for 2005, 2010 and 2030 (projection based on PHCB 2005)



pyramids and use data from PHCB 2005 and BMIS 2010. However, for 2030 the population pyramid uses projections developed by the NSB. The 2005 and 2010 pyramids look similar except that in BMIS 2010, a disproportionally large number of women were reported to be aged 50, and a disproportionally large number of girls were reported to be 14. This unexpected age pattern for these two groups could be caused by age heaping, a phenomenon in which some survey enumerators may have tried to avoid conducting interviews with all women by recording the age of a woman outside of the eligible age range of 15-49 years.

Otherwise, both the 2005 and 2010 pyramids depict a wide base, indicating that a significant proportion of the population comprises children and youth. It also implies that in the coming years, when a large proportion of population will be of working age (15-64), Bhutan will reap the benefits of the demographic dividend. While this period has tremendous potential for economic and social progress, it also presents a great challenge.

However, according to NSB projections, by 2030, the base of the pyramid will become narrower while the upper end will widen. This shift indicates that the proportion of young people will decrease but that of the aging population will increase. In 2005, about 56 per cent of the population was 24 years or younger and only 4.7 per cent was aged 65 or older. By 2030, the population aged 65 and older is expected to reach 6.6 per cent. The implication of this shift in the age pyramid for public health is that there will be greater need to invest in geriatric healthcare services.

According to BMIS 2010, as shown in the Annex Table 1.5, 68 per cent of female respondents aged 15-49 years lived in rural areas and 32 per cent in urban areas. The largest segment of individual women respondents (19 per cent) were in the age group of 25-29 years and the smallest segments of individual women respondents were found in the 40-44 age groups (11 per cent) and the 45-49 year-olds (8 per cent). A large portion of the women respondents aged 15-49 were married (71 per cent), while seven per cent were formerly married and 22 per cent were never married. Slightly more than 70 per cent of women aged 15-49 had given birth at least once in their lifetime. In the case of education, 61 per cent of women aged 15-49 had never been to school, while 12 per cent had primary schooling. Remaining 27 per cent had completed their secondary and higher education. In terms of wealth index, it was found that 17 per cent belonged to the poorest, while 24 per cent to the richest quintile.[10]

Table 1. Distribution of children under the age of 18 years, Bhutan, 2010

Age group	Males		Females		Total	
	%	No.	%	No.	%	No.
0-17	38.5	12,847	38.1	12,923	38.3	25,770
18+	61.5	20,528	61.9	21,022	61.7	41,550
Total	100	33,375	100	33,945	100	67,320

Table 2. Sex ratio among children under the age of 5, Bhutan, 2010

Total	No. of boys	No. of girls	Sex ratio
	3,216	3,081	1.04

Table 1 shows that children under the age of 18 constitute a very significant 38 per cent of Bhutan's population. In other words, approximately two of every five people living in Bhutan is a child, which makes this analysis of their health and well-being exceptionally salient for the overall well-being of the Bhutanese society, now and in the future.

Among children under the age of five, 71 per cent lived in rural areas while 29 per cent resided in urban areas, which mirrors the general urban-rural population distribution. In terms of the wealth index status of the household, children under the age of five are spread quite evenly across all quintiles with 20.6 per cent living in the poorest quintile, indicating that children under the age of five are no more likely to live in poverty than the general population.

Further, the survey reveals that about 79 per cent of children aged 0-17 years in Bhutan live with their parents, while 11 per cent live with their mother only, and two per cent live with their father only. Almost one in 13 children (seven per cent) lives with neither parent and five per cent of the children have at least one parent who has died. The proportion of children not living with a biological parent is higher among girls (nine per cent) compared with boys (six per cent), and increases significantly with the age of the child and with household wealth. It is also significantly higher in urban areas (10 per cent) as compared with rural areas (six per cent). In contrast, the rate of children having one or both parent(s) dead is higher in rural areas and decreases with household wealth.

[10] In BMIS, the households were divided into five equal groups, from "poorest" (Quintile 1) to "richest" (Quintile 5) using principal components analysis to calculate "weights". Each variable among a set of variables that are thought to indicate wealth status are weighted and then compiled into a wealth score, which is assigned to each household. Households are then ranked into five quintiles, from richest to poorest.

The BMIS 2010 interviewed 14,018 women aged 15-49 years on their fertility, fertility preferences, desire for the last birth, contraception, unmet needs, antenatal care, assistance at delivery, their knowledge of HIV and AIDS, and on maternal mortality.

The sample size of children 0 – 1 months in the BMIS 2010 was rather insufficient to determine the sex ratio at birth. However, Table 2 shows that the sex ratio for children under the age of five is 1.04.

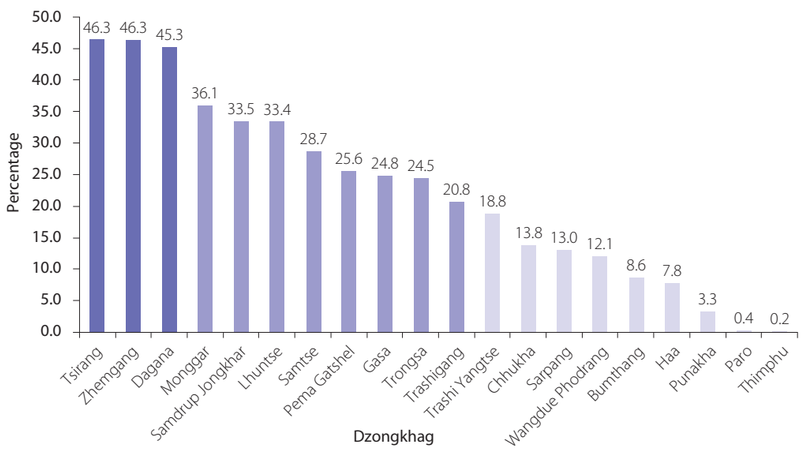
A critical issue facing policy-makers in Bhutan is the substantial disparity between demographic groups across many outcome indicators. In many cases, inequalities in health and education outcomes are very high. As stated earlier, inequality poses a serious threat to Bhutan's aspirations as articulated by the tenets of Gross National Happiness.

The level of inequality for health indicators reflects the overall, increasing level of material inequality in Bhutan. Table 3 shows that the distribution of wealth varies widely between dzongkhags, and between urban and rural areas. There is a tremendous chasm in poverty rates between urban and rural areas in Bhutan. Whereas 28 per cent of the rural population live in the poorest quintile, this is true for less than one per cent of urban residents.

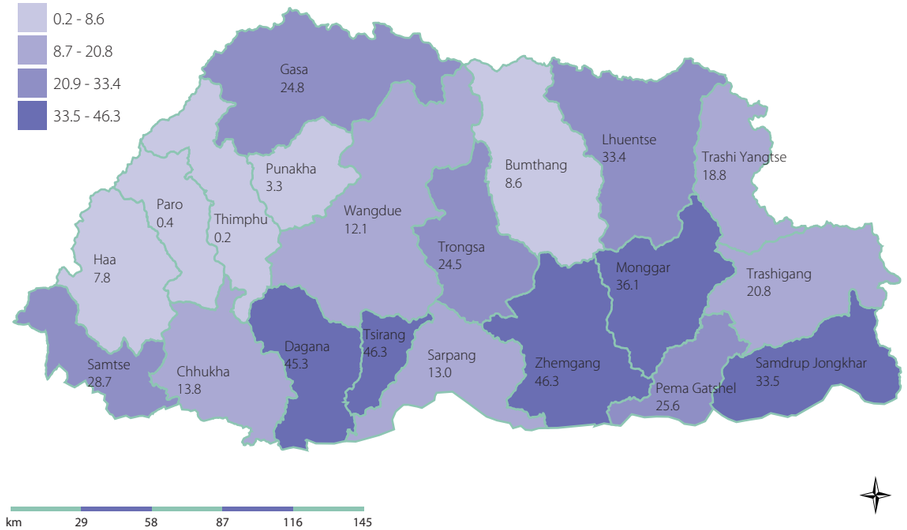
Table 3. Per cent distribution of population by wealth quintiles, Bhutan, 2010

		Wealth index quintiles					Total	Number of individuals
		Poorest (%)	Second (%)	Middle (%)	Fourth (%)	Richest (%)		
Sex	Male	20.2	20.1	20.1	20.1	19.5	100	33,375
	Female	19.8	19.9	19.9	19.9	20.5	100	33,944
Dzongkhag	Bumthang	8.6	25.6	30.6	18.1	17.1	100	1,605
	Chhukha	13.8	16.1	15.6	23.9	30.6	100	6,863
	Dagana	45.3	25.3	14.0	9.9	5.5	100	2,541
	Gasa	24.8	36.1	28.1	7.8	3.2	100	484
	Haa	7.8	10.1	25.9	39.1	17.2	100	1,312
	Lhuntse	33.4	28.0	25.3	9.5	3.7	100	1,564
	Monggar	36.1	28.5	14.7	8.0	12.7	100	4,741
	Paro	0.37	6.7	29.4	37.7	25.9	100	3,776
	Pema Gatshel	25.6	36.8	20.2	9.8	7.6	100	2,627
	Punakha	3.3	15.2	35.0	31.1	15.3	100	2,549
	Samdrup Jongkhar	33.5	18.9	16.7	20.8	10.0	100	3,892
	Samtse	28.7	19.0	17.6	20.6	14.2	100	7,530
	Sarpang	13.0	14.8	20.8	26.9	24.6	100	4,127
	Thimphu	0.16	1.1	11.1	29.3	58.4	100	8,372
	Trashigang	20.8	35.7	31.3	7.9	4.3	100	5,266
	Trashi Yangtse	18.8	40.6	22.1	9.5	9.0	100	1,711
	Trongsa	24.5	29.2	21.8	16.0	8.5	100	1,510
	Tsirang	46.3	28.6	9.4	7.9	7.9	100	2,208
	Wangdue Phodrang	12.1	23.7	31.5	21.8	10.9	100	2,841
	Zhemgang	46.3	23.2	12.8	10.5	7.3	100	1,800
Age group	15-24 years	18.5	19.0	19.8	20.5	22.1	100	12,502
	25-49 years	17.5	17.7	19.0	21.8	23.9	100	21,313
	50-64 years	24.3	26.7	22.8	13.4	12.8	100	7,753
	65+ years	27.7	28.1	22.3	11.8	10.1	100	3,965
Area	Urban	0.3	1.0	10.1	33.4	55.2	100	18,500
	Rural	27.5	27.2	23.8	14.9	6.6	100	48,820
Total		20.0	20.0	20.0	20.0	20.0	100	67,320

Figure 2. **Percentage of the population in the poorest wealth quintile by dzongkhag, Bhutan, 2010**



Map 1. **Share of population in poorest wealth quintile, Bhutan, 2010**



Map 1 shows dzongkhag-level data presented in Table 3. It shows the percentage of the population living in the poorest wealth quintile, illustrating where material poverty as measured by the wealth index is most concentrated.

The stark level of material inequality across dzongkhags can also be seen in Figure 2. If all were equal, 20 per cent of the population in each dzongkhag would live in the poorest wealth quintile. This graph shows that while less than one per cent of people in Paro and Thimphu live in the poorest wealth quintile, more than 40 per cent of people in Tsirang, Dagana, and Zhemgang live in the greatest level of poverty. Poverty is an important factor in the Thematic Analysis

because those from the poorest households and from the rural areas and those with no formal education usually have the worst outcomes.

3.2. Summary of section on demographic profile

The BMIS of 2010 showed that Bhutan has a relatively young population with a median age of 24 years. In 2005, the total population of Bhutan was estimated as 634,982 people and the median age of the Bhutanese population was 22 years. The population growth rate decreased from 3.1 per cent per annum in the 1990s to 1.8 per cent in 2005-2010 and total fertility rate decreased from over six children per woman during 1980s to 3.6 children per woman in 2005 and 2.6 in 2010.

However, the population will keep increasing in the next few decades because of population momentum.

4. Nutrition

4.1. Introduction

Proper nutrition for a population is essential for a healthy, productive, and vibrant society. It is especially important for infants and children as they experience rapid physical and mental development during their early years of life. Improper nutrition during the first five years of life can lead to long-term consequences including increased risk of illness, increased morbidity and mortality and lower academic achievements. It is estimated that up to half of all deaths in children in developing countries is associated with poor nutrition.[11]

The BMIS 2010 collected nutrition-related data with focus on under-five children who are particularly vulnerable. For infants under the age of six months, exclusive breastfeeding provides proper nutrition. After the age of six months, appropriate, hygienic, complementary food needs to be introduced in adequate amounts. Issues of overweight, obesity and chronic diseases that result from excessive eating or improper dietary habits are already of concern and will play a larger role in the future as the population becomes wealthier and older. However, malnutrition from inadequate amounts of food remains a primary public health issue.

The nutritional status of children is monitored by the following three key indicators: the percentage of children who are underweight (low weight for age), stunted (low height for age), and wasted (low weight for height). According to BMIS 2010, 13 per cent of children under-five are underweight, 34 per cent are stunted, and 5.9 per cent are wasted.

Babies who begin life with low birthweights are vulnerable to malnutrition, so the survey takes a close look at them. Bhutan should be proud that 86 per cent of infants with low birthweights achieve normal growth parameters by the age of two. While the continuation of initiatives that support low birthweight babies is important, it is critical not to forget the much larger numbers of healthy weight newborns who become malnourished in their first two years.

Because access to food and use of available food is a prerequisite to good nutrition, the survey also analysed food and nutrition security of households and infant and young child feeding (IYCF) practices. The promotion of exclusive breastfeeding and appropriate complementary feeds needs particular attention.

Improving these nutritional indicators requires a comprehensive, multi-disciplinary, long-term approach. Beyond ensuring that nutritious food is available, education on proper feeding practices, sanitation issues, and adequate healthcare services are all essential components of a plan to improve nutritional status of children and the general population.

MDG 1 strives to reduce hunger by half by 2015. Accomplishing this task will take significant concerted efforts from several ministries. However, the rewards of success are multiple and far-reaching. These include the reduction of under-five morbidity and mortality, and facilitation of children's growth to reach their full physical and mental potential and contribute positively to a productive and vibrant society.

[11] Pelletier, DL.Bulletin of the World Health Organization. 1995; 73(4): 443-8.

Table 4. Percentage of children under 5 who are moderately or severely stunted, distributed by underweight status, Bhutan, 2010

		% of children who are stunted, who are					
		not underweight		moderately to severely underweight		Total	
		% stunted	Total number	% stunted	Total number	% stunted	Total number
Area	Urban	23.5	1,539	70.6	164	28.0	1,702
	Rural	29.4	3,558	79.2	525	35.8	4,083
Age	0-11 months	16.1	1,005	45.5	101	18.8	1,106
	12-23 months	30.4	1,014	79.4	118	35.5	1,133
	24-35 months	30.6	1,068	84.1	157	37.4	1,225
	36-47 months	33.1	1,016	82.9	177	40.5	1,193
	48-59 months	27.6	993	83.4	136	34.3	1,129
Mother's education	None	30.6	3,346	80.7	528	37.4	3,874
	Primary	26.2	642	63.4	78	30.3	720
	Secondary	19.4	1,108	67.6	83	22.7	1,190
Wealth index quintiles	Poorest	33.4	1,007	84.6	184	41.3	1,191
	Second	33.2	884	78.4	153	39.9	1,037
	Middle	32.4	954	76.7	151	38.5	1,105
	Fourth	22.8	1,220	71.5	129	27.5	1,349
	Richest	18.4	1,032	66.8	71	21.5	1,104
Total		**27.6**	**5,096**	**77.2**	**689**	**33.5**	**5,785**

4.2. Nutritional status of children under the age of five

Nutritional health is critical during infancy and early childhood because this is the time when significant neurological and physical development takes place. Underweight, stunting, and wasting in children are the key nutritional indicators used to monitor children's growth, development, and overall health. Underweight (low weight for age), is a composite measure of both acute and chronic malnutrition. The BMIS 2010 reported that 13 per cent of children under the age of five were moderately or severely underweight at the time of the survey.[12] Stunting (low height for age) reflects chronic failure to receive adequate and appropriate nutrition coupled with recurrent or chronic illness. The BMIS 2010 reported that 34 per cent of children under-five were moderately or severely stunted at the time of survey.

Wasting (low weight for height) is an indicator of acute malnutrition. This is caused by acute food shortage and/or recurrent illnesses during which an infant or child fails to gain weight over the short-term, or loses weight. The BMIS 2010 reported that approximately six per cent of children under-five were moderately or severely wasted at the time of survey.

Table 4 shows the correlation between underweight and stunting among children under the age of five. The data show that 28 per cent of children under-five years who are not underweight are stunted compared with a 77 per cent stunting rate for children who are moderately or severely underweight, indicating a very strong positive correlation between underweight and stunting. Indeed, children under the age of five who are underweight have a stunting rate more than twice the national average.

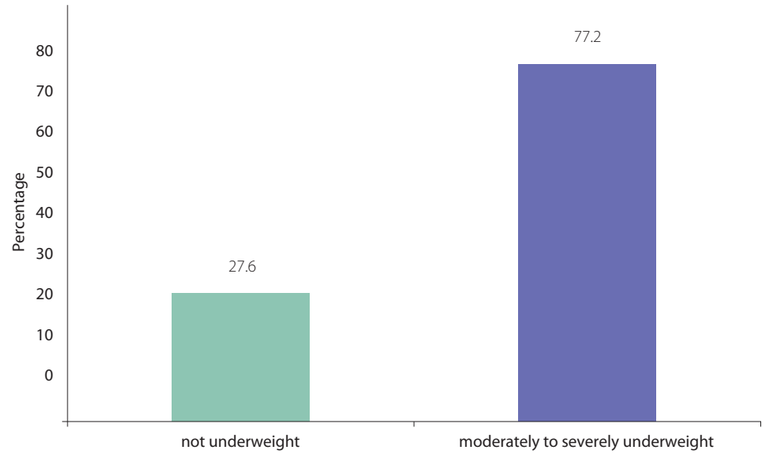
This analysis indicates that the prevalence of stunting in children who are underweight increases substantially with the age of the child and at a much higher rate than in children who are not underweight. Among children who are not underweight, the stunting prevalence of 16 per cent for children aged 0-11 months increases to 28 per cent for children aged 48-59 months (an increase of 12 percentage points). For children who are underweight, the much higher stunting rate of 46 per cent for children aged 0-11 months increases much more rapidly to a remarkable 83 per cent for children aged 48-59 months (an increase of 37 percentage points).

[12] Please see Table NU.1, BMIS 2010 Final Report.

Mother's education level and household wealth further affect the nutritional status of children. 81 per cent of the children whose mothers do not have any education and 85 per cent of the children from the poorest households who are moderately or severely underweight are stunted compared with 68 per cent for underweight children whose mothers have secondary level education and 67 per cent of children from the richest quintile.

Figure 3 illustrates the main finding from Table 4, and shows the very strong correlation between being moderately or severely underweight and stunting prevalence. It shows that children who are underweight are nearly three times as likely to be stunted as their non-underweight counterparts, increasing their vulnerability to the long-term effects of under-nutrition.

Figure 3. Percentage of children under 5 who are moderately or severely stunted, distributed by underweight status, Bhutan, 2010



Prevention of stunting in young children requires prevention of underweight from birth. This implies that policy makers and programme planners must make considerable investments to significantly address the multiple causes of under-nutrition and ensuring food and nutrition security and prevention of illness from the pre-pregnancy period through the first five years of life.

4.3. Weighing at birth and place of delivery, low birthweight and nutritional status of children under the age of two

According to the National Standard of Midwifery Practice for Safe Motherhood (2009), all babies born in health facilities need to be weighed at birth. Weight at birth is a good indicator not only of mother's health and nutritional status but also the newborn's chances for survival, growth, and long-term health and psychosocial development.

This analysis first looks at the percentage of newborns weighed at birth. Table 5 shows that 73 per cent of all children under the age of two born in Bhutan are weighed at birth. There are noteworthy disparities between demographic groups. For example, 94 per cent of children born in urban areas are weighed at birth compared with 64 per cent of rural children. 96 per cent of children whose mothers have secondary level education are weighed at birth compared with 63 per cent of children whose mothers have no education. In other words, urban children and those whose mothers are highly educated are approximately 50 per cent more likely to be weighed at birth than children from rural areas and whose mothers have no education. However, the most significant disparity is by household wealth, in which children from the richest households are more than twice as likely to be weighed at birth as children from the poorest households (97 per cent and 44 per cent, respectively).

These findings can largely be explained by whether a child is born in a health facility or at home. 98 per cent of children who were delivered in a health facility[13] were weighed at birth, which is very close to the stated goal of 100 per cent. This compares with only 28 per cent of the children who were not delivered in a health facility.[14] Map 3 on page

[13] Health facilities include: public and private hospitals and Basic Health Units (BHUs).

[14] 99 per cent of all children not born in a health facility were delivered in a private home. The place of delivery for the remaining children has been categorized as "other".

Table 5. Percentage of children under the age of two who were weighed at birth by whether they were delivered in an institution, Bhutan, 2010

		Not delivered in health facility		Delivered in health facility		Total number of children	
		% of children weighed at birth	Total number of children	% of children weighed at birth	Total number of children	% of children weighed at birth	Total number of children
Area	Urban	40.6	71	100.0	620	93.9	690
	Rural	27.3	803	97.1	875	63.7	1,678
Education	None	26.2	719	97.3	764	62.9	1,484
	Primary	33.7	114	98.7	188	74.1	302
	Secondary +	52.2	40	99.5	542	96.3	582
Wealth index quintiles	Poorest	19.5	315	94.2	156	44.3	471
	Second	30.2	265	95.7	183	56.9	448
	Middle	31.0	169	97.6	306	73.9	475
	Fourth	44.3	104	99.9	414	88.7	518
	Richest	[39.7]	19	99.8	436	97.3	455
Total		**28.4**	**873**	**98.3**	**1,495**	**72.5**	**2,368**

72 shows where the highest percentage of home deliveries takes place. These areas are the rural areas, and the poorer dzongkhags in the southern and eastern parts of the country.

The estimate that 28 per cent of newborns delivered outside a health facility are weighed is likely an overestimate as it is unlikely that they were weighed immediately at birth.[15] For children born in a health facility, the percentage weighed at birth never falls below 94 per cent irrespective of demographic background. However, children from rural areas, the poorest households, and those whose mothers have no education are statistically less likely to be weighed at birth than children from urban areas, the richest households, and whose mothers have secondary level education. This is so because the poorest women are nearly ten times as likely to deliver in a BHU, which may not always have weighing equipment, as larger hospitals do.[16]

The analysis now turns to the issue of low birthweight children. Poor maternal health and nutrition and prematurity are two issues contributing to low birthweight. Newborns with low birthweight require considerable attention and care. They have higher rates of mortality, impaired immune function, increased risk of diseases and are likely to have cognitive disabilities and to remain undernourished throughout their lives. As presented in Table 7 later in the text, newborns with low birthweight also have higher rates of underweight, stunting, and wasting compared with their counterparts born with a healthy weight. However, with proper interventions, most children who are born with low birthweight achieve normal growth parameters within the first two years of life.

It is essential to prevent or at least reduce the numbers of low birthweight babies. This analysis tested the prevalence of low birthweight by whether the mother of the child received the recommended number of antenatal care visits. Table 6 shows that mothers who received four or more antenatal care visits were less likely to give birth to low birthweight babies than mothers who received less than four antenatal care visits (8 per cent and 13 per cent, respectively). This difference of 70 per cent is statistically as well as practically significant. The positive relationship between a higher number of antenatal care visits and reduced likelihood of low birthweight is particularly strong for women in urban areas, with secondary-level education, and from the wealthier households. This finding suggests that these more privileged demographic groups may have additional resources with which to increase the likelihood of their child being born with a healthy weight.

Among women who do receive four or more antenatal care visits, disparities remain among demographic groups

[15] In the BMIS 2010 survey, mothers of children under the age of two were asked whether their child was weighed at birth. Women may have interpreted the meaning of "at birth" to include a time period beyond the one hour period used in the health facility.

[16] BHU deliveries as a percentage of all institutional deliveries by demographic background: Poorest quintile (33 per cent), richest quintile (4 per cent), rural (17 per cent), urban (5 per cent), women with no education (16 per cent), women with secondary level education (6 per cent).

Table 6. Percentage of children under the age of two who are born with low birthweight by mother's antenatal care, Bhutan, 2010

		Antenatal care				Total number of women
		Mothers did not receive antenatal care 4+ times		Mothers received antenatal care 4+ times		
		% of children born underweight	Total number of women	% of children born underweight	Total number of women	
Area	Urban	19.6	85	6.9	608	698
	Rural	10.1	192	8.1	834	1,039
Mother's education	None	13.8	173	9.8	747	930
	Primary	9.6	46	6.0	176	222
	Secondary	13.3	58	5.0	519	585
Wealth index quintiles	Poorest	11.3	45	12.9	155	204
	Second	9.5	57	9.6	187	250
	Middle	11.3	69	9.7	272	344
	Fourth	16.4	72	6.1	389	465
	Richest	[17.6]	33	4.9	438	475
Total		**13.0**	**276**	**7.6**	**1,442**	**1,737**

The cases of 731 women are missing because their child was not weighed at birth or the woman did not know whether the child was weighed at birth of if the child was weighted, his or her weight was unknown

in the percentage of children born with low birthweight. Women from the two poorest wealth quintiles do not show a benefit from a higher number of ANC visits. Those of the poorest quintile who received four or more antenatal care visits are still more than twice more likely to bear children with low birthweight than their counterparts from the richest quintile. Likewise, women with no education who receive antenatal care four or more times are twice as likely to have children with low birthweight as compared with women with secondary level education. In both cases, the disparities are statistically significant. This suggests that these groups lack the resources to improve their level of health and nutrition. It may also be attributed to a lower level antenatal care and or a lower uptake of antenatal care by these groups, as well as less access to health-related information in general.

Even though urban women benefit much more from an increased number of ANC visits, urban women who receive less than four antenatal care visits, are also twice as likely to have low birthweight children than rural women (20 per cent and 10 per cent, respectively), a difference which is statistically significant. This may be because urban women have less access to the resources required to enhance their nutritional status than rural women who can cultivate food for their own consumption, particularly if they are poor.

The analysis now considers the nutritional status of children under the age of two by whether or not they were born with low birthweight. Table 7 shows that underweight, stunting, and wasting are worse for children born with low birthweight than those who were not born with low birthweight. In all cases, the differences are statistically significant. Table 7 shows that 18 per cent of children under the age of two who were born with low birthweight remained underweight at the time of the survey. This estimate of underweight prevalence is twice the level of underweight prevalence in children who were not born with low birthweight (9 per cent). The table also shows that children born with lowbirthweight have a slightly higher rate of stunting during the first two years of life than children not born with low birthweight (31 per cent and 26 per cent, respectively). Likewise, children born with lowbirthweight have a higher prevalence of wasting than children not born with low birthweight (14 and 9 per cent, respectively).[17]

Figure 4 illustrates the main findings from Table 7, showing that children who are born with low birthweight are more likely to have poorer nutritional statuses during their first two years of life than children who are not born with low birthweight.

However, one must consider that the degree of prematurity and severity of the low birthweight will affect

[17] This difference is only statistically significant at the 90 per cent confidence level.

Table 7. Nutritional status of children under the age of two by whether they were born with low birthweight, Bhutan, 2010

		% of children under 2 years who are underweight, stunted, or exhibit wasting, among all children who were weighed at birth and who were:											
		Not born with low birthweight (weighing >= 2500 grams)						Born with low birthweight (weighing < 2500 grams)					
		% under weight	Total	% stunted	Total	% wasted	Total	% under weight	Total	% stunted	Total	% wasted	Total
Sex	Male	9.9	793	28.0	733	10.5	723	22.9	66	41.8	56	11.7	49
	Female	7.8	766	24.5	726	8.0	709	14.5	78	21.9	73	15.7	72
Area	Urban	9.1	626	28.3	570	9.1	564	[26.7]	61	[35.7]	52	[22.0]	47
	Rural	8.7	933	25.0	889	9.3	869	12.2	83	27.0	77	9.0	74
Age in months	0-11	7.5	818	18.7	756	11.8	714	22.5	74	26.7	65	16.0	59
	12-23	10.4	741	34.4	703	6.7	718	14.1	70	34.4	64	12.2	62
Total		**8.9**	**1,559**	**26.3**	**1,459**	**9.2**	**1,432**	**18.4**	**144**	**30.5**	**129**	**14.1**	**121**

how quickly the child will achieve catch-up growth. Figure 5 shows that infants born with low birthweight improve rapidly over their first two years of life. When one considers that 100 per cent of children born with low birthweight were initially below the normal birthweight, it is an achievement that by 0-11 months and 12-23 months the percentage of these children remaining underweight decreased to 22.5 and 14.1 per cent, respectively. This can likely be attributed to premature and low birthweight infants receiving more attention by mothers, caregivers, and healthcare providers. On the contrary, it is cause for concern that of the large numbers of children born with a normal birthweight of 2500 grams or more, 7.5 per cent are underweight by 0-11 months and 10.4 per cent are underweight by 12-23 months.

With regards to stunting, although the difference is not statistically significant, low birthweight children have a higher point estimate of stunting during the first year of life (27 per cent and 19 per cent, respectively). This difference can be accounted for by the fact that infants born with low birthweight due to prematurity or other medical reasons will likely have a shorter length at birth. The gap between the two groups disappears entirely as both converge to a stunting rate of 34 per cent.[18] Of primary concern for policy makers is that the stunting prevalence for all children increases from the time of birth to the age of two. Equally important, stunting increases more rapidly for children who are not born with low birthweight, and is likely a function of this group's corresponding increase in underweight prevalence (see Figure 6).

In terms of wasting, Figure 7 shows that children born with low birthweight have a higher point estimate of wasting during both the first and second year of life than children not born with low birthweight. However, the differences in these estimates are not statistically significant.[19] While the wasting prevalence for both groups decreases as the child grows older for both groups, it decreases more rapidly for children who are not born with low birthweight. The higher prevalence of wasting in children born with a low birthweight can likely be explained by the fact that these children have less physiologic reserve, and when they suffer from an acute illness, they will most likely not recover as quickly as their counterparts who were not born with low birthweight.

In summary, Table 7 and the related figures above suggest that the low weight status of low birthweight children can be corrected with appropriate and timely interventions. Alarming is the large percentage of children who were not born with low birthweight but who become underweight in the first two years of life. More significant investment in reducing the underweight prevalence of all children in this age group will help to ameliorate the sharp rise in the stunting prevalence of all children, which should be of urgent concern for policy makers. Correcting low birthweight children's higher rate of wasting is a more difficult challenge that will require strong interventions during the first two years of the children's lives.

[18] The estimate of stunting prevalence of 34.4 per cent for children aged 12-23 differs slightly from the estimate of 35.9 per cent in the BMIS 2010 final report because the sample for the former only considers those who were weighed at birth.

[19] The difference in estimates of wasting between low birth weight children and non-low birth weight children during year two is on the cusp of statistical significance at the 90 per cent confidence level.

Figure 4. Nutritional status of children under the age of two by whether they were born with low birthweight, Bhutan, 2010

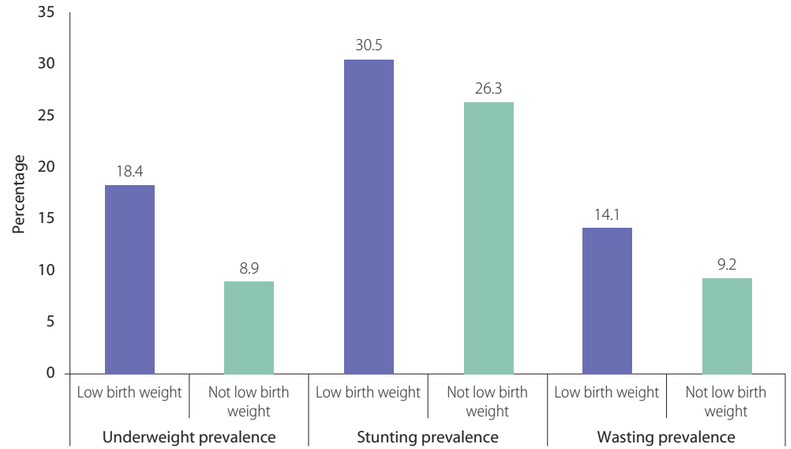
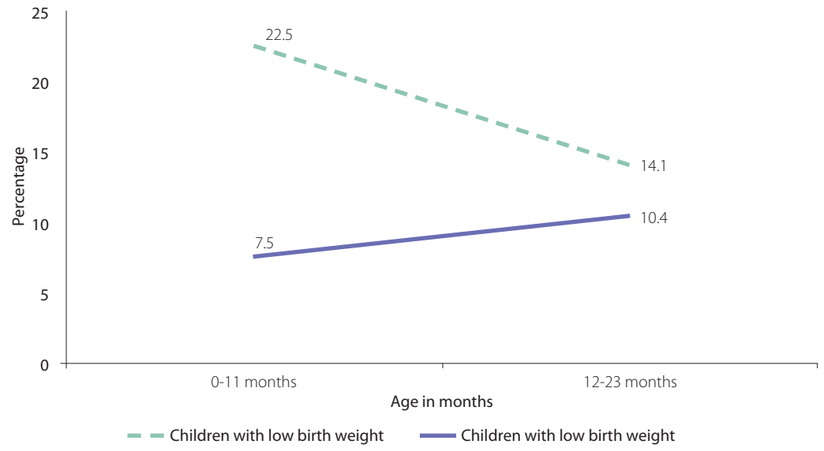


Figure 5. Percentage of underweight children under the age of two by low birthweight status and age, Bhutan, 2010



4.4. Infant and young child feeding

Breast milk is undeniably the best food to meet the nutritional needs of infants, particularly in the first six months of life. It provides maternal antibodies to protect the baby against infections, particularly diarrheal illnesses. It is safe, clean, economical, and promotes maternal-baby bonding as well. Multiple other benefits have been studied, including benefits to maternal health and reduction in the risk for non-communicable diseases. On the contrary, infant formula and other breastmilk substitutes, while may be nutritionally adequate, lacks protective antibodies and can become harmful if prepared with unsafe water. UNICEF and the World Health Organization recommend initiation of breastfeeding within the first hour of life, exclusive breastfeeding for the first six months, and continued breastfeeding for two or more years. Complementary foods of the right quality and amounts need to be added at six

Figure 6. Percentage of stunted children under the age of two by low birthweight status and age, Bhutan, 2010

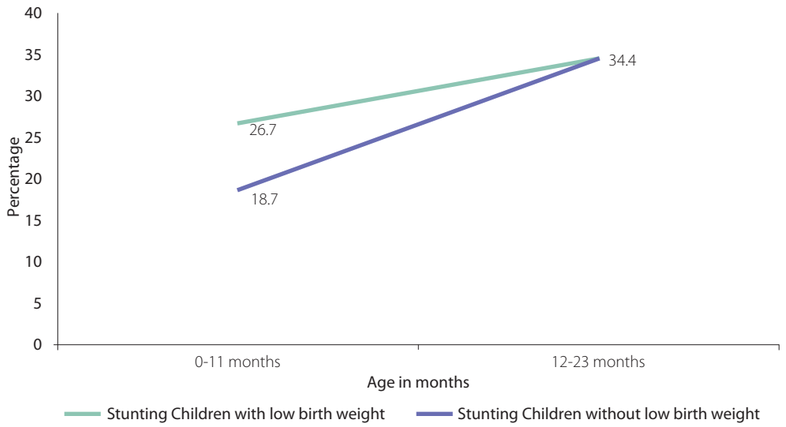
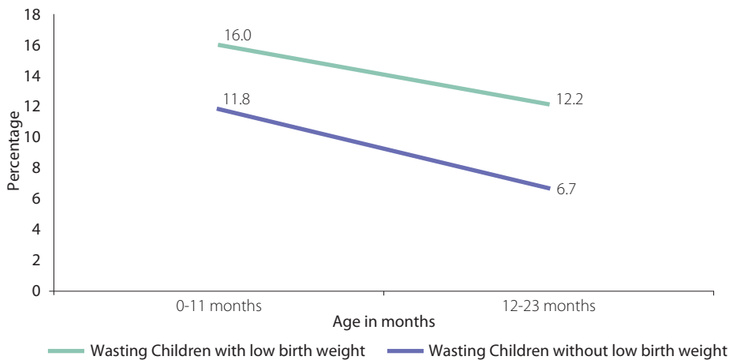


Figure 7. Percentage of wasted children under the age of two by low birthweight status and single age, Bhutan, 2010



months of age to meet the increased metabolic needs of the growing child. Unfortunately, many women do not breastfeed, do not feed as long as recommended, or fail to provide adequate complementary foods.

BMIS 2010 data indicate that 59 per cent of children under the age of two years are breastfed within the first hour of birth and 93 per cent of children within one day of birth.

Figure 8 shows that while 74 per cent of children receive exclusive breastfeeding during the first month of life, this figure drops rapidly in the third month and thereafter up to the sixth month. Overall, only 14 per cent of infants are exclusively breastfed *throughout* the first six months of life, as recommended.

4.4.1. Exclusive breastfeeding and mother's antenatal care

Table 8 shows the percentage of children aged 0-5 months who are exclusively breastfed by whether their mothers had the recommended level of antenatal care (4 or more visits) and by whether their children were delivered in a health facility. As anticipated, women who had more antenatal care exhibit a higher rate of exclusive breastfeeding than women who receive less antenatal care (55 per cent versus 32 per cent, respectively). These differences are statistically significant.

Similarly, 55 per cent of mothers of children 0-5 months who delivered in a health facility exclusively breastfed, compared with 35 per cent of mothers who did not deliver in a health facility. These differences are also statistically significant.

Figure 9 illustrates the data presented in Table 8, showing higher rates of exclusive breastfeeding among women who receive the appropriate level of antenatal care and among women who delivered their child in a health facility.

Figure 8. Percentage of children aged 0-5 months exclusively breastfed by age, Bhutan, 2010

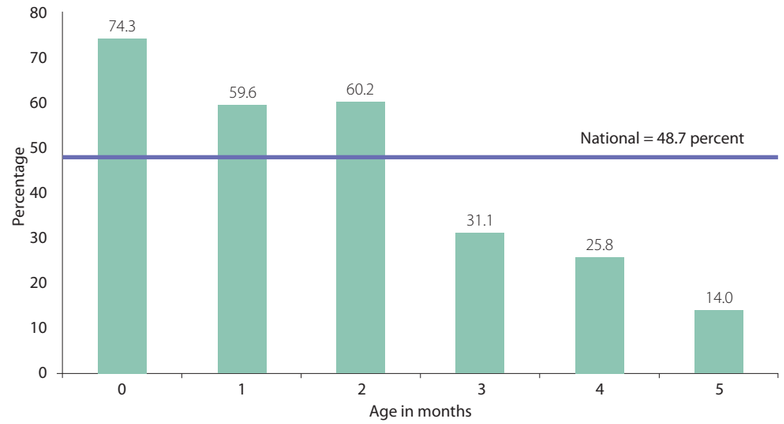


Table 8. Percentage of children aged 0-5 months exclusively breastfed by their mother's antenatal care and by whether they were delivered in an institution, Bhutan, 2010

		Antenatal care				Institutional delivery				Total number of children
		Did not receive antenatal care 4+ times		Received antenatal care 4+ times		Did not deliver in health facility		Delivered in health facility		
		% exclusively breastfed	No. of children	% exclusively breastfed	No. of children	% exclusively breastfed	No. of children	% exclusively breastfed	Number of children	
Sex	Male	33.0	51	53.5	224	31.1	99	55.4	198	297
	Female	31.5	61	56.5	228	39.3	94	54.8	212	306
Area	Urban	*	18	63.6	167	*	18	59.3	177	195
	Rural	32.2	93	50.1	285	34.7	175	51.9	233	408
Total		**32.2**	**111**	**55.1**	**452**	**35.1**	**193**	**55.1**	**410**	**603**

4.4.2. Feeding practices, including breastfeeding, for children under the age of two

Government policy regarding infant and young child feeding (IYCF) clearly states that infants should be exclusively breastfed for six months. In addition, women are advised during antenatal care not to give their newborns anything other than breastmilk during the first three days after birth. Nevertheless, Table 9 shows that eight per cent of mothers of children under the age of two gave their child something to drink or eat other than breastmilk during the first three days of life.

Of children who received something other than breastmilk during the first three days, the most common items offered in order of prevalence are infant formula (29 per cent), plain water (23 per cent), butter (19 per cent), and milk (15 per cent). While sample sizes are relatively small, the data suggest that women in the richest households choose to offer infant formula at a much higher rate than women in the poorest households (60 per cent versus 14 per cent, respectively). Conversely, the poorest women choose butter at a much higher rate than the richest women (34 per cent versus 2 per cent, respectively). The importance of exclusive breastfeeding for six months needs to be consistently emphasised during women's antenatal care visits. Health workers also need to

Figure 9. Percentage of children aged 0-5 months exclusively breastfed by their mother's antenatal care and by whether they were delivered in a health facility, Bhutan, 2010

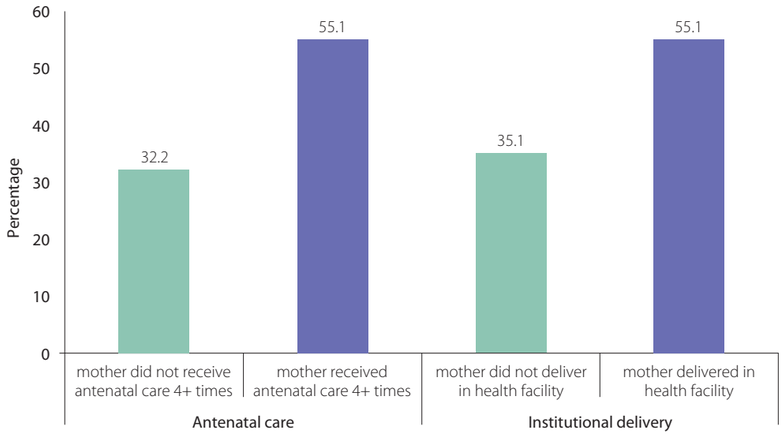


Table 9. Percentage of mothers who gave their newborn something to drink other than breast milk in the first three days after birth, and the type of drink given, among women mothers who gave birth in the two years preceding the survey, Bhutan, 2010

		% of children who received something to drink other than breast milk in first three days	No. of mothers	Type of drink given to those children who received something other than breast milk in first three days										Number of mothers
				Milk (other than breast milk)	Plain water	Sugar or glucose water	Sugar-salt-water solution	Fruit juice	Infant formula	Tea / Infusion	Honey	Butter	Other	
Area	Urban	8.3	690	7.7	26.1	7.1	0.0	0.0	50	3.1	0.0	5.9	0.0	57
	Rural	8.2	1,678	18.0	22.3	7.6	0.0	0.3	20.4	2.8	0.0	24.5	4.1	137
Education	None	7.7	1,484	16.9	27.7	4.4	0.0	0.3	19.3	4.6	0.0	24	3.0	114
	Primary	7.5	302	*	*	*	*	*	*	*	*	*	*	23
	Secondary +	9.8	582	3.9	16.7	13.0	0.0	0.0	57.6	0.0	0.0	8.8	0.0	57
Wealth index quintiles	Poorest	8.2	471	[14.9]	[18.2]	[6.2]	[0.0]	[0.0]	[13.7]	[4.4]	[0.0]	[33.8]	[8.8]	39
	Second	8.8	448	[17.4]	[11.8]	[5.2]	[0.0]	[0.01]	[18.3]	[4.6]	[0.0]	[36]	[5.7]	40
	Middle	7.3	475	[25.2]	[16.5]	[11.5]	[0.0]	[0.0]	[21.7]	[2.4]	[0.0]	[22.8]	[0.0]	35
	Fourth	7	518	[11.3]	[57.4]	[2.6]	[0.0]	[0.0]	[26.8]	[0.0]	[0.0]	[1.9]	[0.0]	36
	Richest	9.8	455	[8.0]	[15.9]	[11.3]	[0.0]	[0.0]	[59.7]	[2.8]	[0.0]	[2.2]	[0.0]	45
Total		**8.2**	**2,368**	**15.0**	**23.4**	**7.4**	**0.0**	**0.2**	**29.1**	**2.9**	**0.0**	**19.0**	**2.9**	**194**

constantly reinforce the intake of appropriate nutritious complementary food on every antenatal visit.

As a child grows, so do their nutritional requirements increase. In order to ensure proper growth and development and to prevent malnutrition, complementary foods need to be added to a child's diet from six months onwards. Complementary foods are nutrient-rich, hygienic, safe and appropriate foods that need to be introduced when breast milk alone is no longer sufficient to meet the increasing caloric and nutrient requirements of the growing child. These foods initially are soft and cooked foods that can be easily made into a thick, soft consistency.

Table 10. Percentage of children aged 6-23 months who received solid, semi-solid or soft foods during the previous day by age group and number of times, Bhutan, 2010

		Children aged 6-8 months			Children aged 9-23 months			
		1 time (%)	2 or more times (%)	Number of children age 6-8 months	1 time (%)	2 times (%)	3 or more times (%)	Number of children age 9-23 months
Sex	Male	7.7	92.3	126	7.6	19.9	72.5	558
	Female	6.5	93.5	103	5.5	18.6	75.9	544
Area	Urban	[1.7]	[98.3]	67	6.8	18.9	74.2	304
	Rural	9.5	90.5	162	6.5	19.4	74.1	798
Mother's education	None	8	92	140	7.7	20	72.2	730
	Primary	[9.1]	[90.9]	22	5.3	18.4	76.3	157
	Secondary+	4.8	95.2	67	3.7	17.4	78.9	225
Wealth index quintiles	Poorest	8	92	45	10.3	19.6	70	229
	Second	[18.7]	[81.3]	41	4.8	19.6	75.6	228
	Middle	0.4	99.6	44	4.4	17.9	77.7	204
	Fourth	8.4	91.6	49	6.9	19.2	73.9	248
	Richest	[1.8]	[98.2]	50	6	20.1	73.9	193
Total		**7.2**	**92.8**	**229**	**6.6**	**19.3**	**74.1**	**1,103**

In specific terms, this requires children aged 6-8 months, who are breastfed to be fed two or three meals of complementary food per day concurrently. Breastfed children aged 9-23 months require 3 or four complementary meals per day.[20] BMIS 2010 data used this standard to estimate the number of children under the age of two who receive appropriate feeding. Table 10 shows that 93 per cent of children aged 6-8 months and 74 per cent age 9-23 months receive the appropriate number of feeds in addition to breastfeeding. Unfortunately, the BMIS did not record the exact quantity or quality of the food given. The 2009 National Nutrition Infant and Young Child Feeding survey, however, provides details of the types of foods children are given to eat.[21] Carbohydrate rich foods made up a majority of a child's intake, whereas protein-rich foods that are needed for growth were very limited in the diets. One positive finding is that no significant disparities by demographic background exist in the percentage of children who are appropriately fed.

Figure 10 depicts the percentage of children aged 6-23 months who are fed the appropriate number of complementary foods per day, in addition to breastfeeding. While it shows that about 93 per cent of children aged 6-8 months old are fed the appropriate number of times, only about 74 per cent of children 9-23 receive the appropriate number of complementary food each day. One noteworthy observation is that over seven per cent of children aged 9-23 months receive only one meal per day alongside breast milk. As mentioned previously, information on the quantity and quality of these food servings was not collected in the survey.

4.5. Underweight prevalence and mother's antenatal care

The World Health Organization (WHO) recommends at least four antenatal care visits for pregnant women. Table 11 presents data on the underweight prevalence of children under the age of two by the level of antenatal care received by their mothers. It shows that over 21 per cent of children under two years of age whose mothers received no antenatal care are moderately or severely underweight, which is twice the level of children whose mothers obtained at least one antenatal care visit. These mothers receiving no antenatal care are more likely to live in rural areas, to come from the poorest two quintiles, to have no formal education, and to be aged 35-49.

Antenatal care provides opportunity for educating mothers on their health and nutrition and also on caring and nutrition for their babies.

[20] WHO: Complementary feeding: report of the global consultation and summary of guiding principles for complementary feeding of the breastfed child, 2001.

[21] National Nutrition Infant and Young Child Feeding Survey.(2009). Food and Nutrition Programme. Department of Public Health. Ministry of Health, Bhutan. p.30

Figure 10. **Distribution of children aged 6-23 months who received solid, semi-solid or soft foods during the previous day by age group and number of times, Bhutan, 2010**

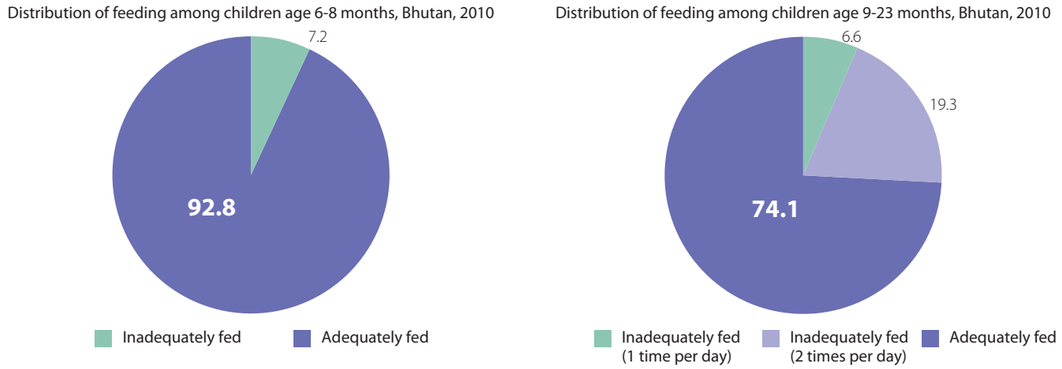


Table 11. **Percentage of children under two years of age who are moderately or severely underweight, by antenatal care received by the mother, Bhutan, 2010**

	Percent of women who had							
	No Antenatal visits		1-3 visits		4 or more visits		Total	
	% of underweight children	No. of children	% of underweight children	No. of children	% of underweight children	No. of children	% of underweight children	No. of children
Total	21.3	137	11.5	443	9.5	1,808	10.6	2,389

4.6. Wasting prevalence and sanitation facilities

Wasting is an acute form of malnutrition ("low weight for height") and can be caused in part by repeated episodes of illness including diarrhoea associated with poor sanitation, which is more likely to occur in households without improved sanitation facilities[22] According to BMIS 2010 data, rural households are far more likely to use unimproved sanitation facilities than urban households (45 per cent versus 6 per cent, respectively). This may lead to the hypothesis that rural children are more likely to be wasted than urban children. The data however show no statistically significant difference between the occurrence of wasting between urban and rural children under the age of five (7 per cent and 6 per cent, respectively).

Given that the national statistics show no difference in wasting prevalence among children under-five by the quality of their household sanitation facilities, a striking finding is the significantly higher level of wasting among urban children from households with unimproved sanitation facilities (13 per cent), compared with those from urban households with improved sanitation facilities (6 per cent), a difference that is statistically highly significant (see Table 12). These children who are wasted and do not have improved sanitation facilities in the urban areas are most probably the urban poor who live in poor and temporary shelters. The outlier status of the wasting estimate for the urban poor indicates that these children likely face an array of other household and environmental conditions that are detrimental to their overall health. There is no difference

[22] An improved sanitation facility is defined as one that hygienically separates human excreta from human contact and is not shared by more than one household. Improved sanitation facilities include flush or pour flush to a piped sewer system, septic tank, or latrine, ventilated improved pit latrine, pit latrine with a slab, and composting toilet.

Table 12. **Percentage of moderately or severely wasted children under the age of five by the quality of their household sanitation facilities, Bhutan, 2010**

		Use of Unimproved Sanitation Facilities		Use of Improved Sanitation Facilities		Total	
		% with wasting	Total	% with wasting	Total	% with wasting	Total
Area	Urban	13.1	103	6.1	1610	6.5	1,713
	Rural	5.3	1,867	5.8	2283	5.6	4,150
Total		**5.7**	**1,969**	**5.9**	**3893**	**5.9**	**5,863**

in the percentage of the children who are moderately or severely wasted in the rural areas when assessed for the type of sanitation facilities.

4.7. Nutritional status of children and their mothers' literacy

The education level of the mother has a strong positive effect on the overall health of a child. Table 13 considers the nutritional status of children under the age of five by the literacy status of their mother. It shows that the eight per cent estimate for children with literate mothers is significantly lower than the 14 per cent underweight prevalence of children with illiterate mothers. This gap holds even when controlling for sex, area of residence (urban or rural), mother's educational attainment, and household wealth. The disparity in underweight prevalence by mother's literacy status is most pronounced among children who are rural, whose mothers have no education, and who come from the poorest quintile, indicating the large benefit of literacy for women and children in these demographic groups.

Likewise with stunting, children whose mothers are not literate are 52 per cent more likely to be stunted than children whose mothers are literate (36 per cent versus 24 per cent, respectively). As with the underweight estimates, this difference is statistically highly significant. The data show no difference in the estimate for wasting prevalence by mother's education.

4.8. Food and nutrition security

Food security in Bhutan is an important, cross-cutting issue that involves areas of agriculture, forestry, livestock breeding, trade and commerce, and transportation to name a few. The issue affects both the rural and urban populations across the country and requires collaborative effort in the short- and long-term at the national, dzongkhag, and local levels of the government, as well as from the private sector, communities, and households across the country.

A comprehensive approach to achieving sustainable food and nutrition security in Bhutan should address household food *availability*, *access*, and *utilization*. Food *availability* refers to the level of food supplies, production, and market supplies stemming from domestic production, food stocks, and food imports. *Access* to food is the ability to acquire food, both physically and financially. *Utilization* refers to an individual's nutritional consumption, infant and child feeding practices, and the ability to productively use their caloric intake.

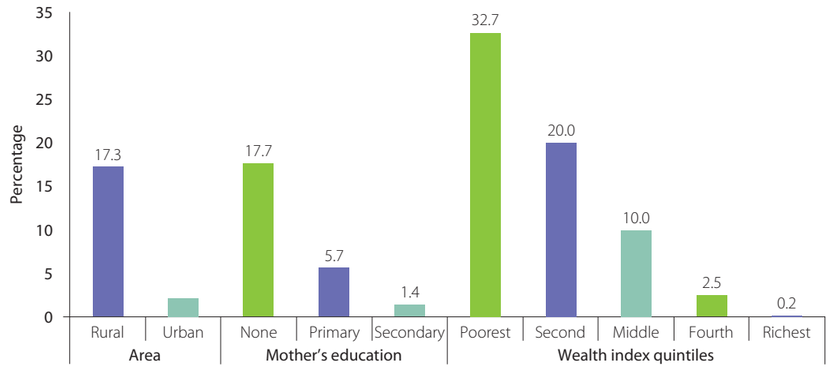
The BMIS 2010 defines food insecurity as "a situation in which there was not enough food to feed all members of the household" during the twelve months preceding the survey. Table 14 indicates that 11 per cent of households faced food and nutrition insecurity in the year prior to the survey. Among food insecure households, the average number of months for which households reported a food shortage was 2.7 months of the year. In other words, approximately 1 in 10 households in Bhutan has insufficient food to feed the family for close to 25 per cent of the year. The achievement of food security needs to be a top priority for the 11th Five Year Plan. Quite obviously, these households are overwhelmingly poor and located in rural areas, particularly in the poorer dzongkhags such as Lhuentse and Samtse. For example, a household in Samtse is 15 times as likely to face food insecurity as one in Thimphu dzongkhag. Larger households are also more likely to face food insecurity than smaller households. A household of seven or more is twice as likely to experience a food shortage as compared with a household of one individual (16 per cent versus 7 per cent, respectively).

Figure 11 shows the percentage of children under the age of five that have faced food insecurity during the year prior to the survey. The data show that children in households

Table 13. Nutrition indicators of children under-five of mothers aged 15-49 by the literacy of the mother, Bhutan, 2010

		% of underweight children				% of stunted children				% of children with wasting			
		Mother is illiterate		Mother is literate		Mother is illiterate		Mother is literate		Mother is illiterate		Mother is literate	
		%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Sex	Male	15.0	2,270	8.7	815	37.0	2,169	23.4	759	6.1	2,200	6.7	754
	Female	13.5	2,212	7.7	774	36.5	2,135	25.1	743	5.6	2,172	5.0	737
Area	Urban	11.8	954	8.9	846	33.2	924	21.9	789	6.5	922	6.4	791
	Rural	14.9	3,528	7.3	743	37.7	3,380	26.7	713	5.7	3,450	5.2	700
Mother's education	None	14.3	3,750	5.2	108	37.6	3,606	31.3	106	6.0	3,639	8.5	106
	Primary	11.7	485	9.7	247	29.6	468	31.5	240	5.2	472	4.0	236
	Secondary	*	*	8.2	1,235	*	*	22.0	1,156			6.0	1,148
Wealth index quintiles	Poorest	16.7	1,170	5.3	63	41.3	1,135	42.5	62	4.9	1,158	7.3	59
	Second	16.9	1,009	8.4	97	41.5	944	24.6	95	6.8	969	4.6	96
	Middle	14.6	926	11.9	224	38.3	892	39.0	215	6.2	903	7.3	218
	Fourth	10.8	1,046	8.8	366	29.9	1,010	20.6	344	6.0	1,010	4.9	340
	Richest	7.7	331	7.1	840	24.1	324	20.3	787	4.8	332	5.9	778
Total		**14.3**	**4,482**	**8.2**	**1,589**	**36.8**	**4,304**	**24.2**	**1,502**	**5.8**	**4,372**	**5.9**	**1,490**

Figure 11. Percentage of children under age five who live in households that faced food insecurity in the twelve months preceding the survey, Bhutan, 2010



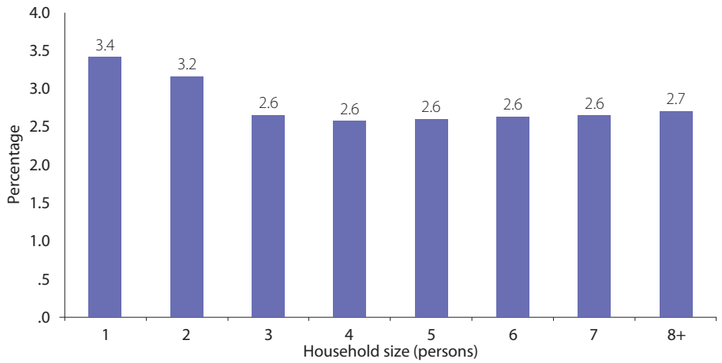
that are rural, poor, or have a mother without any education face a dramatically greater risk of food insecurity. Children living in a rural area are eight times more likely to face food insecurity than children from urban areas. If a child lives in a household from the poorest wealth quintile, they have a one in three chance of facing food insecurity during the year.

There is a strong association between the size of a household and food insecurity; larger households are more likely to face food insecurity. However, of the households that face food insecurity, those with only one or two members also experience food insecurity, on average, for 3.2 months of the year compared with those households with three or more members who face food insecurity, on average, for a period of 2.6 months (see Figure 12). This difference is statistically significant. It is also practically significant in that it indicates that the smallest households with food

Table 14. Percentage of households with food insecurity by month, Bhutan, 2010

		% of households that have faced food insecurity in past 12 months	Mean number of months with inadequate food among food insecure households	Among food insecure households, percentage of households with food insecurity in the month of:												Number of households
				January	February	March	April	May	June	July	August	September	October	November	December	
Dzongkhag	Bumthang	8.2	2.3	15.6	35.8	38.7	50.6	22.4	17.9	11.4	7.3	2.7	12.6	5.7	5.4	26
	Chhukha	15.8	2.3	6.4	13.1	23.5	28.6	30.1	42.9	32.1	22.1	13.4	4.6	5.4	4.8	233
	Dagana	2.5	*	*	*	*	*	*	*	*	*	*	*	*	*	14
	Gasa	8.5	*	*	*	*	*	*	*	*	*	*	*	*	*	9
	Haa	5.9	[2.2]	[8.7]	[27.5]	[30.3]	[32.5]	[72.9]	[38.1]	[4.16]	[0.0]	[0.0]	[0.0]	[0.0]	[4.4]	17
	Lhuntse	16.7	3.1	8.7	14.5	23.0	27.5	34.8	53.0	54.6	41.7	19.2	12.5	8.0	8.7	61
	Monggar	6.1	[2.7]	[14.1]	[22.1]	[17.6]	[19.9]	[34.7]	[56.2]	[42.3]	[15.1]	[5.4]	[11.9]	[11.7]	[23.2]	59
	Paro	8.3	2.1	16.3	20.0	27.1	52.8	37.8	16.0	1.9	12.5	5.8	3.7	4.4	11.2	66
	PemaGatshel	9.4	2.1	1.8	7.7	22.8	29.8	42.6	47.8	30.0	8.7	4.4	2.1	2.6	6.0	53
	Punakha	7.9	2.2	3.0	4.7	6.4	15.2	29.7	38.8	55.2	37.5	12.0	3.6	6.4	5.5	41
	Samdrup Jongkhar	16.0	2.6	1.6	1.6	18.7	39.5	52.6	49.7	39.7	23.4	13.7	10.0	5.0	3.7	132
	Samtse	27.8	3.0	2.7	8.0	21.9	42.6	54.9	62.4	54.0	27.7	14.1	5.5	2.5	2.6	456
	Sarpang	2.5	[2.2]	[0.0]	[14.7]	[20.5]	[33.3]	[57.4]	[54.9]	[41.3]	[1.6]	[0.0]	[0.0]	[0.0]	[0.0]	23
	Thimphu	1.9	*	*	*	*	*	*	*	*	*	*	*	*	*	36
	Trashigang	9.7	2.4	8.0	8.7	7.3	13.3	39.0	54.6	56.4	29.6	10.9	3.9	4.4	6.9	121
	Trashi Yangtse	12.4	3.0	4.1	3.4	2.5	15.0	39.3	86.6	77.0	42.8	16.8	3.9	3.5	2.6	55
	Trongsa	6.2	3.8	28.6	44.1	62.2	53.8	41.5	40.3	28.5	17.1	15.4	14.8	13.7	21.6	20
	Tsirang	11.2	4.3	18.4	26.6	39.9	53.3	59.0	69.7	60.9	37.5	21.8	14.8	11.0	14.0	53
	Wangdue Phodrang	16.5	2.5	5.5	7.7	15.7	18.4	24.8	47.7	50.2	35.7	17.1	9.7	10.1	11.1	103
	Zhemgang	1.9	*	*	*	*	*	*	*	*	*	*	*	*	*	7
Area	Urban	2.3	2.6	16.4	32.9	29.7	29.7	28.5	24.9	25.1	17.4	14.4	6.8	17.3	15.0	100
	Rural	14.3	2.7	6.0	10.8	20.5	33.7	44.0	53.9	46.0	26.3	12.8	6.8	4.8	6.1	1,484
Education of household head	None	14.7	2.8	7.4	12.2	21.5	34.4	45.5	52.0	43.5	25.7	13.2	7.0	5.5	7.1	1,363
	Primary	8.9	2.4	1.8	12.4	18.2	24.9	26.9	52.9	55.2	27.0	10.9	5.9	5.2	3.0	191
	Secondary +	0.9	*	*	*	*	*	*	*	*	*	*	*	*	*	29
Number of household members	1	7.3	3.4	19.1	25.9	36.5	37.5	38.8	50.1	46.2	36.0	13.6	14.1	10.1	12.8	65
	2	9.9	3.2	11.8	19.6	30.9	34.9	42.7	56.5	44.8	24.5	19.4	9.7	9.1	11.7	157
	3	9.1	2.6	4.8	9.8	21.4	42.4	47.4	47.5	41.8	19.2	11.0	7.4	3.5	8.1	191
	4	9.2	2.6	5.7	10.1	19.5	26.1	38.6	54.7	43.9	29.8	11.5	5.5	4.9	6.7	272
	5	10.5	2.6	5.7	12.7	14.9	30.4	43.4	51.0	47.2	27.6	13.8	4.6	4.7	3.8	291
	6	11.4	2.6	5.1	10.3	20.4	33.1	41.7	50.5	42.4	24.4	14.4	8.4	5.7	6.3	228
	7	15.3	2.6	4.8	8.2	19.4	36.4	49.4	52.9	41.1	21.7	11.7	6.3	6.1	6.5	173
	8+	16.5	2.7	6.4	11.9	21.7	34.8	42.2	52.6	49.7	26.3	9.8	4.9	4.8	4.1	206
Wealth index quintiles	Poorest	26.8	2.9	6.1	11.8	25.2	41.8	53.4	59.3	45.3	22.8	11.2	6.6	4.7	6.6	741
	Second	17.0	2.6	5.5	9.0	14.3	22.7	35.3	53.0	50.2	30.8	15.5	7.9	6.0	6.5	483
	Middle	9.0	2.4	9.2	17.2	21.4	27.8	29.7	38.9	39.7	26.7	13.4	6.5	4.9	7.1	269
	Fourth	2.7	2.3	10.1	15.1	23.5	41.1	43.0	29.5	25.3	18.8	10.7	2.6	10.8	4.6	83
	Richest	0.2	*	*	*	*	*	*	*	*	*	*	*	*	*	7
Total		10.8	2.7	6.6	12.2	21.1	33.4	43.0	52.1	44.7	25.7	12.9	6.8	5.6	6.7	1,584

Figure 12. Mean number of months that households face food insecurity by household size, 2010



insecurity. The data do not show any significant difference between urban and rural households in the average number of months households experience food insecurity.

Figure 13 illustrates these data, showing how food insecurity begins to increase in February, reaching its peak in June when more than half of all food insecure households (52 per cent) do not have enough food to feed the family, and then decreasing from July onwards when farmers begin to harvest crops. These data will help planners in designing programmes that address food and nutrition security and hunger during the most critical time of the year, which is from April to July.

4.8.1. Food security and nutritional status of children under the age of five

The analysis now turns to the critical relationship between food security and nutrition. Table 15 shows the nutritional status of children under the age of five by whether their household faced food insecurity during the twelve months preceding the survey. The data show a clear positive correlation between food security and a better nutritional status of children. Of children who live in food secure homes, 12 per cent are underweight as compared with 18 per cent of children in food insecure homes, a difference that is statistically significant. These data indicate that children who face food insecurity at any point in the year are 50 per cent more likely to be underweight than their counterparts who do not face food insecurity.[23] The difference in underweight prevalence between children in food secure and food insecure homes is also statistically significant for individual demographic groups including males, females, rural children, and those whose mothers have no formal education.

Similarly, 33 per cent of children in food secure homes are stunted, an estimate in line with the national average, compared with 39 per cent of children in food insecure homes. This difference is also statistically and practically significant as children in food insecure homes are nearly 20 per cent more likely to be stunted. With regard to wasting, the data do not show a statistically significant difference by whether children's households faced food insecurity.

Figure 14 illustrates data from Table 15, showing how children in food insecure homes are more likely to have poorer nutritional status than their food secure counterparts.

4.9. Summary of section on food and nutrition security

Nutrition is a critical component of the health and well-being of the population of Bhutan. The human and financial resources invested in improving nutrition, especially infants and children, will provide benefits for decades to come. By promoting better nutrition primarily in the young, a healthier and more productive society will develop. Simultaneously, the negative consequences of poor nutrition among the most vulnerable will be reduced. These include poor physical and mental growth, poor health, high mortality rates, and low academic performance.

Malnutrition is monitored by three indicators: the percentage of children who are underweight (low weight for age), stunted (low height for age), and wasted (low weight for height). Of the children under the age of five, 13 per cent are underweight, 34 per cent are stunted, and six per cent are wasted. A major concern for policy makers should be

[23] The increased likelihood of being underweight in food insecure homes is even more pronounced for males who are 62 per cent more likely to be underweight than their food secure peers.

that the stunting prevalence for all children increases from the time of birth to a staggering 36 per cent at the age of two. Between the age of two and five, stunting prevalence initially increases, then drops to 34 per cent at the age of five.

The data show that the way mothers feed their children is far from ideal. Almost 70 per cent of the Bhutanese women with young children do not continue exclusive breastfeeding after two months, while six months of exclusive breastfeeding is required as per global best-practice guidelines.

Frequent antenatal visits by the mother are consistently associated with good nutritional outcomes for the child. Newborns of mothers with adequate antenatal care are less at risk of being born with low birthweight and are more likely to have better nutritional status during the first two years of life. Ensuring that every pregnant woman in Bhutan receives at least four antenatal care visits is an important policy goal; the new policy recommends eight antenatal care visits. Supporting programmes that expand on a continuum of comprehensive healthcare services for mothers, infants, and children is important. One could be the development of antenatal, postnatal, and newborn healthcare services that, beyond providing medical care, focus more on providing comprehensive health education. Areas of expanded education would include exclusive breastfeeding during the first six months, proper complementary feeding practices with continued breastfeeding during the subsequent years. Other public health interventions such as safe water supply, sanitation, hygiene, and food and nutrition security also affect nutrition. Every visit should include a minimum of five minutes of directed patient education.

Figure 13. Percentage of households that faced food insecurity by months of the year, Bhutan, 2010

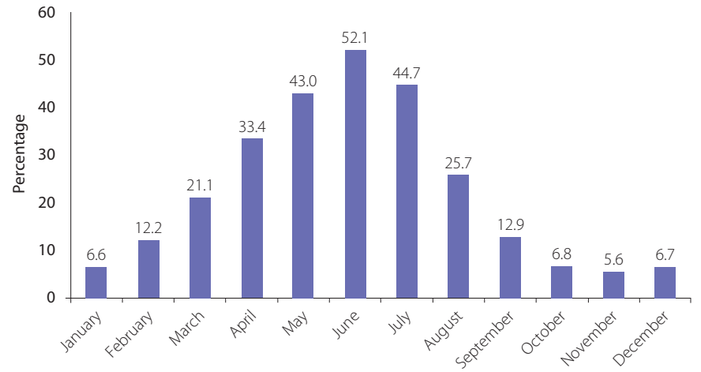


Figure 14. Nutritional status of children under the age of five by food security status of their household, Bhutan, 2010

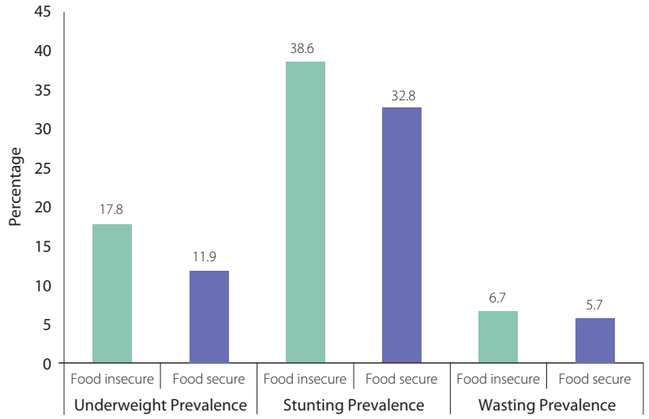


Table 15 shows that households with food and nutrition insecurity have higher percentages of children with malnutrition. Food insecurity shows a clear connection to poverty, is more frequent in larger households, and strongly predominant in rural areas and in poorer dzongkhags. It will require a concerted effort to make food available and accessible to the households that regularly face food shortage. Additionally, education on appropriate food utilization is necessary to help households optimise their nutrition.

Table 15. Nutritional status of children under the age of five by food security status of their household, Bhutan, 2010

		Experienced food shortage during past 12 months		Did not experience food shortage in past 12 months		Experienced food shortage during past 12 months		Did not experience food shortage in past 12 months	
		% of underweight children	Number of children	% of underweight children	Number of children	% of stunted children	Number of children	% of wasting children	Number of children
Sex	Male	20.1	369	12.4	2,716	40.6	350	6.1	2,596
	Female	15.7	407	11.4	2,580	36.8	390	5.3	2,510
Area	Urban	[16.1]	38	10.3	1,762	[41.2]	33	6.5	1,676
	Rural	17.9	738	12.7	3,534	38.5	707	5.3	3,429
Mother's education	None	17.8	715	13.6	3,329	38.6	687	5.9	3,237
	Primary	[10.5]	43	11.3	707	[36.0]	41	4.7	688
	Secondary	*	18	7.7	1,259	*	13	5.9	1,179
Wealth index quintiles	Poorest	15.4	402	16.5	830	38.9	391	5.1	822
	Second	24.7	221	14.0	885	42.6	203	6.1	854
	Middle	17.4	115	13.7	1,036	38.4	110	6.1	1,006
	Fourth	[4.5]	35	10.4	1,376	[15.0]	34	5.7	1,316
	Richest	*	2	7.3	1,169	*	2	5.6	1,107
Total		17.8	776	11.9	5,296	38.6	740	5.7	5,105
		Experienced food shortage during past 12 months		Did not experience food shortage in past 12 months		Experienced food shortage during past 12 months		Did not experience food shortage in past 12 months	
		% of underweight children	Number of children	% of underweight children	Number of children	% of wasting children	Number of children	% of stunted children	Number of children

Mother's literacy and education level exhibit a strongly positive correlation with nutritional outcomes among young children. Therefore, encouraging young women to complete their education, including through non-formal education, needs to be a country-wide priority.

Another area policy makers must address is the inequality seen in nutrition, antenatal, postnatal, and newborn care in rural areas and amongst the poorest and least educated sections of society. Further evaluation of the reasons why mothers are not accessing adequate antenatal care and or delivering in health facilities is critical to formulate a plan to address these issues. Services may need to be made more accessible to make it easier for mothers and children to seek care, including taking services directly to the mother's or infant's home where appropriate. This will require significant efforts to address barriers to access such as cost of services, quality of services, distance from health facilities, inconvenient opening hours and inadequate female health professionals.

Further education of healthcare workers at all levels needs to continually be stressed by policy makers. One of the most sustainable and economical ways of promoting better nutrition and overall health is the continued advancement and training of healthcare providers. Health assistants, general nurse midwives, and others need continual refreshing and advancement of their skills in nutrition, antenatal, postnatal, and newborn care.

Bhutan has advanced considerably in its health and nutritional outcomes over the past decades. Continued emphasis on food and nutrition security is essential to sustain this progress. In addition is the need for policies and programmes to address emerging challenges such as non-communicable diseases, overweight in children, injuries, lifestyle behaviour and the impact of climate all that impact on health outcomes.

5. Child health

5.1. Introduction

Millennium Development Goal 4 (MDG4) calls for a reduction by two thirds of the Under-five Mortality Rate (U5MR) by 2015, compared with the 1990 baseline. In 1990, U5MR was 139 deaths per 1,000 live births.[24] The global distribution of the primary causes of all under-five deaths shows that pneumonia kills more children than any other illness, accounting for 19 per cent of all under-five deaths.[25] This figure, however, does not include deaths due to pneumonia during the first four weeks of life, the neonatal period. It has been estimated that 26 per cent of neonatal deaths, or 10 per cent of all under-five deaths, are caused by severe infections during the neonatal period. And a significant proportion of these infections are caused by pneumonia/sepsis.[26] In the South East Asia region, pneumonia and acute diarrhoea, both communicable diseases, still account for 17 per cent and 19 per cent, respectively of all under-five deaths. [27] In Bhutan, pneumonia and diarrhoea cause 40 per cent of U5MR[28]. Addressing respiratory infections and acute diarrhoea is critical to achieving MDG 4.

Acute Respiratory Infection (ARI) and diarrhoea have been on the list of Bhutan's top ten childhood diseases for many decades and still top the causes of child morbidity chart. In order to address child health in Bhutan, the Acute Respiratory Tract Infection and Control of Diarrheal Disease Programme was established in 1982. Since then, there has been a reduction in diarrhoeal diseases and improvement in diarrhoeal case management at the community level. However, there seems to be no change in the incidence of ARI over the years. In the ninth plan, Early Childhood Development was incorporated as an integrated approach to dealing with child health in Bhutan. In 2009, the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) programme was introduced. It has implemented a strategic approach to address main childhood illnesses in a coordinated and planned manner. The IMNCI programme addresses common childhood diseases among children under-five years of age, including counselling mothers and caregivers about home care. Interventions under IMNCI have reached the most vulnerable population on the periphery of the health system.

5.2. Acute respiratory infections

ARIs, classified as upper or lower respiratory tract infections, are the primary cause of morbidity among children under-five across the world.[29] In Bhutan, ARIs constitute the most common illnesses among children under the age of five, and are the primary cause of their mortality.[30] Except for neonates, children in this age group average three to six

[24] Revised 1990 baseline comes from the The Inter-agency Group for Child Mortality Estimation Levels & Trends in Child Mortality Report 2011

[25] Pneumonia: The Forgotten Killer of Children, UNICEF and WHO 2006

[26] Pneumonia, the Forgotten Killer, UNICEF, 2006

[27] The Forgotten Killer of Children, UNICEF and WHO 2006

[28] Child Health Epidemiology Review Group (CHERG), World Health Organization, Nov 2006

[29] WHO, Acute Respiratory Infection update, September 2009.

[30] Ministry of Health Annual Health Bulletin 2011.

episodes of ARIs annually regardless of their socio-economic status or where they live in Bhutan. This section presents data on the use of solid fuels in the home, which contributes to air pollution and exacerbates ARIs that afflict children in Bhutan.

5.2.1. Pneumonia incidence

Because pneumonia kills more children than any other illness, any effort to improve overall child survival must make the reduction of pneumonia a priority. Prevention efforts include many well-known child survival interventions, such as expanding coverage of vaccines such as Haemophilus influenza type b vaccine (Hib) and Pneumococcal Conjugate Vaccine (PCV), promoting adequate nutrition, and reducing indoor air pollution. But once a child develops pneumonia, a caregiver must recognize the symptoms and seek appropriate care immediately. Since a large proportion of severe pneumonia cases in children of the developing world are caused by bacterial pathogens, prompt treatment with a full course of effective antibiotics is a key to reducing pneumonia deaths. This approach is proven, affordable, and relatively straightforward to implement[31]

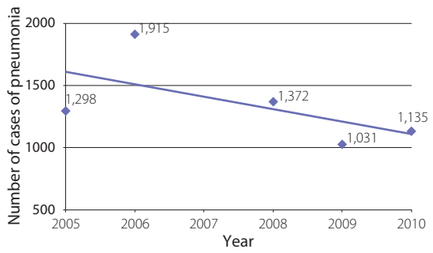
A healthy child has many natural defences that protect its lungs from the invading pathogens that cause pneumonia. However, undernourished children, particularly those not exclusively breastfed or with inadequate zinc intake, are at a higher risk of developing pneumonia. Children and infants with compromised immune systems have weakened defences. Similarly, children and infants suffering from communicable illnesses are more likely to develop pneumonia. Environmental factors, such as living in crowded homes and exposure to indoor air pollution due to solid fuel use or parental smoking, may also play a role in increasing children's susceptibility to pneumonia and its severe consequences.[32]

Table 16. **Under-five pneumonia incidence per 10,000 population (MOH), Bhutan, 2010**

Year	Under 5 Pneumonia Incidence per 10,000 population
2005	1,298
2006	1,915
2007	na
2008	1,372
2009	1,031
2010	1,135

Source: Ministry of Health

Figure 15. **Under-five pneumonia incidence per 10,000 population (MOH), Bhutan, 2010**



Source: Ministry of Health Annual Health Bulletins

Data from the Ministry of Health indicate a small decrease in the incidence of pneumonia among children under the age of five during the period 2005 to 2010. Table 16 and Figure 15 show 1,135 recorded cases of pneumonia per 10,000 under-five children population in 2010, compared with 1,298 cases per 10,000 population in 2005, meaning a decline of 13 per cent. This decline may be attributed in part to the successful reduction of indoor pollution in rural areas by bringing the use of solid fuel down from 77 per cent in 2005[33] to 56 per cent in 2010.[34] Reduction of ARI morbidities may possibly be due to increased general public awareness through non-formal education, village health workers, and local and religious leaders.

The Ministry of Health's 2010 administrative data above indicate a pneumonia incidence rate of 11 per cent compared with the BMIS 2010 estimate of seven per cent shown in Table 17. The difference in estimates may be due to a difference in the data collection period. The Ministry of Health data represent recorded cases for the entire calendar year. The BMIS data reflect questions asked to ascertain suspected pneumonia during the two weeks preceding the survey, which occurred during one season (March-July). Table 17 shows that children in the poorest households, in rural areas, and whose mothers have no education are more likely to have suspected pneumonia than their more privileged counterparts. Pneumonia incidence is higher among males and among older children aged 48-59 months than among the youngest children aged 0-11 months. All these differences in pneumonia incidence are statistically significant.

Of the children in the survey with suspected pneumonia, approximately three-quarters were taken to an appropriate health service provider. Unlike the incidence of pneumonia, there are no great disparities in care-seeking for children across different groups. Care-seeking for sick children does not fall below 60 per cent for any individual demographic group. Table 17 also shows the percentage of children under the age of five with suspected pneumonia who received antibiotics.

Nearly half of all of the children received antibiotics (49 per cent). Treatment with antibiotics was found to increase with wealth and mother's education. Although it appears as though antibiotic treatment is higher for males and among children in urban areas, these differences are not statistically significant. Antibiotic treatment was lowest for older children aged 48-59 months (35 per cent), children from the poorest households (41 per cent), and for those whose mothers have no formal education (42 per cent).

Figure 16 illustrates data on suspected pneumonia from Table 17. It shows that children from the richest quintile of households and those whose mothers have secondary level education are statistically less likely to report pneumonia symptoms (3 and 4 per cent, respectively) than children from poorer households and/or whose mothers have less than secondary level education (10 and 8 per cent, respectively).

5.2.2. Pneumonia and care-seeking behaviour

The results of a global epidemiological analysis of the incidence and distribution of pneumonia, which also assesses current levels of treatment and prevention, are intriguing. This analysis considers the relationship between care-seeking behaviour by parents of children with suspected pneumonia and the child's overall development. While not shown here, this report tested children's Early Childhood

Table 17. **Percentage of children under the age of five with suspected pneumonia, percentage taken to an appropriate provider, and percentage who received antibiotics, Bhutan, 2010**

		Had suspected pneumonia in the last two weeks (%)	% of children taken to an appropriate provider	% of children with suspected pneumonia who received antibiotics in the last two weeks	Number of children under the age of 5 with suspected pneumonia
Sex	Male	7.9	76.1	49.8	253
	Female	5.9	71.5	47.3	182
Area	Urban	4.4	74.1	58.4	81
	rural	7.9	74.2	46.5	354
Age	0-11	5.3	72.2	50.3	65
	12-23	6.5	76.6	61.6	80
	24-35	7.0	71.9	44.7	93
	36-47	7.8	80.3	54.5	100
	48-59	7.9	69.3	35.0	97
Mother's education	None	7.7	75.0	41.9	323
	Primary	7.7	61.1	69.6	60
	Secondary	4.0	84.3	66.9	52
Wealth index quintiles	Poorest	10.1	63.6	40.6	131
	Second	7.7	80.6	46.8	89
	Middle	6.0	77.6	61.5	72
	Fourth	6.9	76.5	44.6	99
	Richest	[3.6]	[81.8]	[65.6]	44
	Total	**6.9**	**74.2**	**48.7**	**435**

** Appropriate providers include hospital, BHU, satellite clinic. VHW, outreach clinic, and private physicians*

[31] World Health Organization and UNICEF, 'Joint Statement on Management of Pneumonia in the Community', New York, 2004,

[32] Pneumonia-The Forgotten Killer of Children, UNICEF, 2006

[33] SEDI 2005, page 59.

[34] BMIS 2010, Table No. 16, Percentage of household members living in households using solid fuels for cooking, Bhutan, 2010

Figure 16. Percentage of children under the age of five with suspected pneumonia by mother's education and wealth quintile, Bhutan, 2010

Table 18. Early Childhood Development Index by care-seeking behavior for suspected pneumonia and care-seeking behavior by inadequate care status and age of mother, Bhutan, 2010

Summary Table for Pneumonia and Care-Seeking				
	Children who received care from appropriate provider	Number of children aged 36-59 months	Children who not receive care from appropriate provider	Number of children aged 36-59 months
ECDI	77.3	128	64.4	45
	Children left with inadequate care	Number of children under the age of 5	Children who were not left with inadequate care	Number of children under the age of 5
Percentage of children taken to appropriate provider	79.4	83	72.4	352
	Children whose mother is age 15-24	Number of children under the age of 5	Children whose mother is age 25-49	Number of children under the age of 5
Percentage of children taken to appropriate provider	77.9	117	71.1	291

Development Index (ECDI) [35] by whether their parents sought care for their suspected pneumonia. The test found no statistically significant difference in the ECDI scores of children aged 36-59 months by whether they were taken to an appropriate healthcare provider or not.

This analysis also considered whether children with suspected pneumonia and who have been left with inadequate care in the week preceding the survey were less likely to be taken to an appropriate healthcare provider. The data show no significant disparity in care-seeking behaviour of parents by whether the child has been left with inadequate care. Similarly, the report finds no difference in care-seeking behaviour by the age of the child's mother.

5.2.3. Solid fuel use

Indoor air pollution due to the use of solid fuels in the home is considered one of the primary causes for ARIs. Table 19 shows that nearly 40 per cent of the population live in homes that use solid fuels for cooking, wood being by far, the most common material. The disparity in use of solid fuels by household wealth could not be any higher. 100 per cent of the poorest households in Bhutan use solid fuels

[35] ECDI is calculated as the percentage of children who are developmentally on track in at least three of four domains related to child development, namely literacy-numeracy, physical, social-emotional skills, and learning.

Table 19. Percentage of household members living in households using solid fuels for cooking, Bhutan, 2010

		Solid fuels*for cooking	No. of household members
Dzongkhag	Bumthang	45.2	1,605
	Chhukha	38.7	6,863
	Dagana	78.7	2,541
	Gasa	57.1	484
	Haa	15.3	1,312
	Lhuntse	46.9	1,564
	Monggar	56.8	4,741
	Paro	5.5	3,776
	Pema Gatshel	65.5	2,627
	Punakha	12.4	2,549
	Samdrup Jongkhar	52.9	3,892
	Samtse	61.3	7,530
	Sarpang	34.0	4,127
	Thimphu	0.6	8,372
	Trashigang	31.9	5,266
	Trashi Yantse	39.5	1,711
	Trongsa	54.5	1,510
	Tsirang	78.3	2,208
	Wangdue Phodrang	31.2	2,841
	Zhemgang	63.7	1,800
Area	Urban	2.2	18,500
	Rural	56.0	48,820
Education of household head	None	50.9	44,415
	Primary	34.3	10,129
	Secondary +	3.8	12,763
Wealth index quintiles	Poorest	99.9	13,461
	Second	70.0	13,468
	Middle	22.8	13,466
	Fourth	4.4	13,462
	Richest	0.3	13,462
Total		**39.5**	**67,319**

**Solid fuels include coal, wood, straw, and grass: data for 13 cases in which education of the household head is not known are not shown*

in the home as compared with zero per cent of the richest households. Substantial disparities exist across other dimensions of demography as well. 56 per cent of the rural population uses solid fuels compared with only two per cent of urban households. Similarly, 51 per cent of households, in which the household head has no education, use solid fuels compared with four per cent of households whose heads have secondary level education. The consequence is that the poorest children, those in rural areas, and those who live in households, in which the adults have no education, are far more likely to be exposed to air pollution that aggravates respiratory problems.

Map 2 illustrates data from Table 19 on the household use of solid fuels. It shows that the highest rates of solid fuel use in Bhutan are found in the poorest dzongkhags in the south and east, particularly in Tsirang and Dagana. In fact, the 10 poorest dzongkhags are also the 10 dzongkhags with the highest rates of solid fuel use. The lowest rates of solid fuel use are in a contiguous region from Thimphu and Paro.

5.2.4. Pneumonia incidence and solid fuel use

Solid fuel use is strongly associated with respiratory infections. For this reason, this analysis tested whether children under the age of five who live in homes that use solid fuels for cooking exhibit a higher rate of pneumonia symptoms. Table 20 shows that 8.5 per cent of children in homes with solid fuel use were suspected to have pneumonia compared with 5.9 per cent of their counterparts in homes without solid fuel use, a difference that is statistically significant. As stated above, solid fuel use is highest in the poorest households, in rural areas, the poorest dzongkhags, and in households in which the head has no formal education. These data suggest that children from these demographic groups are more likely to have pneumonia-like symptoms – this observation is expressed in the data presented in Table 20.

Map 2. Percentage of household members living in households using solid fuels for cooking, Bhutan, 2010

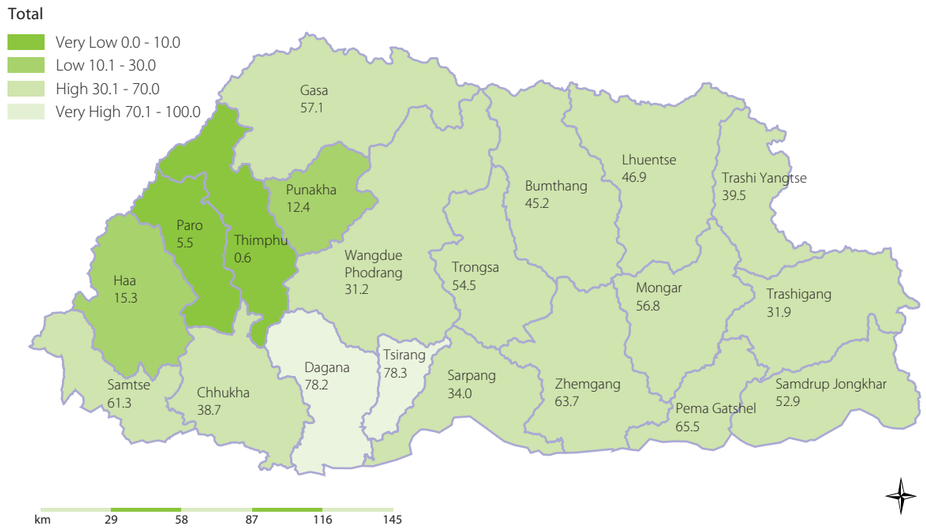
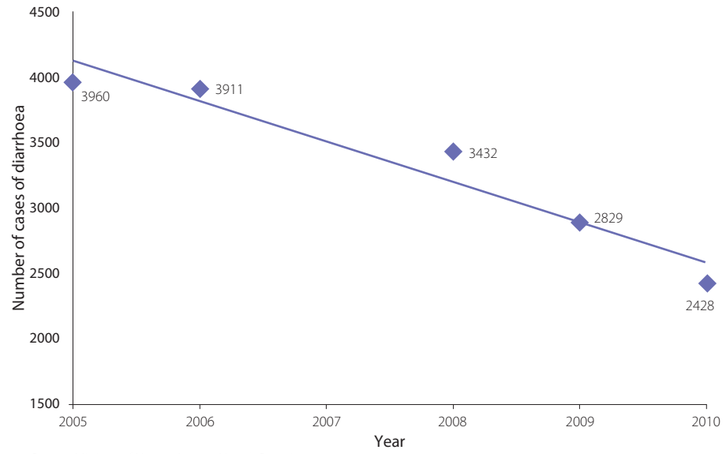


Table 20. Percentage of children under the age of five with suspected pneumonia by use of solid fuel for cooking in the home, Bhutan, 2010

		Not using solid fuels		Using solid fuels		Total number of children under the age of five
		% who had suspected pneumonia in the last two weeks	Number of children under the age of 5	% who had suspected pneumonia in the last two weeks	Number of children under the age of 5	
Area	Urban	4.4	1,810	[4.0]	30	1,841
	Rural	7.2	2,051	8.5	2,405	4,456
Education of household head	None	7.7	1,799	8.7	2,048	3,847
	Primary	5.6	687	6.8	338	1,024
	Secondary +	3.7	1,374	11.1	50	1,423
Wealth index quintiles	Poorest	*	1	10.1	1,293	1,294
	Second	8.6	340	7.3	819	1,159
	Middle	6.0	929	5.8	268	1,197
	Fourth	7.2	1,386	.0	52	1,438
	Richest	3.6	1,205	*	3	1,208
Total		**5.9**	**3,861**	**8.5**	**2,436**	**6,297**

Data for 2 cases in which the education of the household head is not known are not shown

Figure 17. Under-five diarrhoeal incidence per 10,000 population



Source: Ministry of Health Annual Health Bulletins

Table 21. Diarrhoeal incidence of children under the age of five (MOH data), Bhutan, 2010

Year	Under 5 Diarrhoeal Incidence per 10,000 populations
2005	3,960
2006	3,911
2007	na
2008	3,432
2009	2,829
2010	2,428

Source: Ministry of Health

5.3. Diarrhoea

Diarrhoea is defined as having loose or watery stools at least three times per day, or more frequently than normal for an individual. Most episodes of childhood diarrhoea are mild. However, acute cases can lead to significant fluid loss and dehydration, which may result in severe negative effects to a child's health, and sometimes even death. Frequent episodes of diarrhoea over a long duration can lead to under-nutrition and increased risk of infections due to decreased immunity.[36] In Bhutan, diarrhoea among children under-five continues to be a major concern as it ranks second, only after ARI.[37]

5.3.1. Diarrhoeal incidence

Data from the Ministry of Health record a very significant decrease in the incidence of diarrhoea among children under the age of five during the period 2005 to 2010. Table 21 and Figure 17 show 2,428 recorded cases of diarrhoea per 10,000 population in 2010 compared with 3,960 cases per 10,000 population in 2005, a decline of 39 per cent in just five years. Several factors are likely to contribute to this significant reduction in the incidence of diarrhoea, including expanded access and use of improved water and sanitation facilities, and improvements in infant and young child feeding practices. Improved hygienic practices such as hand washing as well as public health awareness campaigns carried out by the non-formal education programme along with knowledge dissemination of hygiene conveyed by village health workers (VHWs), the media, and religious leaders have played a significant role.

Table 22 shows that 25 per cent of children under the age of five had diarrhoea in the two weeks preceding the BMIS 2010 survey. Although the data collection and time period differ, the BMIS estimate is remarkably similar to the Ministry of Health estimate of 24 per cent (see Table 21). The incidence of diarrhoea decreases with wealth status and with mother's educational level. The data do not show significant disparities by sex, area of location (urban/rural) or dzongkhag.

It is well known that mother's education level has a contributing effect on the health of the child. Figure 18 illustrates the data shown in Table 22 and shows that 27

[36] WHO, Diarrhoeal disease, Fact Sheet, August 2009

[37] Ministry of Health Annual Health Bulletin 2011, (based on cases reported in Table 19 p101)

Table 22. Diarrhoea incidence of children under the age of five, Bhutan, 2010

		Had diarrhoea in last two weeks	Number of children aged 0-59 months
Sex	Male	26.4	3,216
	Female	23.8	3,081
Dzongkhag	Bumthang	17.2	171
	Chhukha	30.0	648
	Dagana	24.5	237
	Gasa	[21.4]	43
	Haa	23.0	121
	Lhuntse	30.4	124
	Monggar	25.2	466
	Paro	25.7	337
	Pema Gatshel	15.7	214
	Punakha	27.6	218
	Samdrup Jonkhar	20.2	410
	Samtse	24.7	755
	Sarpang	20.5	350
	Thimphu	25.2	801
	Trashigang	26.5	479
	Trashi Yantse	25.6	169
	Trongsa	23.4	133
	Tsirang	21.2	186
	Wangdue Phodrang	36.3	261
	Zhemgang	28.7	175
Area	Urban	25.3	1,841
	Rural	25.0	4,456
Age	0-11	29.8	1,229
	12-23	36.2	1,234
	24-35	24.3	1,337
	36-47	20.2	1,275
	48-59	15.2	1,222
Mother's education	None	26.5	4,207
	Primary	26.9	781
	Secondary	19.7	1,309
Wealth index quintiles	Poorest	26.3	1,294
	Secondary	25.0	1,159
	Middle	28.0	1,197
	Fourth	27.0	1,438
	Richest	18.8	1,208
Total		**25.1**	**6,297**

per cent of children whose mothers have no education had diarrhoea, compared with 20 per cent of children whose mothers have secondary level education, a difference which is statistically significant. Children under the age of five from the richest households had a diarrhoea rate of 19 per cent, which is considerably (and statistically) lower than children from the other four wealth quintiles.

Research has shown that children with poor nutritional status as well as those exposed to poor environmental conditions are more susceptible to severe diarrhoea and dehydration than healthy children. Notwithstanding this evidence, this analysis tested whether the diarrhoeal incidence among children under the age of five differed by nutritional status. While not shown here, the data show no significant difference in diarrhoeal incidence by nutritional status except in the case in which children who are moderately or severely stunted have a slightly higher (but significant) incidence of diarrhoea than children who are not stunted.[38]

5.3.2. Treatment of diarrhoea

BMIS data show that the large majority of children under the age of five who experience diarrhoea receive some level of treatment. Table 23 shows that 74 per cent of children who had diarrhoea in the two weeks preceding the survey received oral rehydration salts (ORS) or increased fluids. There is little variation by demographic characteristics with the notable exception of the youngest children aged 0-5 months, of which only 48 per cent received this treatment.

The most appropriate treatment of diarrhoea is oral rehydration therapy (ORT) with continued feeding.[39] 62 per cent of children under-five received this more substantial treatment for their diarrhoea. Again, the data reveal little variation among demographic groups with the exception of 0-5 month old children, of whom only one third (33 per cent) receive ORT with continued feeding. This result is likely a function of the fact that nearly half (49 per cent) of the children in Bhutan in this age group are exclusively

[38] Diarrhoeal incidence rates for children under the age of five: not underweight (24.9 per cent), moderately/severely underweight (26.6 per cent), not stunted (24.3 per cent), moderately/severely stunted (26.9 per cent), not wasted (25.1 per cent), moderately/severely wasted (28.9 per cent).

[39] Oral rehydration therapy refers to providing the child with oral rehydration salts or recommended homemade fluids (rice water/rice porridge, whey or weak tea) or increased fluids and continued feeding, which means the child eats somewhat less, the same amount, or more food.

breastfed and are therefore not given any treatment or drugs. Instead, mothers are advised to breastfeed immediately after the child has diarrhoea. In this respect, these data do not indicate a negative outcome.

Although the majority of children with diarrhoea receive treatment, approximately 11 per cent are left to overcome diarrhoea with no intervention. Figure 19 presents data from Table 23. It shows that the youngest children aged 0-5 months are far more likely than older children to receive no treatment for diarrhoea. 37 per cent of children in this age group receive no treatment, which is likely a function of exclusive breastfeeding during this age. However, 14 per cent of children aged 6-11 months, for whom treatment is advised, receive no treatment. This finding is of concern as the diarrhoeal incidence rate for children in this age group is very high at 36 per cent. As a result, they are at a much greater risk of suffering from the repercussions of diarrhoea than the older children.

This analysis also tested differences in nutritional status by whether children with diarrhoea received ORT. While not shown here, the data show that children who did not receive ORT are no more likely to be underweight or stunted

Figure 18. Incidence of diarrhoea among children under the age of five by mother's education and wealth quintile, Bhutan, 2010

Table 23. Treatment of diarrhoea for children under the age of five, Bhutan, 2010

		ORS or increased fluids	ORT (ORS or recommended homemade fluids or increased fluids)	ORT with continued feeding	Not given any treatment or drug	Number of children aged 0-59 months with diarrhea
Sex	Male	73.3	86.7	63.0	9.6	850
	Female	74.0	83.9	60.0	12.0	732
Area	Urban	78.8	86.6	60.0	10.7	467
	Rural	71.4	84.9	62.3	10.7	1,115
Age	0-5	47.7	54.5	32.5	37	141
	06-11	68.9	82.4	59.1	14.4	225
	12-23	76.4	88.5	63.1	8.2	447
	24-35	81.5	93.8	70.9	5.4	325
	36-47	80.2	90.5	61.6	3.4	258
	48-59	69.0	83.5	66.8	11.7	186
Mother's education	None	72.3	85.3	59.3	10.6	1,114
	Primary	77.3	87.6	71.2	7.6	210
	Secondary	76.1	84.1	63.7	13.7	257
Wealth index quintiles	Poorest	69.1	83.5	60.9	12.3	341
	Second	72.0	86.1	64.6	10.7	290
	Middle	70.5	85.6	61.5	11.0	336
	Fourth	78.9	88.2	60.8	7.5	389
	Richest	78.0	82.6	60.4	13.2	227
Total		**73.6**	**85.4**	**61.6**	**10.7**	**1,582**

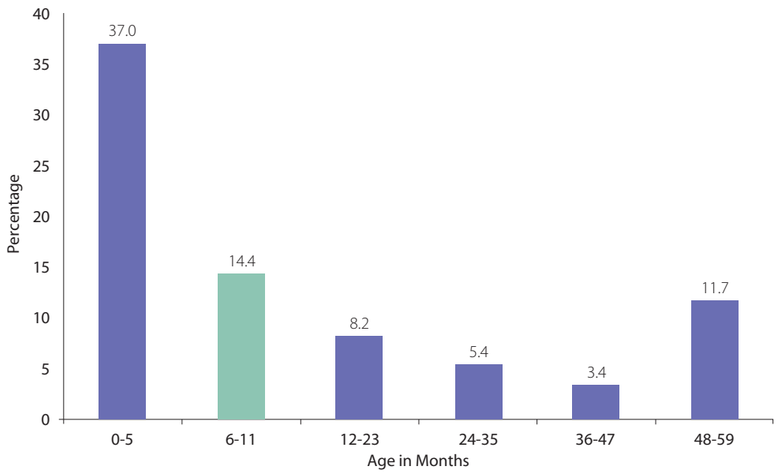
than children who did receive ORT. However, children who did not receive ORT have a higher prevalence of wasting than children who did receive ORT.[40] The data also show that the likelihood of children receiving ORT does not differ by the age of their mother.[41]

5.4. Summary of section on child health

Acute Respiratory Infections (ARI) and diarrhoeal diseases are responsible for 40 per cent of the under-five mortality rate in Bhutan.[42] Apart from this, non-lethal occurrence of ARI and diarrhoeal diseases is one of the most important child healthcare issues in Bhutan. It affects the well-being and physical and mental development of children, for instance, through lower school attendance. Serious improvements have been made in reducing diarrhoeal diseases, with a decrease of 40 per cent in the number of cases among children under the age of five since 2005. However, Bhutan's 25 per cent diarrhoeal incidence rate is still high. With respect to ARI, there has been less improvement, with only a 15 per cent reduction of pneumonia incidence since 2005. In order to meet MDG 4, which calls for a reduction by two thirds of the under-five mortality rate by 2015 as compared with the 1990 baseline, increased efforts to reduce diarrhoeal diseases and ARI are needed.

Indoor air pollution, caused by the use of solid fuels, is considered to be a major contributing factor to ARI. It is, or should be, a major public healthcare concern in Bhutan as 40 per cent of the population uses solid fuels for cooking.

Figure 19. Percentage of children under the age of five who did not receive any treatment or drug for diarrhoea, Bhutan, 2010



Solid fuel use is almost completely confined to the rural areas, being highest in the poorest dzongkhags in the south and east. Children from the poorest households and those whose parents have no formal education are far more likely to be exposed to solid fuel use in the home that aggravates respiratory infections.

The strong connection between solid fuel use, poverty, and lack of education on the one hand and the incidence of Bhutan's number two cause of child mortality on the other gives policy makers a number of handles on the issue of respiratory infections. The foremost policy goal would be to ensure that rural households get access to clean energy sources. In the short-run, improved systems for smoke-free combustion of firewood can be introduced.

Though care-seeking for children does not present a major problem for any demographic group, proper treatment is probably often lacking. Although figures for Bhutan are absent, globally only one out of five caregivers recognize the danger signs of pneumonia[43]. As delayed proper care presents a key risk factor for fatal pneumonia, this can be addressed through additional training of health workers.

The data show differences in the treatment of children with pneumonia symptoms taken to health facilities. Older children (48-59 months), children from the poorest households, and those whose mothers have no formal

[40] Underweight prevalence of children who received ORT (13.5 per cent) and who did not receive ORT (13.1 per cent); Stunting prevalence of children who received ORT (37.2 per cent) and who did not receive ORT (30.5 per cent); Wasting prevalence of children who received ORT (5.2 per cent) and who did not receive ORT (12.8 per cent);

[41] Percentage of children who received ORT whose mothers are aged 15-19 years (82.5 per cent), 20-24 years (81.9 per cent), 25-49 years (79.5 per cent).

[42] Child Health Epidemiology Review Group (CHERG), World Health Organization, Nov 2006

[43] Pneumonia-The Forgotten Killer of Children, UNICEF, 2006

education are less likely to receive antibiotics. Therefore, more attention should be given to ensuring that equitable healthcare services are provided to all people in Bhutan, irrespective of demographic group or type of health facility accessed.

The occurrence of diarrhoea is a country-wide phenomenon which does not differ much between dzongkhags or between urban and rural areas. Access to and treatment by health facilities does not seem to be a key factor. Occurrence of diarrhoeal diseases is clearly related, however, to poverty and lack of education. A mother's education level has a direct effect on child health, through better understanding of the need of hygiene and the transmission of infections.

Mothers' education is positively correlated with lower morbidity and increased treatment for illnesses. Improving community-level health education of the poorest households and parents with no education would be a positive intervention to reduce illnesses among these groups. To this end, interventions such as non-formal education and the village health workers programme are critical.

6. Child mortality

6.1. Introduction

Child mortality rates are the key indicators of the population's health and well-being, and crucial determinants of priorities in public health and social spending. These measures show whether a country has sufficient and equitable distribution of basic goods and services, and whether a country's institutions, policies and programmes are effective to mitigate poverty. MDG 4 calls for a reduction of child mortality by two thirds by 2015, compared with the 1990 baseline.

Box 2. Definitions of child mortality rates

Definition of child mortality rates: Child mortality is defined as deaths of children from 1-5 years old expressed per 1,000 live births.

The Infant Mortality Rate (IMR) is the probability (expressed as a rate per 1,000 live births) of a child, born in a specified year, dying before reaching the age of one year if subject to current age-specific mortality rates.

The Under-Five Mortality Rate (U5MR) is the probability (expressed as a rate per 1,000 live births) of a child, born in a specified year, dying before reaching the age of five years if subject to current age-specific mortality rates.

A live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life—such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles—whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered a live birth.

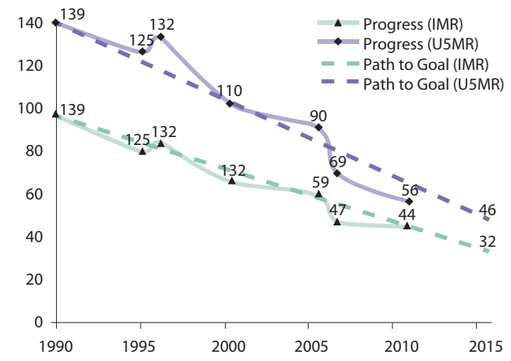
Source: Inter-agency Group for Mortality Estimation (IGME), http://www.childmortality.org.

6.2. Child mortality estimates

The BMIS 2010 data show that Bhutan is well on-track to achieve the MDG 4 targets of 32 deaths per 1,000 live births for IMR and 46 deaths per 1,000 live births for U5MR by 2015.[44] It bears noting that child mortality estimates differ slightly by source based on the use of differing methodologies, which is further discussed in Section 6.3. However the downward trend is consistent across all data sources.

Figure 20 illustrates Bhutan's highly positive trend in its progress towards achievement of the MDG 4. Since 1990, Bhutan has successfully reduced the country's U5MR,

Figure 20. MDG 4: Infant mortality rate and Under-five Mortality Rate



[44] Revised 1990 baseline and 2015 target as well as estimates for 2010 come from the The Inter-agency Group for Child Mortality Estimation Levels & Trends in Child Mortality Report 2011.

bringing it down from 139 deaths per 1,000 live births in 1990 to 69 deaths per 1,000 live births in 2006.[45] These estimates indicate that Bhutan has had a remarkable achievement by cutting its U5MR in half in only 16 years.

This positive trend also applies to a corresponding reduction in the IMR from 96 deaths per 1,000 live births in the baseline year of 1990 to 47 deaths in 2006. As with the U5MR, Bhutan has cut its IMR in half in this short span of time.

Figure 20 also shows the United Nations estimate for Bhutan's U5MR and IMR for 2010 (56 and 44, respectively), indicating continued and rapid progress towards the achievement of MDG 4.[46]

The leading primary causes of U5MR in Bhutan in 2006 included neonatal causes (39 per cent), diarrhoea (21 per cent), and pneumonia (19 per cent). Among the neonatal causes, infections (36 per cent), asphyxia (24 per cent) and pre-maturity (24 per cent) comprise the most common causes of death.[47]

Neonatal mortality rate (NMR), which covers deaths in the first 28 days after birth, is of particular interest as the health interventions needed to address the major causes of neonatal deaths generally differ from those needed to address other under-five deaths. NMR is increasingly important because the proportion of under-five deaths that occur globally during the neonatal period is increasing as overall under-five mortality is decreasing.[48]

Globally, decreases in child mortality are highly correlated with increases in income at the country level as measured by the Gross Domestic Product (GDP). Mortality rates are positively influenced by the benefits of higher incomes, including improved living conditions, better child and maternal nutrition, and greater access to basic services such as healthcare and education. Bhutan has successfully converted its significant gains in national income into expansion in access to and improvements in the quality of healthcare for the population. Improvements in child health and decreases in child mortality, can be, to a large extent, attributed to Bhutan's successful implementation of Expanded Programme on Immunization (EPI) with its high coverage, improvement of access and services for children with major childhood illnesses, and the national referral system.

However, in spite of the overall positive trend, the health sector reform process in Bhutan faces serious challenges, like the increase in non-communicable diseases that are escalating the cost of curative health services. In addition, Bhutan's challenging geography and scattered population, the associated high operational costs, and resource scarcity represent constraints towards full realization of the MDGs. Table 24 presents data on the IMR and U5MR for children from various demographic backgrounds. The IMR and U5MR for males is approximately 35 per cent higher than for females, indicating that there is no sex-based preference in childbearing. The data show very significant disparities in child mortality across groups. For example, a child born in the poorest quintile of households is nearly three times as likely to die by the age of five as a child from the wealthiest two quintiles of households. A child whose mother has no education is two and a half times as likely to die before the age of five as a child whose mother has secondary level education. The urban-rural gap in U5MR is also quite significant; rural children are twice more likely to die before the age of five than urban children. These disparities in U5MR are equally significant for IMR as well. Data from the PHCB 2005 and BMIS 2010 suggest that despite decreases in the IMR and U5MR, disparities in mortality rates by wealth, mother's education, and by area of location are increasing.[49] Unless progressive policy measures undertake the effective reform of the health sector, and are designed to support children most vulnerable to mortality, Bhutan may achieve its MDG targets but not with the equity aspired to by Gross National Happiness.

Figure 21 illustrates U5MR data for each demographic group presented in Table 24. It can be clearly seen that children from the poorest quintile of households, in rural areas, and whose mothers have no formal education have a greater likelihood of dying before the age of five than children from wealthier households, urban areas, and whose mothers have formal education.

[45] BMIS 2010 Final Report, Table CM.1

[46] United Nations Inter-Agency Group for Child Mortality Estimation. 2011. Levels and Trends in Child Mortality,

[47] Child Health Epidemiology Review Group (CHERG), World Health Organization, Nov 2006

[48] Levels and trends in Child Mortality: Report 2011, Estimates Developed by the Inter-Agency

[49] SEDI 2005 and BMIS 2010

6.3. Child mortality estimation methodologies

Nationally representative estimates of child mortality can be derived from a number of different sources, including civil registration and sample surveys, but excluding demographic surveillance sites and hospital data, which are rarely representative. Globally, the preferred source of data is a civil registration system that records births and deaths on a continuous basis; if registration is complete and the system functions efficiently, the resulting estimates will be accurate and timely. However, Bhutan's vital registration system has incomplete coverage. Therefore, household surveys such as the BMIS 2010 and National Health Surveys (NHS) as well as population censuses have become the primary source of data for infant and under-five mortality.

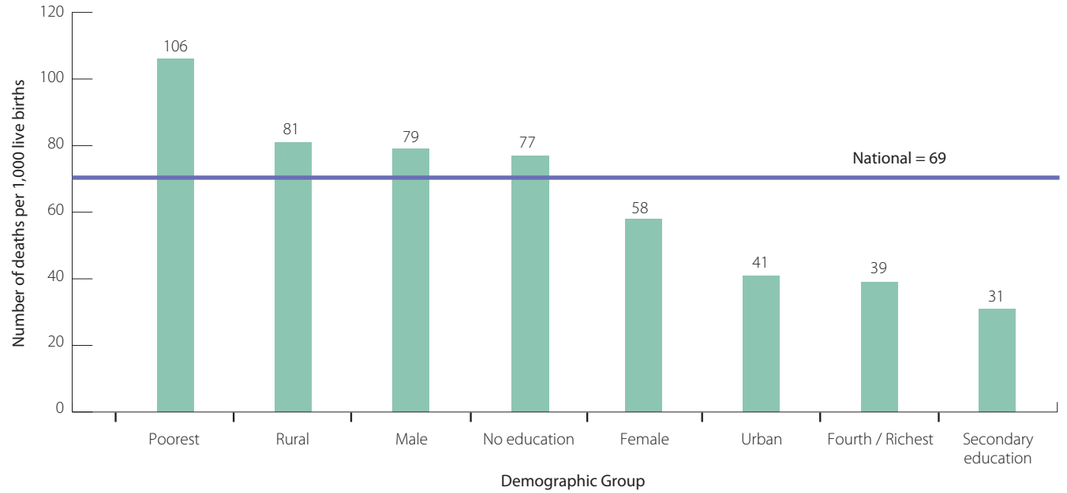
The majority of survey data comes in one of two forms: the full birth history (FBH), whereby women are asked for the date of birth of each of their children, whether the child is still alive, and if not the age at death; and the summary birth history (SBH), whereby women are asked only about the number of their children ever born and the number that have died (or equivalently, the number still alive). FBH data, collected by all Demographic and Health Surveys (DHS), allow the calculation of child mortality indicators for specific time periods in the past. These calculations produce estimates for five 5-year periods before the survey, most commonly the previous 0-4 year period. SBH data, collected by censuses and many Multiple Indicator Cluster Surveys (MICS) such as the BMIS 2010, use the age of the woman as an indicator of exposure time and exposure time

Table 24. Infant and Under-Five Mortality Rates, Bhutan, 2010 (for the year 2006)

Infant and under-five mortality rates, North Model, Bhutan,2010			
		Infant Mortality Rate	Under-five Mortality
		(IMR)	Rate (U5MR)
Sex	Male	54	79
	Female	40	58
Area	Urban	31	41
	Rural	54	81
Mother's Education	None	51	77
	Primary	42	61
	Secondary +	24	31
Wealth index quintiles	Poorest	68	106
	Second	58	88
	Middle	50	74
	Fourth/Richest	28	39
Total		**47**	**69**

Reference period for these data is 2006, North Model was assumed to approximate the age pattern of mortality in Bhutan

Figure 21. Under-Five Mortality Rates by individual demographic groups, Bhutan, 2010 (for the year 2006)



period of the children, and use models to estimate mortality indicators for periods in the past for women aged 25 to 29 through 45 to 49.

The child mortality data from BMIS 2010 presented in Table 24 have been calculated by averaging mortality estimates obtained from women aged 25-29 and 30-34. Prior to the BMIS, the Ministry of Health primarily relied on child mortality estimates from the PHCB 2005 as presented in the Socio-Economic and Demographic Indicators (SEDI) report of the same year. The BMIS 2010 uses an indirect method to produce an estimated IMR of 47 and a U5MR of 69 per 1,000 live births. The PHCB 2005 report uses the simple direct method, which yields an estimated IMR of 40 and a U5MR of 62 per 1,000 live births.[50]

6.3.1. Indirect child mortality estimation methodology

Indirect estimates: The indirect method utilises data commonly collected in censuses and many general surveys: the number of children ever born to women and the number of living children each woman has had along with their ages. Unlike the direct method, the indirect method is dependent upon several assumptions that may or may not hold true: little or no change in fertility levels and age patterns over time, no change or a linear decline in mortality, and a pattern of mortality by age that conforms to known "families," basically derived from the European experience. Overall, the indirect estimation methodology is considered superior as the responses are perceived to be more accurate than those obtained through the direct methodology. One reason is that the questions asked in the indirect method help to mitigate distortions that arise from the sensitivity of the subject matter.

Indirect methods used for estimation of IMR and U5MR in Bhutan are the UN_IGME 2010 data, BMIS 2010, and the SEDI 2005. According to UN_IGME 2010, Bhutan's IMR declined from 89 in 1991 to 68 in 2000. The BMIS provides a new IMR estimate of 47 for the year 2006. In terms of U5MR, the IGME 2010 reports a decline from 143 in 1991 to 106 in 2000. BMIS 2010 shows a further decline in U5MR to 69 in 2006.

The SEDI 2005 report used the indirect method to estimate Bhutan's IMR to be 97 in 1991, falling to 50 by 2005.

[50] Estimation Methods Used by the Inter-agency Group for Child Mortality Estimation, 2009

Table 25. Indirect estimates of Infant and Under-Five Mortality Rates, Bhutan, 1991-2006

Indirect Estimates of Infant and Under-Five Mortality Rates, Bhutan			
Year	IMR	U5MR	Source(s)
1991	93	150	SEDI 2005/IGME2010
1996	80	127	SEDI 2005
2000	67	104	IGME 2010
2005	50	75	SEDI 2005
2006	47	69	BMIS2010

With regard to U5MR, the SEDI 2005 estimated U5MR to be 157 in 1991, falling precipitously to 75 by the year 2005. In addition, SEDI also estimated the annual reduction of these mortality rates at five per cent, which is used for calculating these rates for years that have no rates. The projected annual rate of reduction corresponds to the estimated figures, except in 1996 with SEDI, for which the estimated figures for U5MR and IMR are 127 and 80 per 1,000 live births.

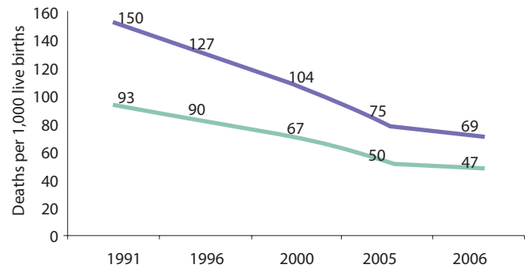
For the years 1991 and 2000, for which there exist multiple estimates, this analysis averages the estimates with equal weight to arrive at a single estimate, which is then input into the trend analysis presented in Table 25 and Figure 22. According to Table 25, which presents estimates of child mortality for Bhutan from 1991 to 2006, the country's IMR has fallen by 49 per cent in this 15 year period, which translates to a 3.3 per cent average annual decline. Similarly, the U5MR has fallen by 54 per cent during the same period that shows an average annual rate of 3.6 per cent decline.

6.3.2. Direct child mortality estimation methodology

Direct estimates: Direct methods of child mortality calculation use data on the date of birth of children, their survival status, and the dates of death or ages at death of deceased children. The direct method requires data that are usually obtained only in specifically designed surveys with birth histories or from vital statistics systems, which generally have incomplete coverage in developing countries.

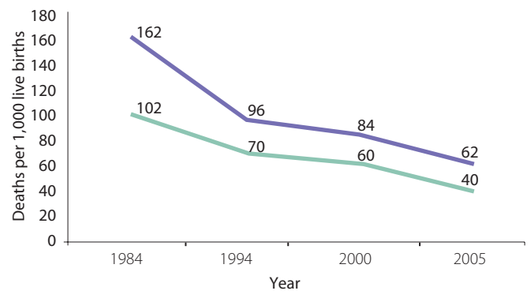
Direct methods used for estimation of Bhutan's IMR and U5MR include the Population and Housing Census of Bhutan (PHCB) 2005 and National Health Surveys (NHS). According to the PHCB 2005, the IMR and U5MR were estimated to be 40 and 62 per 1,000 live births, respectively, in that year, which are lower than the indirect method estimates of 50 and 75 by the SEDI report, published in the same year. NHS estimated the IMR and U5MR to be 102 and 162 per 1,000

Figure 22. Indirect estimates of Infant and Under-Five Mortality Rates, Bhutan, 1991-2006



Note: Horizontal axis not to scale

Figure 23. Direct estimates of Infant and Under-Five Mortality Rates, Bhutan, 1984-2005



live births, respectively, in 1984. The 2000 NHS reports a significant decrease, with IMR and U5MR estimates of 60 and 84, respectively.

Table 26 and Figure 23 report the trend in direct method child mortality estimates from 1984 to 2005. These estimates indicate a 2.9 per cent average annual rate of decline for both IMR and U5MR.

In summary, both direct and indirect methods of child mortality estimation show a strongly positive trend in the reduction of IMR and U5MR in Bhutan between 1984 and 2006. In order to establish a reliable child mortality trend, comparability with other surveys conducted in different years and with other countries, the Inter-agency Group on Child Mortality (IGME) estimates has been used. Figure 23 uses IGME estimates to construct trend lines for IMR and U5MR. The sources used to calculate IGME estimates of child mortality, along with their respective limitations, are detailed in Annex 2.1 of this report.

Table 26. Direct estimates of Infant and Under-Five Mortality Rates, Bhutan, 1984-2005

Direct Estimates of Infant and Under-five Mortality Rates, 1984-2005			
Year	IMR	U5MR	Source(s)
1984	102	162	NHS 1984
1994	70	96	NHS 1994
2000	60	84	NHS 2000
2005	40	62	PHCB 2005

6.3.3. Regional comparison of child mortality estimates

This section positions Bhutan's child mortality estimates within the context of selected countries in South and Southeast Asia. According to IGME data for the year 2010, Bhutan's infant mortality rate is estimated to be 44. This estimate is slightly lower than the BMIS estimate for 2006 and reflects on-track progress towards achievement of MDG 4 to reduce the IMR to 32 by 2015. Figure 24 shows that this estimate is also very close to those for neighbouring countries, including Bangladesh, India, and Nepal.

With regard to under-five mortality, the IGME estimates Bhutan's U5MR to be 56 in the year 2010. This represents a considerable decline from the BMIS estimate of 69 for 2006 and reflects on-track progress towards achievement of the MDG 4 goal to reduce the U5MR in Bhutan to 46 by 2015. However, Figure 25 shows that within the context of selected countries in South Asia, Bhutan's U5MR estimate is only surpassed by India.

6.4. Summary of section on child mortality

Child mortality rate is a key indicator not only of child health and nutrition, but also of the implementation of child survival interventions and, more broadly, of social and economic development. MDG 4 calls for a reduction of child mortality by two thirds by 2015 compared with the 1990 baseline. For Bhutan, this means reducing the U5MR from 56 (2010 estimate) to 44 per 1,000 live births, and the IMR from 44 (2010 estimate) to 32. Achieving the reduction of the U5MR by 21 per cent and the IMR by 27 per cent by 2015 remains a challenge.

Generating accurate child mortality estimates is not easy due to the limited availability of high-quality data for Bhutan.

Box 3. The Inter-agency Group on Child Mortality Estimation (IGME)

The Inter-agency Group on Child Mortality Estimation was established in 2004 to share data on child mortality, harmonize estimates within the UN system, improve methods for child mortality estimation, report on progress towards the Millennium Development Goals and enhance country capacity to produce timely and properly assessed estimates of child mortality.
The Inter-agency Group for Child Mortality Estimation (IGME) is committed to producing the best estimates possible by using advanced statistical methods and working jointly with countries in order to use the most reliable available data. The child mortality estimates are based on the work of IGME, which includes UNICEF, WHO, UNFPA and the World Bank. This group updates the estimates annually based on a detailed review of all newly available data points and assessing data quality. At times, this review will result in adjustments to previously reported estimates. The IGME estimates for child mortality may differ from national estimates or other reported estimates from academic institutions, due to different methods applied. It is important to point out that in the absence of error-free data there will always be substantial uncertainty around data or estimates.

Technical Advisory Group (TAG): The IGME is advised by an independent Technical Advisory Group (TAG) which is chaired by Professor Kenneth Hill from Harvard University and includes other leading scholars from various universities and institutes, as well as independent experts in the field of demography. The role of the TAG is to advise the IGME on methodological issues related to the estimation of child mortality and evaluating data quality.

Figure 24. Under-Five Mortality Rates for selected Asian countries, IGME, 2010

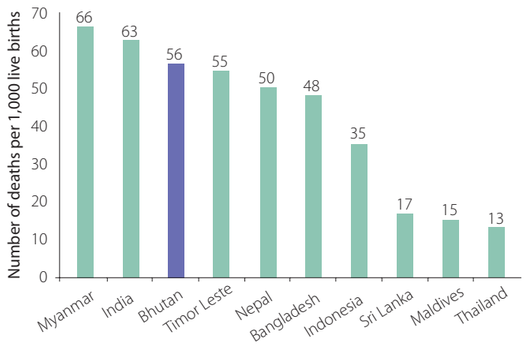
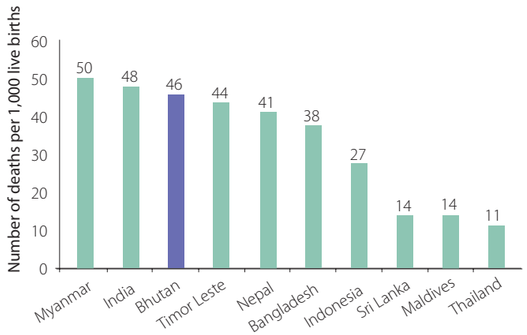


Figure 25. Infant Mortality Rates for selected Asian countries, IGME, 2010



The country still has to improve its vital registration systems in order to accurately record all births and deaths. Different surveys, such as census data with direct estimates (obtained from interviews) and BMIS data with indirect estimates, are currently used as the primary sources of data on child mortality. To establish a reliable child mortality trend, as well as comparability with surveys conducted in different years and in other countries, estimates by the Inter-agency Group on Child Mortality (IGME) have been used. The IGME uses all available national level data on child mortality, including data from vital registration systems, population censuses and household surveys. To estimate the under-five mortality trend series, a statistical model was fitted to data points that meet the quality standards of IGME, and then used to predict a trend line that was extrapolated to a common reference year, set at 2010.

Nevertheless, all approaches show a marked decline of approximately 50 per cent in the U5MR and the IMR between 1990 and 2010. According to IGME estimates, under-five mortality rate has dropped from 139 per 1,000 live births in 1990 to 56 deaths per 1,000 live births in 2010. Extrapolating the trend, IGME estimates, as well as the other approaches, indicate that Bhutan will manage to reach the target of MDG 4 by 2015.

Globally, under-five mortality rates are positively influenced by the benefits of higher incomes, including improved living conditions, better child and maternal nutrition as well as greater access to basic services, such as healthcare and education. The same factors are likely to apply in Bhutan. The marked reduction of child mortality thus far is an indication that the government has successfully invested in healthcare and education to improve outcomes.

Despite the clear declining trend in under-five mortality, strong disparities between the different socio-economic groups and between rural and urban areas remain. Under-five mortality is twice as high among rural children and those whose parents have no formal education than among urban children and those whose parents have secondary-level education. Furthermore, alongside neighbouring countries, Bhutan's absolute mortality levels do not compare well. According to the IGME estimates, only India and Myanmar exhibit a higher U5MR (among selected countries for which there are data).

The leading primary causes of U5MR in Bhutan in 2006 included neonatal causes, pneumonia and diarrhoea. Among the neonatal causes, infections, inability to breathe at birth and pre-maturity comprise the most common causes of death.[51] All of these illnesses can, to a large extent, be addressed by antenatal and postnatal healthcare including institutional delivery, and education. Pneumonia and diarrhoea have been discussed in detail in chapter 5. Given the large number of deaths caused by infections at birth, there is need for improvement of both the quality of healthcare as well as health-related education. Further research is recommended to look into the causes of pre-maturity and lack of oxygen at birth, in order to develop specific interventions.

More broadly, a more equity-focused approach to healthcare by policy makers is needed. Policy makers should design interventions that empower women, remove financial and social barriers to accessing critical healthcare services, develop innovations that facilitate access to these services for the poor and rural, and increase accountability of local health systems.

[51] Child Health Epidemiology Review Group (CHERG), World Health Organization, Nov 2006

7. Reproductive Health

7.1. Introduction

In this report, reproductive health spans fertility, family planning, safe motherhood including antenatal and postnatal care, early childbearing and the health of their infants. Reproductive health bears strongly on the position and rights of women, both as mothers and wives or partners.

The Reproductive Health Programme of the Ministry of Health began as the Maternal and Child Health (MCH) programme in the 1970s. The primary concerns at that time were to reduce high maternal mortality and infant mortality, and to address the high population growth rate in Bhutan. However, with the need to address the broader aspects of reproductive health and as per recommendations of the International Conference on Population and Development in 1994, Bhutan adopted a broader concept of reproductive health in 1997.

The National Reproductive Health Strategy, which will be implemented from 2012 to 2017, focuses on maternal and newborn care, family planning, prevention of unsafe abortion, prevention of reproductive tract infections (RTI) and sexually transmitted infections (STI) including HIV, cervical cancer and gynaecological issues, adolescent sexual reproductive health and sexual and reproductive needs of men. Over the decades, Bhutan has experienced substantial progress in the key indicators of population and reproductive health. The population growth rate declined from 3.1 per cent in 1994 to 1.8 in 2005-2010. Similarly, the Total Fertility Rate TFR decreased from 5.6 in 1994 to 2.6 in 2010 (BMIS). This is still above the replacement level (2.1),which the RGoB had hoped to reach by 2012. However, further decrease in the TFR is expected.

Family planning, apart from being a means to control population, is a very important instrument in a society where women have the right to determine the number of children they will have. Apart from this, the use of condoms is critical in preventing the spread of STIs, including HIV and AIDS. The overall Contraceptive Prevalence Rate (CPR), among all women, aged 15 and 49 years in Bhutan is approximately 48 per cent.[52] Limited availability and insufficient knowledge of contraceptives can limit their use, as well as social factors such as opposition to its use, or health concerns. In Bhutan, women with children appear to see contraceptives primarily as a means to regulate or spread child birth period.

Safe motherhood covers antenatal care, safe institutional delivery, and postnatal care. Antenatal care and postnatal care are considered essential services by any society to safeguard and improve the health of women and their newborns. Antenatal care (ANC), in particular, is a critical intervention as it acts as a key gateway towards institutional delivery, skilled birth assistance, postnatal care and nutrition education concerning both mother and infant. The World Health Organization recommends at least four ANC visits, which 77 per cent of Bhutanese women obtain. However, the RGoB has recently increased its recommendation to eight visits. ANC is also seen as a key intervention in which to transmit knowledge of HIV to pregnant women, in particular, mother-to-child transmission.

Skilled birth assistance and institutional delivery are crucial for safeguarding the health of both mother and child during and immediately after delivery. Proper hygienic

[52] Estimate BMIS, 2010

conditions during delivery and skilled medical assistance can greatly reduce the risks due to infections, post-partum haemorrhage and other complications. In this respect, it should be mentioned that the foremost cause of under-five mortality in Bhutan is due to neonatal complications (see Chapter 6, Section Summary). Though the majority of pregnant Bhutanese women make use of health facilities for delivery, there remains a significant disparity in access between different socio-economic groups.

Postnatal Care (PNC) particularly within 24 hours is equally important as antenatal care. It not only provides an opportunity to treat complications for both the mother and her newborn arising from the delivery, it also offers new mothers critical information on how to care for herself and her infant. Although 71 per cent of newborns in Bhutan receive some form of PNC, concerns remain regarding its quality and timeliness.

Early childbearing is often associated with early marriages. In Bhutan, childbearing among female youth aged 15-18 is 59 births per 1000 female youth. While this is Bhutan's lowest recorded level of childbearing, the number of female youth concerned is still considerable. Because early childbearing poses significant risks for both mother and child, the issue remains an important public health concern.

7.2. Fertility and fertility preferences

In BMIS 2010, total fertility rates and adolescent birth rates are calculated by using information on the date of last birth of each woman, and the one-year period (1-12 months) preceding the survey. Rates are underestimated by a very small margin due to the absence of information on multiple births (twins, triplets, etc.) and on women having multiple deliveries during the one year period preceding the survey. The adolescent birth rate (age-specific fertility rate for female youth aged 15-19) is defined as the number of births to female youth aged 15-19 years during the one year period preceding the survey, divided by the average number of female youth aged 15-19 (number of women-years lived from the age of 15 through 19, inclusive) during the same period, expressed per 1,000 female youth. The total fertility rate (TFR) is calculated by summing the age-specific fertility rates calculated for each of the five-year age groups of women, from the age of 15 through 49. The TFR is expressed as the average number of births per woman. It denotes the average number of children to which a woman will have given birth by the end of her reproductive years if current fertility rates prevailed.

It is imperative to have insight into the fertility preferences of individuals, which are considered to have an important bearing on fertility outcomes and contraceptive use behaviour. Changes in the environment of the individual, including social, economic, and demographic conditions can make the individual reformulate his or her fertility preferences.

This analysis assesses the fertility preferences of women aged 15-49 years including their desire for their last birth and unmet need for contraception, and how these preferences vary with demographic backgrounds.

7.2.1. Fertility rates

The key measure of population growth is the total fertility rate (TFR) of women in their reproductive years. Table 27 shows Bhutan's TFR to be 2.6, indicating that women have, on average, 2.6 children in their lifetime. This figure has held steady since the 2005 census estimate and remains well above the RGoB goal of reaching the population replacement rate of 2.1. The TFR is highest in Gasa, Pema Gatshel, and Zhemgang (4.0, 4.0, and 4.1, respectively) and lowest in Tsirang, Samdrup Jongkhar, and Chhukha (2.1, 2.0, and 1.9, respectively) where it is at or below replacement rate. Rural women give birth to more children, on average, than urban women and women from the poorest quintile have, on average, one more child in their lifetime than women from the richest quintile (3.1 vs. 2.0, respectively).

Table 27 also shows the age-specific fertility rate for women aged 15-49 by five-year age groups. It shows that fertility is highest among women aged 20-29. The data also indicate that women with no formal education and women from the poorest wealth quintile give birth earlier in life than women with secondary level or above education, and/or women from the wealthiest households. In all age groups except the one of 45-49 years, women in rural areas have higher fertility rates than women in urban areas.

Another measure of fertility is the number of children ever born to women. Table 28 shows that the mean number of children ever born to all women is 2.2 and is 2.8 among currently married women. The number of children ever born increases steadily with age. Among women at or near the end of their reproductive age (45-49) the mean number of children ever born is 4.5 for all women and 4.8 for currently married women. Table 28 also shows the number of living children. This figure correlates closely with the number of

Table 27. Age-specific fertility rates among women aged 15-49, Bhutan, 2010

		Age group							Total Fertility Rate
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	
Dzongkhag	Bumthang	41	177	206	97	45	31	*	3.0
	Chhukha	29	120	101	77	36	12	*	1.9
	Dagana	124	189	112	81	71	20	*	3.0
	Gasa	332	272	187	*	*	*	*	4.0
	Haa	53	120	150	71	24	13	5	2.2
	Lhuntse	67	133	153	34	29	36	*	2.3
	Monggar	138	155	147	103	81	13	26	3.3
	Paro	42	192	154	117	30	10	26	2.9
	Pema Gatshel	163	206	203	148	16	57	*	4.0
	Punakha	35	177	201	62	67	12	*	2.8
	Samdrup Jongkhar	20	145	98	55	55	34	*	2.0
	Samtse	63	190	122	96	48	*	*	2.6
	Sarpang	37	176	163	95	28	*	5	2.5
	Thimphu	34	124	139	50	35	20	38	2.2
	Trashigang	86	127	145	95	77	41	*	2.9
	Trashi Yangtse	54	179	164	145	113	13	*	3.3
	Trongsa	95	163	119	110	40	20	*	2.7
	Tsirang	60	102	118	93	33	9	*	2.1
	Wangdue Phodrang	51	181	119	59	69	*	*	2.4
	Zhemgang	150	248	173	71	124	58	*	4.1
Area	Urban	30	145	132	73	49	7	21	2.3
	Rural	77	164	144	89	51	22	5	2.8
Education	None	113	182	127	90	48	17	4	2.9
	Primary	70	149	112	45	84	32	*	2.5
	Secondary+	29	128	177	89	20	34	116	3.0
Wealth Quintile	Poorest	112	179	135	107	62	20	10	3.1
	Second	95	138	129	97	61	37	1	2.8
	Middle	97	190	153	80	53	20	*	3.0
	Fourth	36	182	127	69	46	7	10	2.4
	Richest	10	101	151	75	33	7	26	2.0
Total		**59**	*	*	*	*	*	*	**2.6**

children ever born among younger women. However, the gap increases with age until the discrepancy between the number of children ever born and the number who are living for all women aged 45-49 is greater than one (4.5 vs. 3.2, respectively), meaning that women in this age group have lost, on average, 1.3 children during their lifetime.

92 per cent of women aged 15-19 have never given birth to a child, a number that gets cut in half to 46 per cent for women aged 20-24. However, among married women only 50 per cent of 15-19 year olds have never given birth, indicating that childbearing follows shortly after marriage, even among female youth in this age group. For married women aged 45-49, just over half (51 per cent) have given birth to five or more children and only 1.4 per cent have never given birth, suggesting a very low primary infertility rate in Bhutan.

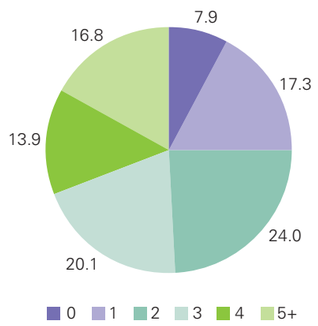
Figure 26 illustrates data presented in Table 28 showing that more than 90 per cent of married women aged 15-49 have given birth to at least one child and approximately one in six women has given birth to five or more children.

Figure 27 compares the mean number of children ever born to married women aged 15-49 to the mean number of their children who are still living. It shows that among younger women, there is little difference between the two, indicating a low prevalence of deaths. Among older women aged 45-49, the gap between the average number of children ever born and the average number of living children is 1.5 children. This means that approximately 30 per cent of the children ever born to women in this age group have died. There are two main reasons why the gap increases with women's age. First, the likelihood that a woman's child

Table 28. Distribution of number of children ever born to married women aged 15-49, Bhutan, 2010

		Number of children ever born to all women aged 15-49 (% of women)											Total number of women aged 15-49	Children ever born	No. of living children
		0	1	2	3	4	5	6	7	8	9	10+			
Age	15-19	91.5	7.4	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,052	0.1	0.1
	20-24	46.3	31.5	18.0	3.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	2,502	0.8	0.8
	25-29	19.7	24.0	32.5	16.5	5.3	1.6	0.2	0.0	0.0	0.0	0.0	2,721	1.7	1.6
	30-34	6.3	9.9	29.8	27.8	16.7	6.7	2.2	0.4	0.1	0.1	0.0	2,219	2.7	2.4
	35-39	3.6	5.8	17.9	26.8	22.5	14.0	5.2	3.1	0.8	0.2	0.2	1,856	3.4	2.9
	40-44	4.4	3.9	11.7	20.1	23.1	16.8	9.3	4.7	3.1	1.7	1.1	1,561	4.0	3.1
	45-49	3.5	3.5	9.9	19.6	15.9	15.6	12.9	7.6	6.6	2.1	2.8	1,106	4.5	3.2
Total		**27.7**	**14.4**	**18.9**	**15.6**	**10.6**	**6.4**	**3.1**	**1.6**	**1.0**	**0.4**	**0.4**	**14,018**	**2.2**	**1.8**
		Children ever born to married women aged 15-49 (% of women)											Total number of women aged 15-49	Children ever born	Number of living children
		0	1	2	3	4	5	6	7	8	9	10+			
Age	15-19	50.0	43.2	6.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	312	0.6	0.5
	20-24	19.6	46.1	27.8	5.7	0.7	0.1	0.1	0.0	0.0	0.0	0.0	1,568	1.2	1.2
	25-29	10.1	25.5	37.1	18.8	6.3	1.9	0.3	0.0	0.0	0.0	0.0	2,257	1.9	1.8
	30-34	1.6	8.6	30.7	30.2	18.6	7.5	2.2	0.4	0.1	0.1	0.0	1,923	2.9	2.6
	35-39	1.5	4.2	17.9	27.3	24.0	15.1	5.5	3.3	0.8	0.2	0.2	1,650	3.6	3.0
	40-44	2.3	2.8	10.8	21.0	23.9	17.7	9.8	5.1	3.5	1.9	1.2	1,363	4.2	3.2
	45-49	1.4	2.6	8.7	19.3	16.9	16.7	13.5	7.9	7.4	2.4	3.1	957	4.8	3.3
Total		**7.9**	**17.3**	**24.0**	**20.1**	**13.9**	**8.4**	**4.0**	**2.1**	**1.3**	**0.5**	**0.5**	**10,029**	**2.8**	**2.4**

Figure 26. Distribution of number of children ever born to married women aged 15-49, Bhutan, 2010



will die increases with the age of the woman and her child. Second, Bhutan's child mortality rates have decreased dramatically over the past three decades.

7.2.2. Desire for last birth

The BMIS questionnaire asked women who gave birth in the two years preceding the survey and who were pregnant at the time of the survey whether they wanted their child at the time. If women said "No", they were asked if they would have wanted the child at a later date or not at all. Table 29 shows that the overwhelming majority of women who were pregnant or gave birth in the two years preceding the survey wanted to get pregnant at the time (82 per cent). This figure holds rather steady across all demographic groups except among women aged 35-49 and women who have four or more children, only 66 per cent and 64 per cent of whom wanted the pregnancy at that time. This decrease and similarity between the two groups should be expected as older women and those who have the most children are often the same women. Nevertheless, nearly one out of five births and pregnancies was unwanted at the time (18 per cent).

Figure 27. Mean number of children ever born and mean number of living children among married women aged 15-49, Bhutan, 2010

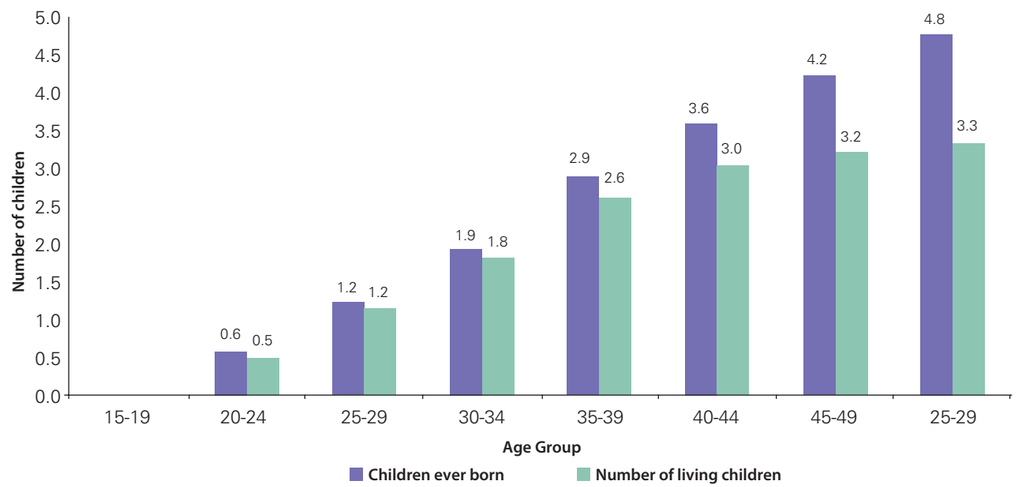


Table 29. Planning status of births in the two years preceding the survey (including pregnancies) of all women, Bhutan, 2010

		Planning Status				Total	Total number of births and pregnancies
		Wanted then (%)	Wanted later (%)	Did not want any more children (%)	Missing / Don't know (%)		
Age	15-24	87	9.4	3.6	0.0	100	1,100
	25-34	82.7	4.9	12.4	0.0	100	1,505
	35-49	66	3	31	0.0	100	336
Area	Urban	83.5	6.4	10.1	0.0	100	890
	Rural	81.9	6.3	11.7	0.0	100	2,050
Education	None	82.2	4.7	13.1	0.0	100	1,808
	Primary	80.7	7.4	11.9	0.0	100	371
	Secondary +	83.6	9.9	6.5	0.0	100	761
Wealth index quintiles	Poorest	81.2	6.2	12.6	0.0	100	566
	Second	80.5	6.1	13.4	0.1	100	545
	Middle	79.4	7.9	12.7	0.0	100	582
	Fourth	85.3	5.9	8.8	0.0	100	660
	Richest	85.1	5.8	9.1	0.0	100	587
Number of living children	0	90.2	8.4	1.3	0.2	100	242
	1	89	8.8	2.2	0.0	100	1,015
	2	85.9	5.2	8.9	0.0	100	802
	3	75.5	4.7	19.8	0.0	100	435
	4+	63.6	3.4	33.0	0.0	100	447
Total		**82.4**	**6.4**	**11.2**	**0.0**	**100**	**2,940**

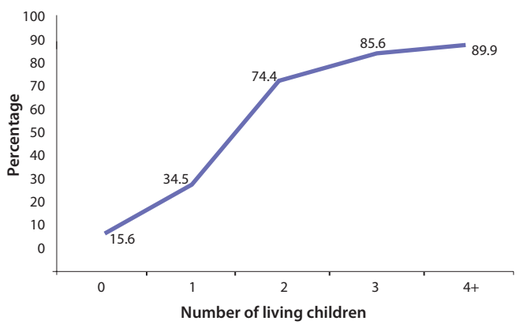
Table 29 also shows that the percentage of women who state that they want no more children increases rapidly with the number of living children from only one per cent among women with no living children at the time to 33 per cent among women with four or more children. The percentage of women aged 15-49 who want no more children is also higher among those with no formal education or who are from the poorest quintile of households. This outcome is probably related to the greater number of children these women have and at an earlier time in their lives than their counterparts who have secondary education or are from wealthy households.

Table 30 looks a little more closely at the desire to limit childbearing by presenting data on the percentage of women who give birth or were pregnant in the two years preceding the survey who indicated that they did not want any more children at the time when they got pregnant. It shows that this figure climbs steadily with the number of living children that women have. Among women with no living children who got pregnant or had a child, only 16 per cent indicated that they did not want to have any children. This figure climbs to 74 per cent among women with two living children and to 90 per cent for women with four or more children. These data indicate that the overwhelming majority of women, on average, prefer smaller families (i.e. two or fewer children).

The data also show that women in the rural areas who have 0-2 living children are more likely to want another child than their counterparts in urban areas. However, these differences dissipate among women with three children or more in which more than 80 per cent of women from nearly every demographic group indicate that they do not want any more children.

Figure 28 illustrates the dramatic increase in the percentage of women who state that they did not want any more children at the time of their last pregnancy. It shows that while only 16 per cent of women with no living children did not want to have any children, 90 per cent of women with four or more children did not want another child.

Figure 28. Percentage of women aged 15-49 who were pregnant or gave birth in two years preceding the survey not wanting any more children when they got pregnant by their number of living children, Bhutan, 2010



7.3. Family planning

Family planning services are an important component of comprehensive reproductive health services, an integral part of the primary healthcare system.

BMIS 2010 data indicate that 66 per cent of all married or in union women use some form of contraception. The most popular method is injectables, which are used by 29 per cent of married women and women in union in Bhutan. Sexually active adolescents are far less likely to use contraception than older women. Only about 30 per cent of married young women and those in union aged 15-19 currently use a method of contraception compared with 57 per cent of 20-24 year olds and 71 per cent of 40-44 year olds. As expected, married women with children are more likely to use contraception then women who have not had children.

7.3.1. Contraception

The use of contraception in Bhutan has been increasing over the past decade. Traditionally, Bhutan has calculated the Contraceptive Prevalence Rate (CPR) as the percentage of all women aged 15-49 who use some method of contraception, regardless of their marital status or whether they are sexually active. As Figure 29 indicates, the CPR, under this definition, has climbed from 28 per cent in 2003, as estimated by the Bhutan Living Standard Survey (BLSS), to approximately 48 per cent in 2010, as estimated by the BMIS 2010.

The global definition, however, calculates the CPR for married or in union women only. This helps to partially eliminate women who have no need for contraception because they are not sexually active. Under this definition, contraception use has been increasing as well, albeit at a slower rate. The BMIS estimates a CPR for married women of 66 per cent, which is an increase over the BLSS CPR estimate of 59 per cent for married women in 2003. In a separate

Table 30. Planning status of births in the two years preceding the survey (including pregnancies) by number of living children, Bhutan, 2010

	Number of living children												Total number of births and pregnancies
	0		1		2		3		4+				
	Wanted no more children (%)	Total number of married women aged 15-49	Wanted no more children (%)	Total number of married women aged 15-49	Wanted no more children (%)	Total number of married women aged 15-49	Wanted no more children (%)	Total number of married women aged 15-49	Wanted no more children (%)	Total number of married women aged 15-49			
Age													
15-24	18.0	170	33	610	73.7	273	[75.8]	43	*	4			1,100
25-34	9.7	72	35.3	391	74.3	490	86.3	329	91.0	224			1,505
35-49	*	.	*	14	[80.0]	39	88.7	63	88.5	219			336
Area													
Urban	11.4	97	28.3	326	75.7	268	81.1	114	89.6	85			890
Rural	18.4	145	37.4	689	73.7	534	87.2	321	90.0	362			2,050
Education													
None	17.1	108	36.8	496	71.8	489	85.6	334	89.3	380			1,808
Primary	[22.3]	24	42.8	120	77.5	126	92.4	53	90.4	47			371
Secondary +	12.7	109	29.1	398	79.0	186	78.0	48	*	19			761
Wealth index quintiles													
Poorest	[6.4]	30	43.6	174	68.3	132	87.5	101	88.6	129			566
Second	[19.7]	33	36.1	167	74.2	147	89.9	87	90.5	110			545
Middle	31.8	46	31.3	210	73.9	150	90.5	83	89.6	94			582
Fourth	7.7	63	34.7	228	75.1	194	75.5	106	93.1	68			660
Richest	[14.1]	69	29.3	235	78.5	179	87.2	58	[88.2]	45			587
Total	**15.6**	**242**	**34.5**	**1,015**	**74.4**	**802**	**85.6**	**435**	**89.9**	**447**			**2,940**

calculation not shown here, the CPR for unmarried, sexually active women in Bhutan is only 26 per cent. This estimate is very low and should raise concern for policy makers who are interested in safeguarding women's reproductive and sexual health. Along with unmarried women who are not sexually active, this figure contributes to the lower CPR for all women as shown in Figure 29.

This analysis also assessed the percentage of married women aged 15-49 who use the male condom by their attitude toward domestic violence (as a potential proxy for intra-household bargaining power). As shown in Table 31, women who believe domestic violence is justified report a statistically lower use of the male condom than women who do not believe domestic violence is justified (7 per cent versus 5 per cent, respectively). This difference is most prominent among women with education and those from the richest households. Women in these groups report higher use of the male condom than women with no education and from poorer households regardless of whether they accept domestic violence.

Figure 29. Contraceptive Prevalence Rate (CPR) for all women aged 15-49 and for married women aged 15-49, Bhutan, 2003-2010

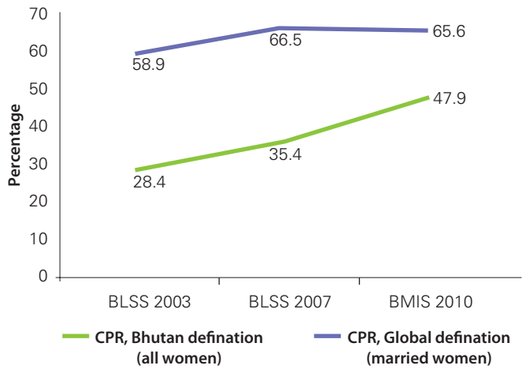


Table 31. Percentage of women aged 15-49 years currently married or in union who are using (or whose partner is using) a contraceptive method, by women's attitude towards domestic violence, Bhutan, 2010

		Does not accept domestic violence for the five specified reasons		Accepts domestic violence for any of five specified reasons	
		Uses male condom (%)	No. of women currently married or in union	Uses male condom (%)	No. of women currently married or in union
Area	Urban	12.9	1,153	10	1,833
	Rural	3.9	2,004	2.8	5,039
Age	15-19	4.4	75	2.1	236
	20-24	4.7	446	6.5	1,122
	25-29	11.5	786	7	1,472
	30-34	6.4	601	5.1	1,322
	35-39	10.5	527	3.5	1,122
	40-44	2.6	424	3.2	939
	45-49	2	299	1.3	658
Education	None	3.5	2,082	2.6	5,004
	Primary	8.2	341	4.7	823
	Secondary +	17.2	734	15	1,044
Wealth index quintiles	Poorest	0.9	561	1.4	1,294
	Second	1.2	509	1.7	1,380
	Middle	4.3	535	3.3	1,402
	Fourth	8	642	5.2	1,547
	Richest	15.5	912	12.8	1,248
Number of living children	0	5.1	270	7.1	566
	1	11.9	575	6.7	1,293
	2	8.4	880	5.9	1,760
	3	5.3	679	3.7	1,521
	4+	4.4	754	2.3	1,731
Total		**7.2**	**3,158**	**4.8**	**6,871**

Table 32. Percentage of women aged 20-49 currently married or in union who were who are using (or whose partner is using) a contraceptive method by their early marriage status, Bhutan, 2010

		Contraception prevalence rate among married women aged 20-49 who were:									
		Married before the age of 18				Married at or after the age of 18					
		No method (%)	Any modern method (%)	Any method (%)	Number of married women 20-49	No method (%)	Any modern method (%)	Any method (%)	Number of married women 20-49		
Area	Urban	28.5	71.3	71.5	895	38.9	60.6	61.1	2,050		
	Rural	28.3	71.7	71.7	2,491	34.5	65.3	65.5	4,282		
	20-24	32.8	67	67.2	608	50.2	49.7	49.8	959		
	25-29	26.3	73.6	73.7	719	42.3	57.3	57.7	1,538		
	30-34	23.6	76.4	76.4	663	28	71.7	72	1,260		
	35-39	26.3	73.7	73.7	626	24.3	75.4	75.7	1,024		
	40-44	27.2	72.8	72.8	489	30.1	69.4	69.9	874		
	45-49	41.3	58.7	58.7	281	40.7	58.7	59.3	676		
Education	None	28	71.9	72	2,740	33.6	66.1	66.4	4,153		
	Primary	31.5	68.4	68.5	466	32.6	66.9	67.4	643		
	Secondary	24.2	75.8	75.8	180	43.4	56.1	56.6	1,536		
Wealth index quintiles	Poorest	24.8	75.2	75.2	742	33.4	66.3	66.6	1,033		
	Second	28.2	71.8	71.8	700	34.4	65.5	65.6	1,093		
	Middle	26.5	73.5	73.5	669	36.6	62.8	63.4	1,184		
	Fourth	32	67.9	68	744	33.9	65.8	66.1	1,410		
	Richest	30.6	69	69.4	531	39.7	59.9	60.3	1,611		
Number of living children	0	91.4	8.6	8.6	67	85.9	13.9	14.1	608		
	1	49	51	51	361	42.9	56.8	57.1	1,371		
	2	24.5	75.3	75.5	931	28.7	71	71.3	1,696		
	3	22.4	77.5	77.6	890	24.4	75.2	75.6	1,309		
	4+	25.8	74.2	74.2	1,137	26.4	73.1	73.6	1,349		
Total		**28.3**	**71.6**	**71.7**	**3,386**	**35.9**	**63.8**	**64.1**	**6,332**		

While not shown here, a separate analysis shows that 11 per cent of married women, who have comprehensive knowledge of HIV transmission, report on using the male condom as a preferred choice of contraception, compared with only five per cent of women who do not have comprehensive knowledge of HIV.

7.3.1.1. Contraceptive prevalence and early marriage

Table 32 shows that 72 per cent of currently married (or in union) women aged 20-49 who married before age 18 use any method of contraception compared with 64 per cent of women who married at or after age 18, a difference which is statistically significant. This disparity in use of contraception by age of marriage is most significant among women from urban areas, with secondary level education, and in the age group 20-29.

Irrespective of age at first marriage, women who have no living children exhibit the lowest contraceptive prevalence rate. Eight per cent of women married before age 18 and 14 per cent of women married at or after age 18 use contraception. The use of contraception more than quadruples for women who have one living child (51 per cent and 57 per cent, respectively). The highest rates of contraceptive use are reported by women in their thirties and those who have at least two living children.

Figure 30 illustrates the significant gap in contraceptive use among younger women by their age of marriage. The graph shows a significant 17 percentage point gap in the use of contraception among 20-24 year-old women by whether they were married before or after the age of 18. This gap dissipates to a statistically insignificant difference by the age of 35.

The key explanation behind these data can be seen in Figure 31, which shows the contraceptive prevalence rate of currently married women by age of marriage, controlling for the number of living children they have. As can be seen clearly, given the equivalent number of living children, married women use contraception at the same rate regardless of their age at first marriage.

The reason younger women who married at or after the age of 18 use contraception at a lower rate than their peers who married early is because they have less children on average. Women aged 20-49 married before the age of 18 have had, on average, 3.4 children ever born compared with women married at or after the age of 18 who have had, on average, 2.6 children ever born. Overall, 65 per cent of women in the sample married at or after age 18. However, 90 per cent of women aged 20-49 with no living children, and 79 per cent of women with one living child first married at or after the age of 18. These data show that contraceptive prevalence among women aged 20-49 is primarily a function of the number of living children a woman has, rather than a function of their age at first marriage. These data do not provide support for the hypothesis that those women who marry early have a lower rate of contraceptive use due to lack of information, access, or intra-household bargaining power.

Figure 30. Percentage of women aged 20-49 currently married or in union who are using (or whose partner is using) any contraceptive method by their early marriage status, Bhutan, 2010

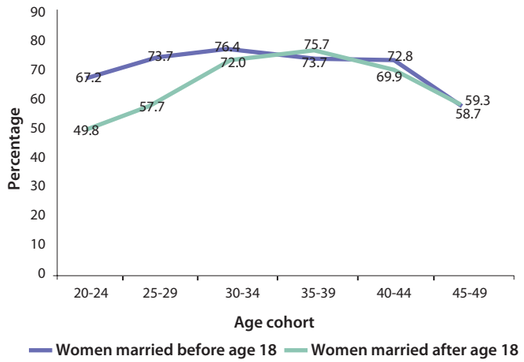


Figure 31. Percentage of women aged 20-49 currently married or in union who are using (or whose partner is using) any contraceptive method by their number of living children, Bhutan, 2010

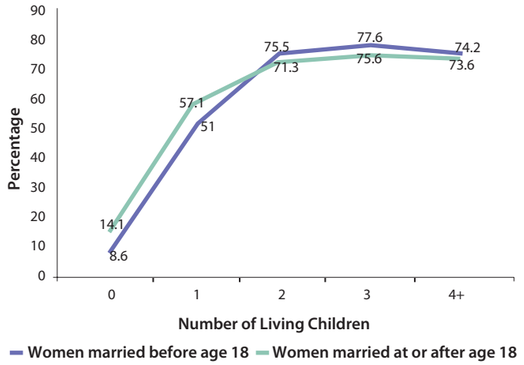


Table 33. Percentage of women currently married or in union aged 15-49 who are using a contraceptive method by their literacy status, Bhutan, 2010

		Not Literate			Literate			Total number of women aged 15-49
		male condom (%)	any method (%)	Total number of women aged 15-49	male condom (%)	any method (%)	Total number of women aged 15-49	
Area	Urban	6.4	67.9	1,663	17.1	59	1,324	2,986
	Rural	2	67.9	5,985	9.9	57	1,058	7,043
Age	15-19	2.3	29.8	215	3.6	31	97	312
	20-24	2.5	59	980	11.9	52.4	588	1,568
	25-29	3.4	66.2	1,463	18.2	56.5	795	2,257
	30-34	3.2	75.1	1,462	12.9	68.6	461	1,923
	35-39	3.7	75.9	1,409	18	68.8	241	1,650
	40-44	2.7	72.4	1,215	5.3	59.2	148	1,363
	45-49	1.4	59.5	904	[3.3]	[52.6]	53	957
Education	None	2.8	67.8	6,870	6.3	56.1	216	7,087
	Primary	4.2	68.7	777	8.7	61.2	387	1,165
	Secondary +	.	.	.	15.9	57.7	1,778	1,778
Wealth index quintiles	Poorest	1.1	69.5	1,773	4.5	59.4	82	1,855
	Second	1.4	67.3	1,744	3.6	44.9	144	1,888
	Middle	2.7	66.9	1,653	8.8	54.5	285	1,937
	Fourth	4.2	68.7	1,637	11.3	59.7	551	2,189
	Richest	7.9	66.4	840	17.7	59.6	1,320	2,160
Total		**2.9**	**67.9**	**7,648**	**13.9**	**58.1**	**2,382**	**10,029**

7.3.1.2. Contraceptive prevalence and literacy

Women with a higher level of education consistently exhibit better reproductive health outcomes than women with little to no formal education. In addition to acquiring data on women's educational attainment, the BMIS 2010 assessed the literacy of women on their achievement of secondary level education and for women with no or only primary level education, on their ability to read a simple sentence.

This analysis assesses the percentage of currently married (or in union) women aged 15-49 who use any method of contraception, and more specifically a male condom, by their literacy status. As with Table 32, Table 33 shows that both literate and non-literate women report the same level of overall contraceptive use after controlling for the number of living children. However, the choice of contraceptive method differs by women's literacy status.

Literate women are nearly five times as likely to use a male condom than women who are not literate (14 per cent versus 3 per cent). Literate women are considerably more likely to be younger, urban, and from the wealthier quintiles of households. These are the same groups of women who have a higher level of comprehensive knowledge of HIV. It may be that literate women are choosing male condoms as their preferred choice of contraception, in part, because of their higher rate of knowledge about the transmission modes of HIV.

Table 32 also suggests that the disparity in preference for male condoms by women's literacy status is highest among women from urban areas and those from wealthier households. This may suggest that some women who live in rural or remote areas or who are from poorer households, who would otherwise chose a male condom as the preferred choice for contraception, may not, because of lack of access. The data in Table 33 also show a disproportionately high disparity in use of a male condom by women's literacy status among those who have one or two living children. This could be because literate women with this family size are more likely to use a male condom as a limiting or spacing method in family planning than non-literate women who have, on average, larger families.[53]

[53] BMIS, 2010

7.3.2. Unmet need for contraception

Unmet need refers to women and couples who do not want another birth within the next two years, or ever, but are not using a method of contraception. Studies showed that unmet need results from growing demand, service delivery constraints, lack of support from communities and spouses, misinformation, financial costs, and transportation restrictions.

The BMIS 2010 indicates that 12 per cent of women in Bhutan report an unmet need for contraception. Total unmet need for contraception is simply the sum of unmet need for spacing and unmet need for limiting.[54] Spacing is creating an interval of desired length between consecutive births, limiting is the preventing of any further pregnancies. Unmet need is higher for younger age 15-19 (27 per cent) than for women aged 45-49 (7 per cent). Unmet need is slightly higher for limiting (7 per cent) than for spacing (5 per cent).

However, further analysis was done to assess the unmet need for contraception among married women aged 15-49 years against their knowledge of mother-to-child transmission of HIV and their attitudes towards domestic violence. No significant difference was found. Very little difference exists in the prevalence of unmet need for contraception among women aged 20-49 years between those who married before and after 18 years of age (see Table 34). No significant differences were found either between women who received postnatal care and those that received no care.

This analysis considers unmet need for contraception among married women aged 15-49 by literacy status to examine the relationship between literacy and the decision of women to use contraception.

Unmet need for contraception among married women aged 15-49 is higher among literate women (15 per cent) than among the illiterate women (11 per cent). Among rural women unmet need is higher than among urban women. The difference in unmet need between rural and urban women is more pronounced among literate women (18 per cent versus 13 per cent, respectively) than among non-literate women (11 per cent versus 8 per cent, respectively). This could be attributed to factors like opposition to contraception use,

Table 34. Prevalence of unmet need for contraception among women aged 20-49, as a function of their early marriage, Bhutan, 2010

		% of currently married women aged 20-49 having an unmet need for contraception, who:				Total number of women aged 20-49
		married after the age of 18		married before the age of 18		
		%	Total number of women aged 20-49	%	Total number of women aged 20-49	
Area	Urban	11.0	2,050	8.3	895	2,945
	Rural	12.4	4,282	10.2	2,491	6,773
Age group	20-24	19.9	959	11.5	608	1,568
	25-29	15.9	1,538	10.6	719	2,257
	30-39	9.7	2,284	9.7	1,288	3,573
	40-49	6.6	1,550	7.4	770	2,320
Education	None	10.6	4,153	9.3	2,740	6,893
	Primary	11.9	643	13.1	466	1,109
	Secondary +	15.8	1,536	6.7	180	1,715
Wealth index quintiles	Poorest	11.8	1,033	9.2	741	1,774
	Second	13.2	1,093	8.9	700	1,792
	Middle	12.9	1,184	10.4	669	1,854
	Fourth	10.4	1,410	10.0	744	2,155
	Richest	11.9	1,611	10.3	531	2,143
Total		**12.0**	**6,332**	**9.7**	**3,386**	**9,718**

[54] Spacing refers to the interval of time between pregnancy or childbirths and limiting refers to preventing further pregnancy or childbirth

Table 35. Unmet need for contraception among married women aged 15-49 by literacy status, Bhutan, 2010

		Not Literate		Literate		Total number of women aged 15-49
		% with unmet need	Total number of women aged 15-49	% with unmet need	Total number of women aged 15-49	
Area	Urban	8.3	1,663	12.9	1,324	2,986
	Rural	11.2	5,985	18.4	1,058	7,043
Age	15-19	26.8	215	28.9	97	312
	20-24	14.9	980	19.4	588	1,568
	25-29	12.9	1,463	16.5	795	2,257
	30-34	9.7	1,462	12.1	461	1,923
	35-39	8.9	1,409	9.6	241	1,650
	40-44	7.2	1,215	6.4	148	1,363
	45-49	6.4	904	7.3	53	957
Education	None	10.4	6,870	16.6	216	7,087
	Primary	12.0	777	15.1	387	1,165
	Secondary +	.	-	15.2	1,778	1,778
Wealth index quintiles	Poorest	10.9	1,773	14.6	82	1,855
	Second	11.1	1,744	28.8	144	1,888
	Middle	12.1	1,653	19.2	285	1,937
	Fourth	9.7	1,637	12.2	551	2,189
	Richest	7.1	840	14.4	1,320	2,160
Total		**10.5**	**7,648**	**15.3**	**2,382**	**10,029**

lack of knowledge of either method or its source, method related reasons, side effects, health concerns, difficulty in obtaining contraceptives, etc.

Girls and young women aged 15-19 years have a higher unmet need (27 per cent for illiterate and 20 per cent for literate women) than women aged 45-49 years (around 7 per cent for both literate and illiterate women). Furthermore, though not shown here, the data indicate that 31 per cent of married female youth aged 15-18 years have an unmet need for contraception, which can result in early child bearing, with consequent risks for the health of both mother and child.

7.4. Safe motherhood

Every pregnancy faces risk and it is important that pregnant women understand all the risks associated with their pregnancy and childbirth. Appropriate care during pregnancy begins with comprehensive antenatal care. The World Health Organization and UNICEF recommend a minimum of at least four visits during the course of a woman's pregnancy. The number of antenatal care visits and the quality of services a pregnant woman avails will be indicative of whether she will seek skilled birth assistance, deliver safely in a hospital or clinic, or whether she is likely to seek postnatal care for herself and her child. The number of ANC visits is positively correlated with the nutritional status of their newborns. This analysis will show a positive correlation between mother's antenatal visits and low birthweight:

The Ministry of Health has responded to this global body of evidence by initiating a policy to increase the number of recommended level of antenatal care to eight or more visits. The data presented in this section provide further evidence that comprehensive antenatal care as measured by the number of visits contributes powerfully to reduced risks during pregnancy and to the health of both mother and child.

7.4.1. Antenatal care

Comprehensive antenatal care (ANC) represents a critical intervention that aims to protect and promote the health of women and their newborns. Table 36 shows the distribution of the number of ANC visits received by women who gave birth in the two years preceding the survey. It shows that Bhutan has achieved near universal coverage (98 per cent) of at least one visit to a skilled ANC provider.

Table 36. Distribution of the number of antenatal care visits received by women who gave birth during the two years preceding the survey, Bhutan, 2010

		% of women who had:									At least once	At least 4 times	At least 8 times	No. of women
		No ANC visits	1 visit	2 visits	3 visits	4 visits	5 visits	6 visits	7 visits	8 or more visits				
Dzongkhag	Bumthang	2.5	3.2	4.9	16.9	18.7	21.0	12.6	9.9	10.2	97.5	72.4	10.2	69
	Chhukha	2.0	2.4	3.3	8.1	11.7	13.5	19.0	15.1	25.0	98.0	84.2	25.0	223
	Dagana	2.3	4.0	5.3	16.9	23.3	24.3	12.3	6.6	4.3	97.7	70.7	4.3	100
	Gasa	[10.8]	[7.0]	[7.7]	[8.3]	[14.2]	[7.3]	[8.6]	[3.3]	[22.2]	[89.2]	[55.6]	[22.2]	28
	Haa	2.4	2.4	2.1	7.3	16.2	8.9	10.5	7.7	42.5	97.6	85.8	42.5	43
	Lhuntse	4.3	4.4	17.8	13.7	27.2	19.9	3.2	1.9	7.7	95.7	59.8	7.7	47
	Monggar	0.7	3.0	8.4	9.1	18.3	20.7	21.7	7.1	10.2	99.3	78.1	10.2	186
	Paro	1.1	3.4	6.2	11.9	22.9	21.9	12.9	4.4	13.8	98.9	75.9	13.8	146
	Pema Gatshel	13.0	2.0	4.0	9.3	26.7	13.5	20.8	3.7	5.7	87.0	70.4	5.7	94
	Punakha	1.6	2.2	6.2	12.9	26.4	17.1	20.7	7.4	5.4	98.4	77.1	5.4	100
	Samdrup Jongkhar	1.6	3.3	6.9	17.3	23.8	19.0	16.4	3.2	7.7	98.4	70.1	7.7	163
	Samtse	0.8	1.5	3.7	7.2	31.3	29.0	12.8	7.4	6.2	99.2	86.8	6.2	221
	Sarpang	0.0	0.3	0.0	4.9	18.1	25.6	18.7	6.7	25.8	100.0	94.9	25.8	132
	Thimphu	1.6	2.3	3.7	8.2	14.4	20.6	19.5	16.4	12.8	98.4	83.6	12.8	298
	Trashigang	4.1	5.2	3.5	16.9	34.4	13.8	10.2	0.8	10.1	95.9	69.3	10.1	161
	Trashi Yangtse	5.2	0.0	8.6	14.7	25.2	14.0	15.0	5.4	11.0	94.8	70.5	11.0	60
	Trongsa	1.4	3.6	4.0	17.8	23.0	15.5	20.6	5.6	8.4	98.6	73.2	8.4	50
	Tsirang	0.7	2.0	3.3	12.5	52.0	18.6	3.8	0.0	5.5	99.3	79.8	5.5	62
	Wangdue Phodrang	0.7	2.5	8.9	14.2	21.0	21.5	16.1	1.5	12.6	99.3	72.6	12.6	103
	Zhemgang	7.6	4.5	9.4	20.4	12.2	13.7	12.4	6.5	13.4	92.4	58.2	13.4	82
Area	Urban	0.7	2.2	2.6	6.7	16.5	20.1	19.3	12.6	18.6	99.3	87.1	18.6	690
	Rural	3.2	3.0	6.3	13.5	24.6	19.0	14.3	5.3	10.1	96.8	73.3	10.1	1,678
Mother's age at birth	Less than 20	3.3	3.3	7.1	11.1	23.6	17.3	15.1	7.9	9.9	96.7	73.8	9.9	269
	20-34	2.0	2.5	4.6	11.2	22.0	19.9	16.2	7.4	13.5	98.0	79.1	13.5	1,852
	35-49	5.2	3.9	8.2	14.6	21.9	17.1	13.1	7.1	8.5	94.8	67.5	8.5	247
Education	None	3.2	3.4	5.9	12.8	23.8	20.3	14.0	5.7	10.0	96.8	73.8	10.0	1,484
	Primary	0.9	2.4	5.2	16.2	24.7	14.5	15.1	8.7	11.9	99.1	74.9	11.9	302
	Secondary +	1.4	1.3	3.6	5.9	16.7	19.4	20.7	11.3	19.6	98.6	87.7	19.6	582
Wealth index quintiles	Poorest	4.3	4.2	9.8	17.2	25.0	21.2	8.6	3.4	5.8	95.7	64.0	5.8	471
	Second	4.7	3.5	7.2	14.7	25.3	17.1	14.3	5.5	6.6	95.3	68.8	6.6	448
	Middle	2.0	2.1	3.8	13.5	21.9	21.6	16.4	5.2	12.7	98.0	77.8	12.7	475
	Fourth	0.8	2.4	4.1	8.3	22.0	19.8	19.1	7.4	15.4	99.2	83.7	15.4	518
	Richest	0.8	1.5	1.4	4.2	16.6	16.8	20.4	15.9	22.1	99.2	91.8	22.1	455
Total		**2.5**	**2.7**	**5.3**	**11.5**	**22.2**	**19.3**	**15.8**	**7.4**	**12.6**	**97.5**	**77.3**	**12.6**	**2,368**

However, only 77 per cent of women receive the four or more ANC visits recommended by the WHO. Women from rural areas, the poorest households, and those with no formal education receive a statistically significant lower number of antenatal care visits than their counterparts from the richest households, urban areas, or with secondary level education. The disparities in the level of antenatal care are practically significant as well as evidenced by the 28 percentage point gap in four or more ANC visits between the richest women (92 per cent) and the poorest women (64 per cent). Substantial geographical disparities are evident as well, with 95 per cent of women from Sarpang reporting four or more ANC visits compared with 58 per cent of women from Zhemgang. The data also show that women under the age of 20 and women aged 35-49 are also statistically less likely to receive four or more ANC visits than women of prime childbearing age.

In 2009, the Ministry of Health revised upward its recommended number of ANC visits from four or more to eight or more.[55] For this reason, Table 36 shows the percentage of women who received at least eight antenatal care visits by any provider. The table shows that 13 per cent of women have received at least eight ANC visits. Women

[55] Revised Midwifery Standard, Ministry of Health, 2009

from the richest households, urban areas, or with secondary level education are most likely to reach this new threshold. Indeed, women from the richest households are nearly four times more likely to have eight or more ANC visits than women from the poorest households.

Finally, it should be noted that 2.5 per cent of women aged 15-49 years who had a live birth during the two years preceding the survey did not receive any antenatal care at all. These women come from overwhelmingly poor households, the poorest dzongkhags, and rural areas. They have no formal education and/or are older mothers of the age 35-49 years. Together, these data indicate that the Ministry of Health must urgently prioritize the needs of women from marginalized groups to increase the quantity and quality of antenatal care for all women in Bhutan.

Figure 32 presents data on the number of antenatal care visits received by women aged 15-49 by various benchmarks. It shows that while Bhutan has made tremendous strides in the level of ANC received, much work remains, to achieve the objective of having women obtain eight or more antenatal care visits. According to BMIS data, only one in eight women receives this recommended level of antenatal care.

Figure 33 provides a more disaggregated illustration of the data presented in Table 36 and Figure 32, showing the distribution of the number of ANC visits received by women aged 15-49 who gave birth in the two years preceding the survey. In addition to the 13 per cent of women who receive eight or more antenatal care visits, another 23 per cent receive 6-7 ANC visits and are on the cusp of reaching the new benchmark. These women are more likely to be from urban areas, have secondary level education, and hail from middle to upper segments of the wealth distribution. However, policy makers should not lose sight of the urgent need to reach those women who receive little to no antenatal care, the majority of whom come from the most deprived demographic groups.

7.4.1.1. Antenatal care and skilled birth assistance

As stated above, antenatal care represents a crucial gateway to other reproductive health services. Skilled birth attendants (i.e. doctor, nurse/midwife, health assistant, and assistant clinical officer) have a higher level of training and expertise to help manage and refer pregnancy complications more effectively than non-skilled birth attendants. Ensuring

Figure 32. Percentage of women who received antenatal care at least once, at least four times, and at least eight times by any provider, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

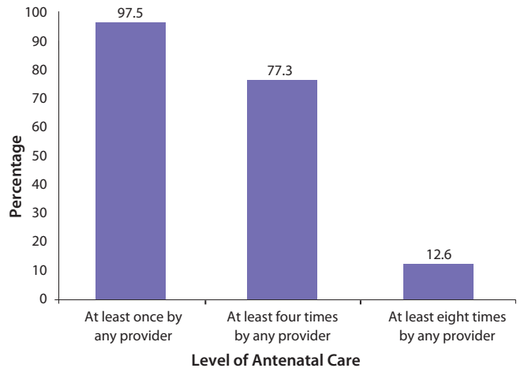
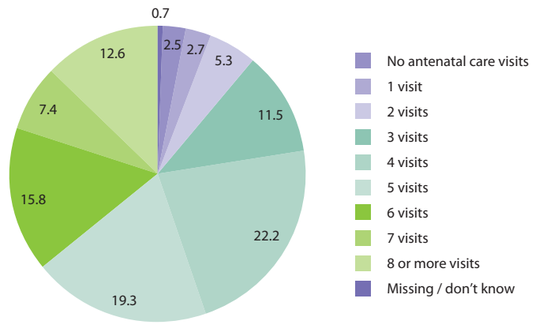


Figure 33. Distribution of number of antenatal care visits among women 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010



skilled birth assistance is widely seen as the single most critical intervention for reducing both maternal and newborn mortality.[56]

BMIS data indicate that 65 per cent of women who gave birth in the two years preceding the survey received skilled birth assistance. Table 37 analyses the data further to test the percentage of women who receive skilled birth assistance by the level of antenatal care received. Indeed, the data show a statistically significant and strong positive

[56] See Graham,W. 2001. "Monitoring and Evaluating: The Impact of Skilled Attendance." In J Fullerton (ed). Skilled Attendant at Delivery: A Review of the Evidence. New York, N.Y.: Interagency Group for Safe Motherhood/Family Care International.

Table 37. Percentage of women who received skilled birth attendance by the number of antenatal care visits received, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

		% receiving skilled birth assistance among mothers who received antenatal care:								Total number of women who gave birth in the past 2 years
		0-3 times		4-5 times		6-7 times		8+ times		
		% of births with skilled birth assistance	No. of women who gave birth in the past 2 years	% of births with skilled birth assistance	No. of women who gave birth in the past 2 years	% of births with skilled birth assistance	No. of women who gave birth in the past 2 years	% of births with skilled birth assistance	No. of women who gave birth in the past 2 years	
Area	Urban	81.3	82	88.3	253	93.6	221	90.6	128	690
	Rural	40.2	394	53.7	728	69.4	329	72.9	170	1,678
Education	None	41.1	340	52.1	652	68.8	292	72.5	148	1,484
	Primary	45.2	73	63.6	117	82.9	72	[58.4]	36	302
	Secondary	83.6	63	94.7	210	93.7	186	97.9	114	582
Wealth index quintiles	Poorest	25.6	149	38.6	218	49.5	57	[36.2]	27	471
	Second	33.2	118	45.1	189	52.6	89	[68.3]	30	448
	Middle	62.3	96	62.3	204	83.6	103	71.1	61	475
	Fourth	71.2	80	80.7	217	84.4	137	86.6	80	518
	Richest	[95.5]	32	93.5	152	96.2	165	97.1	101	455
Total		**47.3**	**476**	**62.6**	**980**	**79.1**	**550**	**80.5**	**298**	**2,368**

correlation between the level of antenatal care received and the percentage of women who receive skilled birth assistance. 47 per cent of women who receive less than the recommended four antenatal care visits receive skilled birth assistance compared with 63 per cent of women who receive 4-5 ANC visits. This figure climbs steadily to 80 per cent for women with eight or more visits, making women with the highest level of antenatal care twice more likely to have skilled assistance at birth than women with the least amount of antenatal care.

Irrespective of how much antenatal care a woman receives, there are tremendous disparities in the level of skilled birth assistance by area of residence, level of education, and household wealth. However, antenatal care appears to help mitigate these disparities, as the marginal effect of antenatal care on the likelihood of receiving skilled birth assistance is much higher for women from these deprived demographic groups. For example, the 41 percentage point urban-rural gap in skilled birth assistance for women who receive less than four ANC visits falls to 18 points for women with eight or more ANC visits. A similar closing of the inequity also occurs by education level and household wealth.

Given this strong evidence of the positive effect of antenatal care on skilled birth assistance alongside the fact that women from the poorest households, rural areas, and with no education exhibit the lowest uptake of antenatal care, policy makers should strongly focus on reaching these populations with safe motherhood programmes designed to improve the well-being of women and children in Bhutan, and to achieve MDG goals.

7.4.1.2. Antenatal care and institutional delivery

Increasing the number of women to deliver in an institution[57] ensures proper medical attention and hygienic conditions during delivery. This helps reduce the risks of complications and infections that can cause morbidity and mortality to either the mother or the baby. BMIS data indicate that 63 per cent of women who gave birth in the two years preceding the survey delivered their child in a health facility against the Ministry of Health goal of 100 per cent institutional delivery for all women. This means that more than one in three births in Bhutan still occurs at home, putting the health and lives of women and children at increased risk.

As with skilled birth assistance, this analysis tested the relationship between the level of antenatal care and institutional delivery. Again, the data indicate a strongly positive, statistically significant correlation between antenatal care and delivery in a health facility. For women

[57] In this report, an institution is synonymous with health facility, which includes hospitals, basic health units (BHUs), and satellite clinics.

with less than four ANC visits, 45 per cent delivered in an institution as compared with 60 per cent institutional delivery for women with 4-5 ANC visits. And as with skilled birth assistance, this figure further increased to 82 per cent for women who received eight or more ANC visits.

Naturally, skilled birth assistance and institutional delivery are highly correlated so the parallel relationship between ANC and these two indicators should not come as a surprise. Likewise, it should be expected that, regardless of the number of antenatal visits, the data show that the poorest women, those in rural areas, and those with no formal education are least likely to deliver in a health facility. For example, women with no education are more than twice as likely to deliver their child at home than women with secondary level education.

Again, the higher rate of institutional delivery associated with the greater number of antenatal care visits is largely driven by these same groups of women. For example, the 43 percentage point gap in institutional delivery by level of education for women with the least amount of antenatal care gets cut by nearly 40 per cent to 27 points among women with the highest level of antenatal care. These data provide further evidence that a strong programmatic focus on getting the most deprived women to increase the number of their antenatal care visits yields the highest marginal benefit in subsequent reproductive healthcare uptake. That the poorest women, those in rural and remote areas, and with no education are also least likely to receive the appropriate level of antenatal care only strengthens the argument that policy makers prioritize women from the most deprived backgrounds.

Figure 34 provides a visual summary of the data presented in Tables 37 and 38, showing the strongly positive relationship between antenatal care, skilled birth assistance, and institutional delivery. An increase from less than four ANC visits to more than eight ANC visits almost doubles the likelihood that a woman will receive skilled birth assistance and/or institutional delivery. The gains appear to level off somewhat after a woman receives at least 6-7 ANC visits.

As noted, skilled birth assistance and institutional delivery are almost perfectly correlated. In terms of process, the likely relationship among these indicators is that antenatal care increases the likelihood of institutional delivery, which in turn increases the likelihood of skilled birth assistance at an almost equal rate. The takeaway point is that antenatal care provides the critical entry point for women to take up other reproductive health services, particularly women from the most marginalized backgrounds.

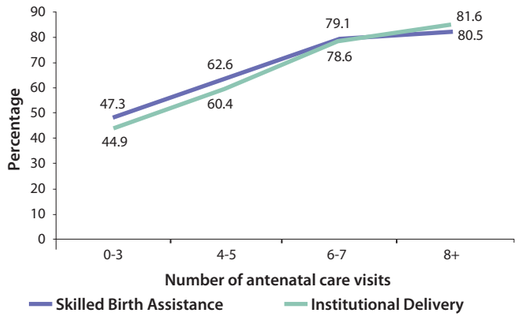
Table 38. Percentage of women who delivered in a health facility by the number of antenatal care visits received, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

		% of women who delivered in a health facility who received antenatal care:								Total number of women who gave birth in the past 2 years
		0-3 times		4-5 times		6-7 times		8+ times		
		% of births in a health facility	No. of women who gave birth in the past 2 years	% of births in a health facility	No. of women who gave birth in the past 2 years	% of births in a health facility	No. of women who gave birth in the past 2 years	% of births in a health facility	No. of women who gave birth in the past 2 years	
Area	Urban	81.3	82	88.2	253	93.6	221	91.5	128	690
	Rural	37.3	394	50.7	728	68.5	329	74.1	170	1,678
Education	None	38.7	340	49.2	652	68.3	292	71.8	148	1,484
	Primary	42.1	73	63.1	117	82.3	72	[66.9]	36	302
	Secondary +	81.6	63	93.4	210	93.3	186	98.9	114	582
Wealth index quintiles	Poorest	22.8	149	36	218	53.2	57	[47.3]	27	471
	Second	31.7	118	41.4	189	49.8	89	[68.3]	30	448
	Middle	57.4	96	59.6	204	81.1	103	70.1	61	475
	Fourth	70.2	80	78.2	217	84.5	137	87.6	80	518
	Richest	[95.5]	32	94.6	152	96.2	165	97.1	101	455
Total		**44.9**	**476**	**60.4**	**980**	**78.6**	**550**	**81.6**	**298**	**2,368**

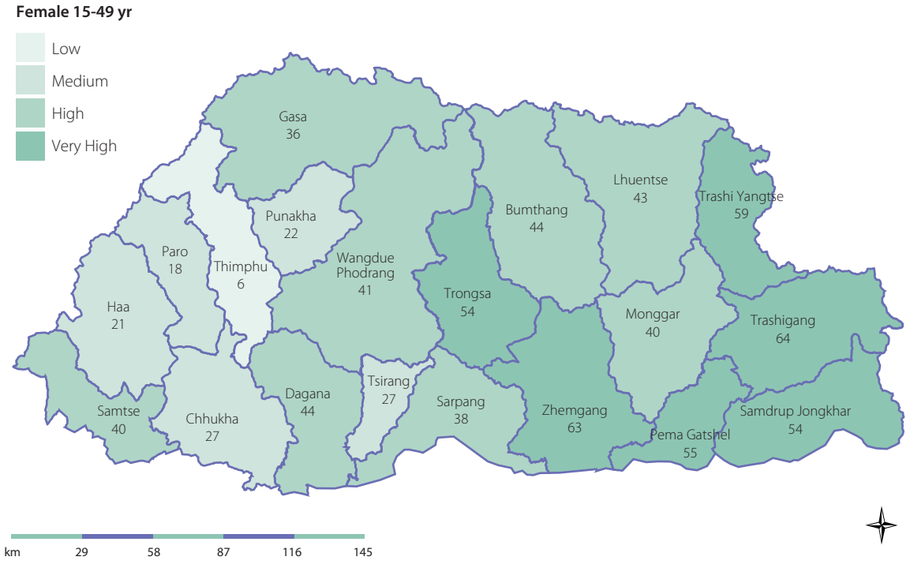
Turning now to women who do not give birth in a health facility, Map 3 shows the percentage of women who give birth at home by dzongkhag. It shows that the highest rates of home delivery occur primarily in southern and eastern dzongkhags, most notably in Trashigang and Zhemgang where nearly two thirds of women give birth at home (64 and 63 per cent, respectively). These figures are ten times as high as the six per cent home delivery rate in Thimphu dzongkhag. Given the positive relationship between antenatal care and institutional delivery, ANC outreach should place a special focus on those dzongkhags with the highest rates of home delivery, which also happen to be the dzongkhags with the lowest levels of antenatal care uptake.

Table 39 assesses the number of ANC visits received by women by whether they deliver at home or in a health facility. The data show that women who deliver at home are more than twice as likely to receive less than the recommended four ANC visits as women with institutional delivery (31 per cent versus 14 per cent, respectively). Conversely, women who deliver at home are only 40 per cent as likely to receive eight or more ANC visits as women with institutional delivery (7 per cent versus 17 per cent, respectively). Even among women who deliver at home, there are disparities. Women from the poorest households and in rural areas who deliver at home receive a statistically lower number of ANC visits than women from wealthier households and in urban areas who deliver

Figure 34. Percentage of women who received skilled birth assistance and who delivered in a health facility by the number of antenatal care visits received, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010



Map 3. Percentage of women who gave birth in the two years preceding the survey who delivered the child at their or another's home by dzongkhag, Bhutan, 2010



Note: The boundaries and the names shown and the designations used on these maps do not imply official endorsement or acceptance by the United Nations.

Table 39. Percentage of antenatal care visits among women aged 15-49 who gave birth during the two years preceding the survey by place of delivery, Bhutan, 2010

		Women who did not deliver in health facility						Women who delivered in health facility						
		Number of antenatal care visits				Total	Number of women who gave birth in the last 2 years	Number of antenatal care visits				Total	Number of women who gave birth in the last 2 years	
		0-3 times	4-5 times	6-7 times	8+ times			0-3 times	4-5 times	6-7 times	8+ times			
Area	Urban	19.8	43.5	20.7	15.9	100	71	10.6	36.4	33.8	19.2	100	690	71
	Rural	32.4	47.9	13.8	5.9	100	803	16.3	42.9	26.2	14.6	100	1,678	803
Education	None	30.4	49.5	13.9	6.2	100	719	16.4	42.8	26.6	14.1	100	1,484	719
	Primary	37.6	39.8	11.7	10.9	100	114	16.4	39.4	31.5	12.7	100	302	114
	Secondary +	29.4	35.5	31.9	3.1	100	40	9.6	36.8	32.5	21.2	100	582	40
Wealth index quintiles	Poorest	38.6	47.5	9	4.9	100	315	21.7	50.6	19.4	8.3	100	471	315
	Second	32.2	45.7	18.3	3.9	100	265	19.8	44	24.9	11.3	100	448	265
	Middle	25.4	51.2	12.1	11.3	100	169	17.2	40.8	27.8	14.2	100	475	169
	Fourth	22	47	21.1	9.9	100	104	13.3	41.4	28.3	17.1	100	518	104
	Richest	7.7	43.3	33.2	15.7	100	19	7.1	33.4	36.9	22.7	100	455	19
Total		**31.3**	**47.5**	**14.4**	**6.7**	**100**	**873**	**13.9**	**40.2**	**29.4**	**16.50**	**100**	**1,495**	**2,368**

at home, indicating that increased wealth and access to health facilities can contribute to a somewhat higher level of antenatal care, which may help mitigate some risks associated with home delivery.

Figure 35 illustrates the difference in the level of antenatal care received by women by whether they deliver at home or in an institution, as presented in Table 38. The positive relationship between a higher number of ANC visits and institutional delivery can be seen in the imbalance in antenatal care between the two groups.

With regard to place of delivery, this report disaggregates institutional delivery to measure the proportion of deliveries that take place in hospitals versus BHUs.[58] Of women who delivered in a health facility, 88 per cent delivered in hospitals and 12 per cent delivered in a BHU. Women from rural areas are more than three times as likely to deliver in BHUs than urban women (17 per cent versus 5 per cent, respectively). Women from the poorest households are nearly ten times more likely to deliver in a BHU than women from the richest households (33 per cent versus 4 per cent, respectively). Women under the age of 20 are nearly twice as likely to deliver in a BHU than women aged 20-34. As women who deliver in BHUs are disproportionately from disadvantaged demographic groups, policy makers should strengthen the quality of reproductive healthcare services provided in BHUs so as to reduce disparities in the quality in care.

7.4.1.3. Antenatal care and comprehensive knowledge of HIV and AIDS

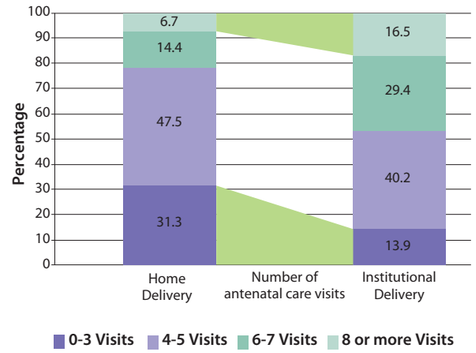
Counselling and the provision of information on the prevention of sexually transmitted infections (STIs), HIV, and prevention of mother-to-child transmission (PMTCT) of HIV is an integral part of antenatal care in Bhutan as reflected in the National Midwifery Standard. To assess the association of antenatal care on the knowledge of HIV, this analysis tested PMTCT knowledge and comprehensive knowledge of HIV transmission by the level of antenatal care visits women received.

Table 40. **Knowledge of Prevention of Mother-to-Child Transmission of HIV and comprehensive knowledge of HIV transmission by level of antenatal care received, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010**

		Women who did not receive antenatal care 4+ times, who:			Women who received antenatal care 4+ times, who:			Total number of women aged 15-49 who gave birth in past two years
		Know three ways HIV can be transmitted from mother to child (PMTCT)	Have comprehensive knowledge of HIV	Number of women aged 15-49 who gave birth in past two years	Know three ways HIV can be transmitted from mother to child (PMTCT)	Have comprehensive knowledge of HIV	Number of women aged 15-49 who gave birth in past two years	
Area	Urban	65.0	22.5	84	65.8	34.5	601	690
	Rural	56.9	8.6	394	59.8	14.0	1,230	1,678
Age	15-19	[70.9]	[7.9]	30	51.5	14.7	106	140
	20-24	58.2	11.8	142	62.9	19.7	561	718
	25-29	65.4	15.3	140	63.4	25.4	623	781
	30-34	50.3	7.0	91	59.5	20.7	329	427
	35-39	48.2	5.8	46	64.1	13.9	153	209
	40-44	[58.3]	[15.7]	20	53.0	4.4	48	72
	45-49	*	*	9	*	*	11	21
Education	None	53.7	7.7	341	57.9	11.9	1,095	1,484
	Primary	60.3	15.4	73	61.7	17.2	226	302
	Secondary +	80.7	23.7	64	70.0	41.3	511	582
Wealth index quintiles	Poorest	43.5	4.5	149	54.0	4.3	302	471
	Second	62.6	12.2	119	60.4	8.7	309	448
	Middle	71.7	7.6	96	61.8	13.3	370	475
	Fourth	61.3	17.7	80	66.1	28.0	433	518
	Richest	[63.9]	[29.3]	34	63.7	40.5	418	455
Total		**58.3**	**11.0**	**478**	**61.7**	**20.7**	**1,831**	**2,368**

[58] BMIS 2010 data show that less than 0.1 per cent of births occurred in satellite clinics.

Figure 35. **Number of antenatal care visits among women aged 15-49 who gave birth in the two years preceding the survey by place of delivery, Bhutan, 2010**



As shown in Table 40, there is no statistical difference in PMTCT knowledge between women who received four or more antenatal care visits and those who received less than four antenatal care visits (62 per cent versus 58 per cent, respectively). This may be due, in part, to the fact that only about half (54 per cent) of pregnant women received HIV counselling during antenatal care[59], which is a required component of ANC services.

Table 40 shows a statistically significant, higher level of comprehensive knowledge of HIV among women who attended four or more antenatal care visits (21 per cent), as compared with those who received less than four ANC visits (11 per cent). However, given the absence of a significantly higher level of PMTCT knowledge among women with a higher level of antenatal care, which would ostensibly be the primary information about HIV communicated during ANC, the higher level of comprehensive knowledge is unlikely a function of increased antenatal care. Rather, women with a greater number of antenatal care visits are more likely to already have a higher level of comprehensive knowledge of HIV. Indeed, women who receive more ANC are considerably more likely to be younger, from urban areas, have secondary level education, and come from the richest quintile of households. These are the same demographic groups that demonstrate a significantly higher level of knowledge about HIV.[60]

The key finding of these data is that increased antenatal care is not associated with a higher level of the HIV knowledge required to prevent mother-to-child transmission of the virus. The key programming implication is that, in addition to expanding uptake of the recommended level of ANC to all women, particularly those from the most deprived groups, the Ministry of Health must redouble its efforts to ensure that comprehensive HIV counselling is part of every woman's antenatal care and that it focuses strongly on inculcating PMTCT knowledge.

More specifically, there is need for the MOH Reproductive Health Programme to actively collaborate with the National Aids Control Programme (NACP).

7.4.1.4. Antenatal care and literacy

Literacy is an important determinant to acquiring the knowledge necessary to practise good behaviour and safeguard one's health. For this reason, this analysis tests the relationship between literacy and the number of antenatal care visits received by women. Table 41 shows a slight but statistically significant difference in the percentage of women who received at least one antenatal care visit between those who are literate (99 per cent) and those who are not literate (97 per cent). The observed gap in antenatal care by literacy status is most pronounced among women from rural areas and from the poorest two wealth quintiles, suggesting a disproportionately positive effect of literacy on antenatal care uptake for women from these demographic backgrounds.

The narrow differences noted above are largely a corollary function of Bhutan's success in achieving near-universal coverage of at least one ANC visit for pregnant women with no single demographic group falling below 94 per cent uptake. With respect to the recommended four or more ANC visits however, significant disparities by literacy status begin to emerge. 86 per cent of literate women received four or more ANC visits compared with 74 per cent of women who are not literate, a difference, which is highly statistically significant. As with the previous indicator, these observed differences are more pronounced among women from rural areas, from the poorer wealth quintiles and those with no formal education.

[59] See Table HA.7, Bhutan Multiple Indicator Survey (BMIS) 2010 Final Report.

[60] See Table HA.1, Bhutan Multiple Indicator Survey (BMIS) 2010 Final Report.

Table 41. Antenatal care by literacy status, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

		Not literate			Literate			Total		
		% of women who have received skilled ANC at least once	% of women who have received skilled ANC at least four times	Number of women aged 15-49	% of women who have received skilled ANC at least once	% of women who have received skilled ANC at least four times	Number of women aged 15-49	% of women who have received skilled ANC at least once	% of women who have received skilled ANC at least four times	Number of women aged 15-49
Area	Urban	99.8	83.2	310	98.4	91.3	380	99.1	87.7	690
	Rural	95.9	71.7	1,314	98.9	81.1	364	96.6	73.8	1,678
Education	None	96.4	73.7	1,430	[100.0]	[94.6]	54	96.5	74.5	1,484
	Primary	98.6	75.3	194	99.2	74.5	108	98.8	75	302
	Secondary +	.	.	-	98.5	87.7	582	98.5	87.7	582
Wealth index quintiles	Poorest	95.6	64	437	[97.5]	[71.3]	35	95.7	64.5	471
	Second	94.5	67.9	401	99.3	85.1	47	95	69.7	448
	Middle	96.9	77.7	351	99.4	79.2	125	97.5	78.1	475
	Fourth	99.6	84.7	339	98.3	83.7	179	99.2	84.4	518
	Richest	99.5	92.3	97	98.6	91.6	358	98.8	91.8	455
Total		**96.7**	**73.9**	**1,624**	**98.7**	**86.3**	**744**	**97.3**	**77.8**	**2,368**

Table 42. Postnatal care by a skilled provider: whether and when it was given, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

		% of women who received postnatal care at any time from skilled provider	Number of women who gave birth in past 2 years	Time for first postnatal examination						Total number of women who received postnatal care
				Less than 4 hours (%)	4-23 hours (%)	Within 1-2 days (%)	Within 3-41 days (%)	Dont' know' (%)	Total	
Area	Urban	81.9	690	61.0	3.5	10.3	24.7	0.4	100	565
	Rural	52.5	1,678	52.1	3.3	11.2	32.5	1.0	100	880
Education	None	52.8	1,484	53.8	3.2	9.9	32.1	1.0	100	783
	Primary	59.3	302	61.4	2.6	15.3	19.9	0.8	100	179
	Secondary +	83.0	582	56.4	3.9	10.7	28.8	0.3	100	483
Wealth index quintiles	Poorest	39.7	471	44.9	1.6	10.6	41.7	1.3	100	187
	Second	47.5	448	52.2	2.9	8.7	34.6	1.5	100	213
	Middle	62.9	475	56.3	3.2	9.1	30.4	1.1	100	299
	Fourth	69.7	518	55.7	4.6	13.3	26.2	0.2	100	361
	Richest	84.7	455	62.1	3.4	11.3	23.0	0.2	100	386
Place of delivery	Non-institutional	29.1	873	12.0	1.3	9.8	75.8	1.1	100	254
	Institutional	79.7	1,495	64.9	3.8	11.1	19.6	0.6	100	1,192
Total		**61.0**	**2,368**	**55.6**	**3.4**	**10.8**	**29.5**	**0.7**	**100**	**1,445**

Overall, these data suggest that, when controlling for single demographic characteristics, literacy is associated with a higher level of antenatal care uptake, particularly in the case of four or more visits.

7.4.2. Postnatal care

Postnatal care (PNC) is important for the well-being of the mother and the child. It provides an opportunity to treat delivery complications both for mother and child, and it provides the mother with important information on how

to care for herself and her infant. The postnatal period is defined as the time between delivery of the placenta and 42 days (six weeks) following delivery. The timing of postnatal care is important because the first two days after delivery are critical; most maternal and neonatal deaths occur during this period. Globally, 50 per cent of all maternal deaths occur during the first 24 hours after delivery. To promote PNC and mitigate this risk, it is important that every pregnant woman deliver in a health facility to obtain immediate care for the mother and the newborn.

7.4.2.1. Postnatal care for mothers

The BMIS 2010 asked women who gave birth in the past two years if anyone checked on their health after delivery, how long after delivery did the first check take place, and by whom. Table 42 shows that 61 per cent of women in Bhutan receive postnatal care at any time by a skilled provider. Not surprisingly, this figure differs dramatically by whether a woman gave birth in an institution or not. 80 per cent of women who give birth in a hospital or BHU receive postnatal care compared with 29 per cent of women who give birth at home. As institutional delivery is highly correlated with living in an urban area and with increased wealth and education, PNC is much higher among these more privileged groups of women. For example, urban women and those with secondary level education are 55 per cent more likely to receive PNC than their counterparts from rural areas and without any formal education. Women from the richest quintile of households are more than twice as likely to receive PNC than women from the poorest quintile (85 per cent versus 40 per cent). Dzongkhag-level disparities are not smaller. As expected, Thimphu dzongkhag records the highest rate of PNC at 90 per cent, which is nearly three times the figure of 34 per cent in Zhemgang. All of these differences are highly statistically and practically significant, that require increased policy and programming attention from central and dzongkhag levels.

Table 42 also shows the distribution of the time when women received their first postnatal care checks. Of the 61 per cent of women who received any postnatal care, 56 per cent received their first PNC check within four hours after delivery. The first 24 hour period after birth is especially critical to prevent maternal death and provide timely healthcare intervention. Every mother should receive a PNC check within this period. However, only 59 per cent of women who received any postnatal care received their first check within this time period. The 50 percentage point gap in

Table 43. Postnatal care for newborns by skilled provider: when and whether it was given, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010

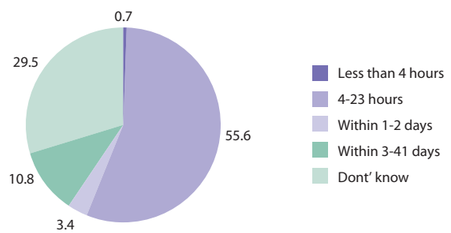
		% of children who received postnatal care at any time from skilled provider	Number of women who gave birth in past 2 years	Time for first postnatal examination						Total number of children who received PNC
				Less than four hours (%)	4-23 hours (%)	Within 1-2 days (%)	Within 3-41 days (%)	Don't know (%)	Total	
Area	Urban	81.1	690	51.8	2.8	9.1	19.4	16.9	100	560
	Rural	67.3	1,678	29.9	1.9	7.0	20.2	41.1	100	1,130
Education	None	68.9	1,484	31.4	2.1	6.5	19.1	40.9	100	1,023
	Primary	66.7	302	41.5	0.9	8.8	12.4	36.3	100	201
	Secondary +	79.8	582	47.9	3.1	9.7	25.0	14.2	100	465
Wealth index quintiles	Poorest	63.4	471	21.1	1.0	4.5	21.4	52.0	100	299
	Second	65.9	448	25.6	1.2	3.6	20.4	49.2	100	296
	Middle	68.4	475	39.6	2.2	6.8	20.5	30.9	100	325
	Fourth	74.5	518	39.0	3.2	11.8	18.2	27.9	100	386
	Richest	84.4	455	54.6	3.1	9.9	19.6	12.8	100	384
Place of delivery	Non-institutional	63.4	873	3.5	0.2	3.8	27.8	64.7	100	554
	Institutional	76.0	1,495	53.5	3.2	9.5	16.1	17.6	100	1,135
Total		**71.3**	**2,368**	**37.1**	**2.2**	**7.7**	**19.9**	**33.0**	**100**	**1,689**

receiving any PNC between women who give birth in a health facility and women who give birth at home is exaggerated further when considering whether they get their first check within 24 hours. Among women who receive any postnatal care, 69 per cent of those who deliver in a health facility receive PNC within 24 hours compared with only 13 per cent for those who deliver at home.

Figure 36 shows the total distribution of time of first postnatal check of women after giving birth.

In summary, only 61 per cent of women in Bhutan receive any postnatal care after giving birth. Of all women who gave birth regardless of place of delivery, only 36 per cent of women received PNC within the critical 24 hours. Even though the vast majority of these women gave birth in an institution, delivering one's child in a health facility is no guarantee of receiving postnatal care. These findings have significant programme implications to develop strategies to increase the PNC coverage both at the health facilities and at home. The MOH needs to design and implement innovative PNC interventions through involvement of community volunteers.

Figure 36. Postnatal care by a skilled provider: when it was given, among women aged 15-49 who gave birth in the two years preceding the survey, Bhutan, 2010



7.4.2.2. Postnatal care for newborns

The BMIS 2010 survey also measured the extent to which newborns receive postnatal care. Table 43 shows that 71 per cent of children received postnatal care at any time by a skilled provider, a figure slightly higher than postnatal care for women (61 per cent). One positive note is that the disparity in postnatal care for children between those born in an institution and those born at home is much smaller than the disparity in postnatal care for women by this distinction. In both places of delivery, the majority of children receive postnatal care at some point. 76 per cent of children born in an institution receive PNC compared with 63 per cent of children born at home. Children born in urban areas, to mothers with secondary level education, and from the richest households are statistically more likely to receive postnatal care than their counterparts from rural areas, with mothers who have no education, and from the poorest quintile. However, the disparities between demographic groups for postnatal care for children are not as significant as those of postnatal care for women.

Table 43 also considers the distribution of the time in which the first postnatal care checks took place among children who received any postnatal care. It shows that 37 per cent of children, who received any PNC, received the check within four hours of birth. 47 per cent of children received their first check within the critical two-day period after birth. Given that only 71 per cent of children receive any postnatal care, the percentage of all newborns who receive postnatal care within two days of birth is 34 per cent. Again, this figure is much higher for children born in a health facility (56 per cent) than for children born at home, only five per cent of which receive PNC within two days of birth. Of newborns who receive any postnatal care, those born at home are far less likely to receive the first check within two days (8 per cent) than those born in a health facility (66 per cent). In fact, nearly two thirds of women who delivered their child at home do not recollect when their newborn's first check took place.

Figure 37 shows the total distribution of time of first postnatal check of women after giving birth.

7.4.3. Postnatal care, antenatal care, and institutional delivery

This analysis has tried to argue the association between antenatal care and institutional delivery, and between institutional delivery and postnatal care. It is evident that antenatal care and institutional delivery have a strongly positive association with postnatal care. While the proportion of women with less than four ANC visits who received PNC is 34 per cent, women who received four or more ANC visits have a PNC rate of 46 per cent. Although every woman who delivers in a health facility is expected to receive her first PNC visit at the facility, 6.8 per cent of women who delivered in a health facility report that they did not receive a postnatal care check.

Among women who did not deliver at a health facility, the proportion of women from the poorest wealth quintile who receive postnatal care is three per cent compared with 23 per cent among women from the richest wealth quintile. However, there is no statistical difference in the percentage of who receive postnatal care among women who delivered at a health facility. 62 per cent of women from the poorest quintile receive PNC, compared with 67 per cent of women from the richest quintile. This elimination in the postnatal care wealth gap is likely a consequence of how once women make it to an institution to give birth, health workers are likely to give them relatively equal service, regardless of their demographic background.

7.4.4. Early childbearing

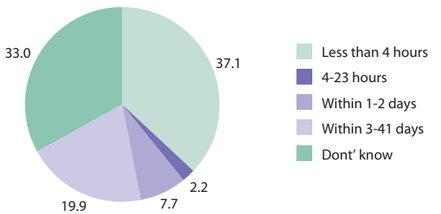
Early marriage often leads to early childbearing with all its associated risks to the health of young women and their children. According to UNICEF, female youth between the age of 15 and 19 are twice more likely to die during pregnancy or childbirth as women in their twenties[61]. In Bhutan, as with marriage before age 15, the percentage of girls who give birth before age 15 is at its lowest level ever among women aged 15-49 at only 0.5 per cent for female youth aged 15-19. However, the percentage of girls and women aged 15-49 who have had a live birth before age 18 has not only remained stable (like early marriage) but has actually increased over time. For this reason, early childbearing and the impact it has on women's well-being remains an issue worth examining.

[61] United Nations Population Fund, State of the World Population 2005: The promise of equality: Gender equity, reproductive health, and the Millennium Development Goals, UNFPA, New York, 2005, pp. 12-13; cited in UNICEF Child Protection Information Sheets, 2006.

Table 44. Percentage of women aged 15-49 who received skilled postnatal care within two days of delivery by level of antenatal care received and place of delivery, among women who gave birth in the two years preceding the survey, Bhutan, 2010

		Antenatal care				Institutional delivery				Total number of women aged 15-49
		Postnatal care among women who did not receive antenatal care 4+ times		Postnatal care among women who received antenatal care 4+ times		Postnatal care among women who did not deliver in health facility		Postnatal care among women who delivered in health facility		
		% of women who received skilled PNC within two days of delivery	Number of women aged 15-49	% of women who received skilled PNC within two days of delivery	Number of women aged 15-49	% of women who received skilled PNC within two days of delivery	Number of women aged 15-49	% of women who received skilled PNC within two days of delivery	Number of women aged 15-49	
Area	Urban	52.3	84	62.7	601	8.0	71	67.4	620	690
	Rural	30.1	394	37.8	1,230	6.6	803	60.9	875	1,678
Education	None	28.0	341	39.1	1,095	5.8	719	63.1	764	1,484
	Primary	34.1	73	51.8	226	11.0	114	68.8	188	302
	Secondary+	66.1	64	58.3	511	10.4	40	62.5	542	582
Wealth index quintiles	Poorest	15.8	149	27.6	302	3.3	315	61.7	156	471
	Second	29.5	119	32.4	309	7.8	265	63.0	183	448
	Middle	40.5	96	44.6	370	4.6	169	64.4	306	475
	Fourth	52.2	80	51.6	433	14.7	104	60.5	414	518
	Richest	68.6	34	64.8	418	23.2	19	66.9	436	455
Total		**34.0**	**478**	**46.0**	**1,831**	**6.7**	**873**	**63.6**	**1,495**	**2,368**

Figure 37. Postnatal care for newborns by a skilled provider: when it was given, among women who gave birth in the two years preceding the survey Bhutan, 2010



7.4.4.1. Early childbearing among women aged 15-24

Table 45 shows the age-specific fertility rate (ASFR) for female youth aged 15-19, estimated at 59 births per 1,000 in Bhutan. There are tremendous differences in fertility among these young women by demographic background. The adolescent birth rate for rural women is more than twice that of urban women; women with no formal education have a birth rate more than three times that of women with secondary level education; and most strikingly, women from the poorest households have a birth rate 11 times that of women from the richest households.

The total fertility rates (TFRs) shown in Table 45 do not show such a significant disparity, indicating the disproportionate level of early childbearing among the poorest, the rural, and those with no education. However, the TFR for adolescent women remains above the government's goal of reaching the replacement level TFR of 2.1 by 2012.[62]

Looking more closely at the data, Table 46 shows that these disparities by area of location, education, and wealth status in early childbearing hold across every indicator. In each of the three early childbearing indicators below, women who live in rural areas, come from the poorest households, or have no education, are anywhere from two to 12 times more likely to experience early childbearing vis-à-vis their more privileged counterparts in each demographic domain. The high correlation between these identities means that many of these women inhabit all three of these demographic characteristics - that is, there is a large number of rural women with no education and who come from the poorest households. This combination of multiple vulnerabilities almost certainly increases the likelihood of early childbearing.

7.4.4.2. Early childbearing, education, and literacy

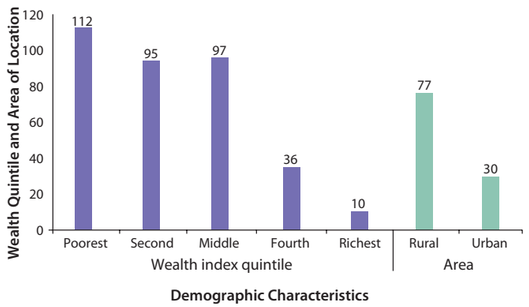
As with early marriage, this report examines the relationship between early childbearing and women's level of school participation, educational attainment, and literacy. Table 47 shows that among female youth aged 15-18 who have not begun childbearing, the secondary school net attendance ratio is almost 58 per cent. In contrast, secondary school participation drops to only 1.2 per cent among girls who have

[62] Vision 2020, Royal Government of Bhutan Planning Commission 1999, p.26.

Table 45. Adolescent birth rate and total fertility rate, Bhutan, 2010

		Adolescent birth rate (Age-specific fertility rate for women aged 15-19)	Total Fertility Rate
Area	Urban	30	2.3
	Rural	77	2.8
Mother's education	None	113	2.9
	Primary	70	2.5
	Secondary+	29	3.0
Wealth index quintile	Poorest	112	3.1
	Second	95	2.8
	Middle	97	3.0
	Fourth	36	2.4
	Richest	10	2.0
Total		**59**	**2.6**

Figure 38. Adolescent birth rate, Bhutan, 2010



begun childbearing.[63] Another way of looking at these data is to divide this group of female youth aged 15-18 into those who attend secondary level school or higher and those who do not. Table 48 reveals that of those who do attend school, 0.2 per cent have begun childbearing compared with 17.2 per cent of those female youth who do not attend school.

As early marriage and early childbearing exhibit a strongly positive correlation, it should not come as a surprise that the data show a significantly detrimental effect of early childbearing on school participation. The evidence shows that women who get married, pregnant, and/or have children have either already dropped out of school, which increases the likelihood of early marriage and childbearing,

[63] Separating women who are pregnant for the first time from those who have given a live birth shows that none of the 42 women who are pregnant attend school although this secondary school net attendance ratio of 0.0 per cent is not significantly different than the 1.8 per cent school attendance of those women who have already had a live birth.

Table 46. Early childbearing among young women aged 15-24, Bhutan, 2010

		% of young women that have begun childbearing	Number of women aged 15-19	% of women young who have had a live birth before the age of 15	Number of women aged 15-24	% of young women who have had a live birth before the age of 18	Number of women aged 20-24
Area	Urban	3.7	753	0.4	1,635	10.3	882
	Rural	15.3	1,299	1.1	2,920	18	1,620
Education	None	25.1	548	1.7	1,706	24	1,158
	Primary	15.7	304	0.7	643	22.7	340
	Secondary+	3.4	1,201	0.3	2,205	2.7	1,004
Wealth index quintiles	Poorest	18.3	316	1.5	718	21.1	402
	Second	21.2	323	1.2	737	17.7	413
	Middle	18.6	339	1.6	839	16.8	499
	Fourth	6	441	0.3	1,055	17.1	614
	Richest	1.5	633	0.3	1,207	6.3	574
Total		**11**	**2,052**	**0.9**	**4,555**	**15.3**	**2,502**

Table 47. Secondary level school attendance by early childbearing status among young women aged 15-18, Bhutan, 2010

	Secondary School attendance among young women aged 15-18 by whether they have begun childbearing					
	Have not begun child bearing		Have begun child bearing		Total	
	Secondary School net attendance ratio	No. of women aged 15-18	Secondary School net attendance ratio	No. of women aged 15-18	Secondary School net attendance ratio	No. of women aged 15-18
Total	**57.9**	**1 ,489**	**1.2**	**132**	**53.3**	**1,621**

Table 48. Young women aged 15-18 who had early childbearing by secondary school participation, Bhutan, 2010

	% of young women aged 15-18 who have begun childbearing by secondary school participation status					
	Not in the secondary school		Attending secondary school		Total	
	% of women who have begun child bearing	No. of women of secondary school age	% of women who have begun child bearing	No. of women of secondary school age	% of women who have begun child bearing	No. of women of secondary school age
Total	**17.2**	**757**	**0.2**	**863**	**8.1**	**1,621**

Table 49. Educational attainment by early childbearing status among young women aged 15-19, Bhutan, 2010

	Level of educational attainment			Total	No. of women aged 15-19
	None	Primary	Secondary+		
Have not begun childbearing	22.5	14.0	63.5	100	1,826
Have begun childbearing	60.8	21.2	18.0	100	226
Total	**26.7**	**14.8**	**58.5**	**100**	**2,052**

Table 50. Literacy rates by early childbearing status among mothers aged 20-24, Bhutan, 2010

		% of mothers who:				Number of mothers aged 20-24
		Had first birth after the age of 18		Had first birth before the age of 18		
		Literacy	Number of non-early mothers aged 20-24	Literacy	Number of early mothers aged 20-24	
Area	Urban	55.6	292	31.8	91	383
	Rural	30.3	669	15.5	292	962
Education	None	4.2	532	6.6	278	810
	Primary	38.4	141	37.3	77	219
	Secondary +	100	288	100	27	315
Wealth index quintiles	Poorest	12.3	189	5.7	85	274
	Second	21.6	169	12.6	73	242
	Middle	35.4	207	21.3	84	291
	Fourth	45.2	242	22.6	105	347
	Richest	79.5	154	51.5	36	191
Total		**38**	**961**	**19.4**	**383**	**1,344**

or if they have remained in school, face significant obstacles in continuing their education.

Table 49 provides evidence for the hypothesis that women with less education are more likely to begin early childbearing. The data show that early childbearing among female youth aged 15-19 is highly concentrated among those with no formal education. Three out of every five women who begin early childbearing have no education. While not shown in this table, women with no education are 60 per cent more likely to begin childbearing than those who have ever attended primary school. In other words, ever attending school is associated with a significant decrease in the likelihood of early childbearing.

This negative relationship between early childbearing and educational attainment carries forward to educational outcomes such as literacy, a key indicator for women's empowerment and improved well-being. Table 50 shows that the literacy rate of mothers aged 20-24 who gave birth before the age of 18 is only half that of mothers who have gave birth at or after the age of 18 (19 per cent versus 38 per cent, respectively). This difference holds when controlling for each area of location and wealth quintile. The literacy gap between early and non-early mothers increases with wealth quintile.

Although not shown here, data show that when expanding the population to include all women aged 20-24 irrespective of their motherhood status, the disparity in literacy between women who gave birth before age 18 increases from 19 percentage points to 34 percentage points, indicating the even higher literacy rate of women aged 20-24 who have never given birth.

7.4.5. Young motherhood

As there is concern for the effect of early childbearing on a woman's education, so is there for the impact it may have on a woman's health and that of her newborn. This section also considers associations between the age of a woman at the birth of her child and her reproductive health outcomes. It also tests child health and education outcomes against the age of the mother.

7.4.5.1. Young motherhood and reproductive and newborn health

A concern often expressed by many in the health sector is that young pregnant women have a lower uptake of antenatal care than older women. To test this, the analysis considered the percentage of women who received antenatal care at least once by a skilled provider and at least four times by any provider if they had given birth in the past two years by the age of the mother at birth. Table 50 shows the results. As at least one skilled antenatal care visit is nearly universal in Bhutan, the difference between any two groups never exceeds five percentage points and there is no statistically significant difference by age of mother. When considering at least four antenatal care visits, disparities across demographic

Table 51. Percentage of young women aged 15-49 who received antenatal care and neonatal tetanus protection, by age of mother at birth of child, Bhutan, 2010

		Mother's age at birth											
		15-19				20-24				25-49			
		Received antenatal care at least once by skilled provider (%)	Received antenatal care 4+ times (%)	Protected against tetanus (%)	Total number of women aged 15-49	Received antenatal care at least once by skilled provider (%)	Received antenatal care 4+ times	% protected against tetanus	Total number of women aged 15-49	Received antenatal care at least once by skilled provider	Received antenatal care 4+ times	% protected against tetanus	Total number of women aged 15-49
Area	Urban	100	84.0	[84.3]	52	99.0	88.3	86.3	250	98.9	86.8	65.6	388
	Rural	94.9	70.9	72.7	213	98.0	74.7	78.7	565	96.0	72.9	68.5	896
Education	None	94.4	72.7	74.0	158	97.9	76.9	78.7	472	96.2	72.1	66.7	850
	Primary	97.3	64.0	68.7	51	99.7	72.4	76.5	120	98.5	81.3	60.3	131
	Secondary	98.9	84.1	83.2	56	98.4	86.6	88.4	223	98.4	89.2	73.4	303
Wealth index quintiles	Poorest	96.2	64.7	73.9	66	97.9	68.5	76.9	155	94.1	60.5	66.8	247
	Second	94.1	65.3	81.3	73	98.4	70.1	81.7	132	93.5	69.2	61.9	243
	Middle	95.0	79.4	64.9	69	96.7	80.5	74.6	176	98.9	75.4	68.1	231
	Fourth	98.7	84.2	[77.3]	47	98.9	84.4	83.5	214	99.5	83.0	68.9	257
	Richest	100	100	*	10	100	88.6	89.3	139	98.2	93.0	71.3	306
Total		**95.9**	**73.5**	**74.9**	**265**	**98.3**	**78.9**	**81.0**	**816**	**96.9**	**77.1**	**67.6**	**1,284**

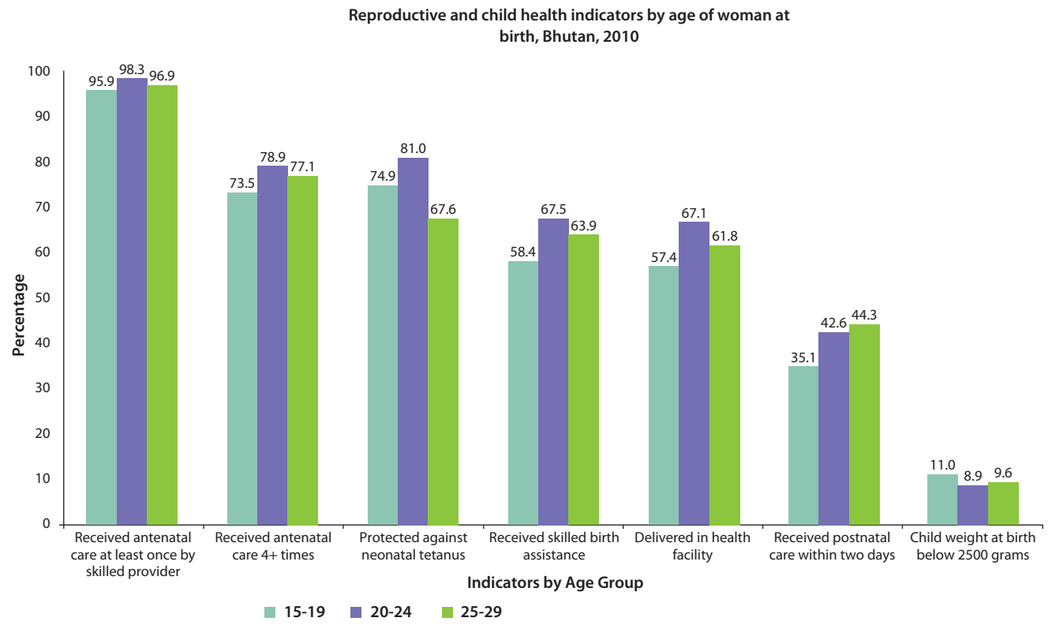
4 women who gave birth before age 15 not included.

Table 52. Percentage of women aged 15-49 receiving skilled birth assistance, institutional delivery, postnatal care, and child's weight by age of mother at birth of child, Bhutan, 2010

		Mother's age at birth																					
		15-19						20-24						25-49									
		Received skilled birth assistance (%	Delivered in health facility (%)	Received postnatal care within two days (%)	Birth below 2500 grams	Number of women who gave birth in last two years	Skilled birth assistance (%)	Delivered in health facility (%)	Received postnatal care within two days (%)	Birth below 2500 grams	Number of women who gave birth in last two years	Received skilled birth assistance (%)	Delivered in health facility (%)	Received postnatal care within two days (%)	Birth below 2500 grams	Number of women who gave birth in last two years	Received skilled birth assistance (%)	Delivered in health facility (%)	Received postnatal care within two days (%)	Birth below 2500 grams	Number of women who gave birth in last two years	
Area	Urban	[92.2]	[92.2]	[54.3]	[10.2]	52	93.4	92.9	60.4	7.5	250	86.6	87.4	62.9	8.1	388							
	Rural	50.2	48.9	30.4	11.1	213	56.1	55.7	34.7	9.3	565	54.1	50.8	36.3	10	896							
Education	None	50.5	49.6	27.7	10.9	158	58.3	57.1	37	9.2	472	51.5	48.8	36	9.8	850							
	Primary	51	49.1	32.5	10.3	51	56.6	56.3	46.1	8.3	120	72	72.8	53.5	10.6	131							
	Secondary +	87.7	87	58	11.8	56	92.9	94.1	52.7	8.5	223	95.1	93.6	63.6	8.1	303							
Wealth index quintiles	poorest	31.6	31.3	16.9	12.1	66	33.5	35.2	25.2	9.6	155	35.4	32.2	22.4	12.3	247							
	Second	39.4	38.5	25.2	11.5	73	44.8	43.6	29.2	9.7	132	43.7	40	32.5	9.4	243							
	Middle	77.4	75.6	52.1	10.2	69	69.3	66.4	42.8	9.9	176	62.7	59.5	40.6	9.2	231							
	Fourth	[89]	[87.6]	[41.2]	[10.5]	47	85.9	86.1	51.2	7.4	214	75.2	73.2	53.7	10	257							
	Richest	*	*	*	*	10	96.6	96.6	61.3	7.4	139	94.3	95.2	66.3	7	306							
Total		**58.4**	**57.4**	**35.1**	**11**	**265**	**67.5**	**67.5**	**42.6**	**8.9**	**816**	**63.9**	**61.8**	**44.3**	**9.6**	**1,284**							

Data for 4 women who gave birth before age 15 not included

Figure 39. Reproductive and newborn health care among young women aged 15-49 by age of mother at birth of child, Bhutan, 2010



characteristics, as well as by age of mother, appear to exist. However, only one of the parameters for comparing means shows any statistically significant difference. The report's conclusion then is that the uptake of antenatal care by young women is statistically equivalent to that of older women in Bhutan.

However, the analysis shows statistically significant differences in neonatal tetanus protection among women by their age at birth. Young women aged 15-19 have a lower level of neonatal tetanus protection than women aged 20-24. However, young women aged 15-19 and 20-24 have a higher level of protection than women aged 25-49.

At the time of birth, there are several indicators of reproductive health. The analysis now considers the proportion of women by age group who have received skilled birth assistance, institutional delivery, postnatal care, and whose newborns are born with low birthweight.

As Table 52 shows, young women aged 15-19 experience a lower level of reproductive healthcare for all three indicators than their counterparts aged 20-24. Similarly, women in this age group are more likely to give birth to newborns with low birthweight, defined as weighing less than 2,500 grams. All of these differences are statistically significant. And, although the youngest cohort of women appear to fare worse than women aged 25-49, none of the observed differences are statistically significant except for postnatal care, which is the only indicator in reproductive health that improves consistently with age. Outcomes for women aged 20-24 are equivalent to those of older women except in the case of institutional delivery in which the younger cohort fares better.

Figure 39 illustrates the above discussion, showing the somewhat lower level of reproductive and newborn health for the youngest mothers aged 15-19 and the relatively better outcomes for women aged 20-24.

7.4.5.2. Young motherhood and child outcomes

A key concern in public health is whether children of young mothers are more likely to have poorer health and educational outcomes than children of older mothers. For this reason, the analysis looked at a range of child well-being indicators by age of mother[64] and found very little evidence

[64] For most indicators, the analysis considered the current age of the mother but for primary school attendance and breastfeeding the analysis used the age of mother at birth.

Table 53. **Child health and education outcomes by mother's age among women aged 15-49, Bhutan, 2010**

Indicator	Age Group	Mother's age group			
		15-24		25-49	
		%	No.	%	No.
Early Childhood Education	36-59 months	6.8	478	10.3	1,866
Learning Materials in the Home	0-59 months	50.4	1,701	52	4,306
Inadequate Care	0-59 months	12	1,701	14.8	4,306
Early Childhood Development Index Score	36-59 months	68.4	478	72.2	1,866
Primary School Attendance**	6-12 years	90.4	4,474	88.9	4,310
Breastfeeding within one hour of birth**	0-2 years	58.8	1081*	58.9	1284*
Exclusive Breastfeeding**	0-5 months	46.5	173	51.2	363
Appropriate treatment of diarrhoea	0-59 months	82.0	446	79.5	1,064
Care-seeking behaviour for suspected pneumonia	0-59 months	77.9	117	71.1	291
Underweight Prevalence	0-59 months	10.9	1,701	13.1	4,306
Stunting Prevalence	0-59 months	32.9	1,701	33.5	4,306
Wasting Prevalence	0-59 months	5.8	1,701	5.9	4,306

** Number of mothers who gave birth in past 2 years, 3 women who gave birth before age 15 not shown.*
*** Indicator uses mother's age at birth of child*

for this hypothesis in Bhutan. Selected indicators cover education such as participation in formal early childhood education, having learning materials in the home, having adequate adult care, the Early Childhood Development Index (ECDI), and primary level school participation. They also include critical health issues such as breastfeeding and nutritional indicators, appropriate treatment for diarrhoea, and care-seeking behaviour during suspected pneumonia.

Table 53 notes the national-level statistics for these key health and educational outcomes of young children. In most cases, children's outcomes by age of mother are statistically equivalent. In fact, in three of the four cases in which there is a statistical difference, children of younger mothers have a better outcome than children of older mothers.[65] In only one case – the percentage of children attending early childhood education – is the estimate lower for children of young mothers than for children of older mothers. Given these data, this analysis concludes that there is no evidence that mother's age bears a significant impact on the health and educational outcomes of young children in Bhutan.

[65] The three indicators are: inadequate care, primary level school attendance, and underweight prevalence.

7.5. Summary of section on reproductive health

Reproductive health in the context of this analysis covers fertility, family planning, safe motherhood, antenatal/post natal care, early child rearing and health of their infants. It is an important component of healthcare, influencing the well-being of women in particular young mothers and their newborns. It also influences demographic developments, and consequently, the socio-economic development of Bhutan. It directly affects the physical well-being of mothers during and after pregnancy and affects the conditions under which the newborn begins his or her life as well as future child development. As such, reproductive healthcare is key for empowering women.

This chapter provides new analysis of BMIS 2010 data in the areas of fertility rates, fertility preferences, birth control, use of and unmet need for contraceptives, antenatal care, skilled birth assistance, institutional delivery, postnatal care, early childbearing and young motherhood. An attempt was made to illuminate differences in health outcomes, as well as disparities in accessibility, availability, and utilization of services across demographic groups.

Population growth in Bhutan is gradually decreasing, from 3.1 per cent in 1994 to 1.8 per cent in 2005-2010. The key indicator for population growth is the total fertility rate (TFR) of women in their reproductive years. This is the total number of children that women have, on average, during their lifetime. As of 2010, Bhutan's TFR is 2.6. A stable population is attained when the TFR reaches replacement level, which means that for every man and woman, there are two new individuals born to replace them. Taking into account mortality before reproduction, the population replacement rate is 2.1 in Bhutan.

The overall picture that emerges from the data analysis on reproductive health parameters is clear. Though Bhutan has made considerable progress on many fronts regarding reproductive health, there are still large disparities between demographic groups. For key indicators of reproductive health, women from rural areas, the poorest households, and with little to no formal education invariably fare considerably worse than urban women, those from the wealthiest households, and/or have at secondary level education or above. These findings provide compelling evidence that calls for a public health strategy that focuses on the reproductive needs of marginalized and poor women. The strategy should be holistic, encompassing access to quality healthcare services and education.

In the long term, improving access to quality education is the most sustainable way to improve reproductive health outcomes. Moreover, as it influences key elements such as early child bearing, uptake of ANC and PNC, and the probability of institutional delivery, very serious efforts should be made to substantially increase the literacy rate among women. In addition, addressing income disparities will further improve women's reproductive health. This calls for a concerted effort from all government departments to direct resources towards and design policies and programmes that focus on the poorest households, remote areas, and those with no education.

Apart from this, improving the availability and promoting the use of contraceptives, especially among unmarried women and young women without children, should be a priority. Present use is very low, which may result in the increase of STIs and unwanted early childbearing.

Further, antenatal and postnatal care emerges as a key factor for the uptake and success of healthcare given at and after birth. The Ministry of Health can ensure significant progress here, in particular among the women in rural areas, the poorest households, and those with no formal education, by addressing the following issues. As ANC coverage remains relatively low among these groups, this should be increased by ensuring that all underprivileged women receive at least four, but preferably eight, ANC visits. HIV-counselling and knowledge transfer on mother-to-child-transmission should be an integral component of the visit. At the same time, the quality of care delivered at health institutions, especially at BHUs, should be improved. Access to quality and timely postnatal care requires attention as the data show inadequate levels for both mother and child. The effect of these measures, taken together, can and should lead to a significant reduction in the inequality of reproductive health outcomes between demographic groups.

8. Maternal mortality

8.1. Introduction

Maternal health is an important part of the healthcare system aimed at reducing morbidity and mortality related to pregnancy and child birth. The healthcare that a woman receives during pregnancy, at the time of delivery, and soon after delivery is important for the survival and well-being of both the mother and child. As a result, it has been considered as a healthcare priority by the Royal Government of Bhutan since the establishment of the Reproductive Health Programme called the Maternal and Child Health (MCH) in the 1970s. Bhutan is committed to realizing MDG 5 by reducing maternal mortality by three-fourths by 2015.

The most commonly used indicator to estimate the prevalence of maternal deaths is the Maternal Mortality Ratio (MMR). Maternal mortality ratio is widely acknowledged to be a general indicator of population health, of the status of women in society, and of the healthcare system functionality.

The measurement of maternal death is complex because of the comparative rarity of the absolute number of maternal deaths in Bhutan, which is less than 20 per year.[66] Other context-specific factors such as a reluctance to report abortion-related deaths, errors due to poor memory recall, or lack of accurate medical reporting also make the measurement of maternal death complex.

Maternal mortality is defined as the death of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy from any causes related to or aggravated but not from accidental or incidental causes.[67] The causes of deaths can be divided into; a) direct causes that are related to obstetric complications during pregnancy, labour or the post-partum period, and b) indirect causes. There are five direct causes of maternal death: haemorrhage (usually occurring postpartum), sepsis, eclampsia (pregnancy induced hypertension), obstructed labour, and complications from abortion. Indirect obstetric deaths occur from either previously existing conditions or from conditions arising in pregnancy, which are not related to direct obstetric causes but may be aggravated by the physiological effects of pregnancy.

8.2. Measuring maternal mortality

Measuring maternal mortality requires a comprehensive and accurate reporting of maternal deaths. Globally, various sources are used to measure maternal mortality, including civil registration systems, household surveys, sisterhood estimation methods (indirect and direct), reproductive-age mortality studies, verbal autopsies, and censuses.

Of the different approaches described above, the BMIS 2010 uses the Direct Sisterhood Method wherein the data on the age of surviving sisters of survey respondents, the age at death of sisters who have died, and the number of years since the death of sisters were used. During the survey, all women aged 15 through 49 were asked about all the sisters and brothers born to their natural mother in chronological order starting with the oldest. Then they were asked about the survivorship of each of the siblings, the ages of surviving

[66] Reproductive Health Programme, Ministry of Health, Bhutan 2011

[67] "Trends in Maternal Mortality Report 1990-2008"

siblings, the years since death of deceased siblings, and the age at death of deceased siblings. For all dead female siblings, the respondents were asked additional questions to determine whether the death was maternity-related; that is, whether the sister was pregnant when she died; if not, whether the sister died during childbirth; and if not, whether the sister died within two months of the end of a pregnancy or childbirth. Listing all siblings in chronological order of their birth is believed to result in better reporting of events than would be the case if only information on sisters were sought. Moreover, the information collected also allows direct estimates of adult male and female mortality.

8.3. Data quality

Before estimating mortality, the data quality must be ensured and one measure of the quality of the data collected is the completeness of information on siblings. Another crude measure of the quality of maternal mortality data is the distribution of respondents' year of birth in relation to their siblings. If there is no bias in reporting, the year of birth of respondents overall should be equivalent to the year of birth of siblings.

Annex table 1.3 in the report shows that the median year of birth of respondents (1973) is almost equal to that of their siblings (1972). This indicates respondents' accurate reporting of siblings. Yet another crude measure of data quality is the mean number of siblings, or the mean sib-ship size (see Annex table 1.4). The mean sib-ship size should decline over time in line with the decline in fertility rates. That it does not monotonically decline suggests some reporting error, but this should not affect subsequent calculations of mortality rates, which are given only for the four year period preceding the survey.

8.4. Adult mortality

Maternal mortality is a subset of adult mortality. If the overall adult mortality estimates display a stable and expected pattern, the maternal mortality estimates have greater credibility.

The BMIS 2010 collected data for male and female adult mortality through the sibling history module of the women's questionnaire. Age-specific death rates are computed by dividing the number of deaths in each age group by the total women-years of exposure in that age group during a specified reference period. Table 54 shows the direct estimates of age-specific mortality rates for females and males. Note that mortality rates presented are age-adjusted.

Table 54. Adult Mortality: Direct estimates of female and male mortality by age during the four years prior to the survey, Bhutan 2010

Adult Mortality: Direct estimates of female and male mortality by age during the four years prior to the survey, Bhutan 2010			
Maternal Age	**Deaths**	**Exposure**	**Age-Adjusted Mortality Rate***
Female			
15-19	8	18,872	0.1
20-24	21	22,088	0.2
25-29	30	21,339	0.3
30-34	35	17,483	0.3
35-39	20	13,095	0.2
40-44	14	8,404	0.2
45-49	17	6,375	0.2
15-49	145	107,656	1.4
Male			
15-19	14	20,052	0.1
20-24	33	22,926	0.3
25-29	42	22,177	0.4
30-34	33	17,901	0.3
35-39	23	13,827	0.2
40-44	29	9,549	0.3
45-49	23	6,828	0.3
15-49	197	113,259	1.8
Total			
15-19	22	38,924	0.1
20-24	53	45,014	0.2
25-29	72	43,516	0.3
30-34	68	35,384	0.3
35-39	44	26,922	0.2
40-44	43	17,953	0.3
45-49	39	13,293	0.2
15-49	342	220,915	1.6

Expressed per 1,000 population

Further, to minimize the impact of possible heaping[68] of reported years, death direct estimates are presented for the period 0-4 years before the survey rather than 0-5 years. Therefore, these estimates roughly correspond to the period 2006-2010.

Since the number of sibling deaths is very small and sampling variability is large, the data over the age range 15-49 have been aggregated. The overall adult mortality rate is 1.6 deaths per 1,000 population as shown in Table 54. There are more male than female deaths in the five years preceding the survey (197 versus 145, respectively). The male mortality rate is 1.8 deaths per 1,000 population and is 29 per cent higher than the female mortality rate of 1.4 deaths per 1,000 population.

[68] Age heaping occurs because respondents may not know or offer their exact age in a survey. They may round their age up or down to the nearest number that ends in 0 or 5. When the ages are graphed, the distribution isn't smooth; instead, there are heaps over the ages ending in 0 and 5.

8.5. Maternal mortality

Government investments in maternal health have contributed to a reduction in Bhutan's maternal mortality ratio from 380 in 1994 to 255 in 2000.[69] This BMIS 2010 is the first time since 2000 that Bhutan has produced a robust estimate of MMR. Table 55 shows data on maternal mortality for the period 0-4 years before the BMIS 2010. Age-specific maternal mortality rates are calculated by dividing the number of maternal deaths by total women-years of exposure, after which maternal mortality rates are age-adjusted. Because the women's questionnaire is not administered to women over the age of 49, maternal mortality rates could suffer from 'truncation bias'. To remove this statistical bias, the overall MMR for women aged 15-49 is standardized by the age distribution of the survey respondents.

As stated earlier, maternal deaths are defined as any death that occurs during pregnancy, childbirth, or within two months after the birth or termination of a pregnancy. For each age group, maternal deaths are a relatively rare occurrence. Therefore, the age-specific pattern should be interpreted with caution. In the BMIS 2010, the respondents reported 12 maternal deaths in the five years preceding the survey. Maternal deaths accounted for eight per cent of all deaths in women aged 15-49; in other words, about one in twelve Bhutanese women who died in the five years preceding the survey died from pregnancy or pregnancy-related causes.

The maternal mortality ratio (MMR) is often considered a more useful measure of maternal mortality because it measures the obstetric risk associated with each live birth. Table 55 shows that the MMR for Bhutan for the period 2006-2010 is 145.7 deaths per 100,000 live births.

Figure 40 presents data from BMIS 2010 on maternal mortality estimates using the direct method. The data provide point estimates for MMR for three five-year periods from 1996-2010. These estimates suggest that MMR has declined in Bhutan from 262 during the period 1996-2000 to 146 during the period 2006-2010. This decline in MMR represents a 116 point (44 per cent) decrease in one decade, using a given year for each five-year period. Assuming a continual rate of logarithmic decline, this analysis forecasts a decrease in MMR to 105 deaths per 100,000 live births for the period 2011-2015.

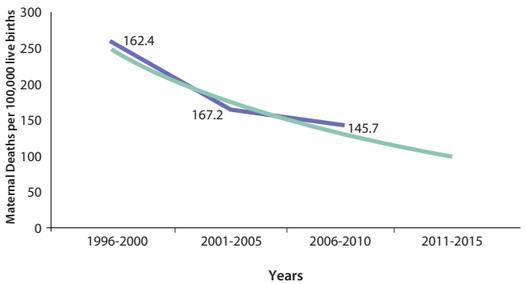
[69] Ministry of Health National Health Surveys 1994 and 2000

Table 55. Direct estimates of maternal mortality for the period 0-4 years prior to the survey, Bhutan 2010

Direct estimates of maternal mortality for the period 0-4 years prior to the survey, Bhutan 2010				
Maternal Age	**Deaths**	**Exposure**	**Age-Adjusted Mortality Rate***	**Proportion of maternal deaths to all female deaths**
0-4 YEARS				
Maternal Age				
15-19	1	18,872	0	0.12
20-24	1	22,088	0	0.05
25-29	6	21,339	0.1	0.20
30-34	0	17,483	0	0.00
35-39	3	13,095	0	0.15
40-44	1	8,404	0	0.08
45-49	0	6,375	0	0.00
Total	**12**	**107,656**	**0.1**	**0.08**
General Fertility Rate (GFR)			0.0686	
Maternal Mortality Ratio (MMR)**			145.7	

*Expressed per 1,000 women-years of exposure;
**Expressed per 100,000 live births; calculated as the maternal mortality rate divided by the general fertility

Figure 40. Maternal mortality ratio (MMR) (direct method estimates), 1996-2010, Bhutan, 2010



8.6. Summary of section on maternal mortality

The World Health Organization, UNICEF, UNFPA, and the World Bank recently published a report titled, Trends in Maternal Mortality: 1990 to 2008.[70] This document provides robust estimates of many countries' maternal mortality ratios over this time period. The report estimates Bhutan's MMR for 1990 at 940 per 100,000 live births. For 2008, the estimate is 200 with a confidence interval of 110 to 370. The BMIS estimate for the period 2006-2010 is 146, which is squarely within, and at the lower end, of this interval.

The above mentioned report notes that only 14 countries in its 172 country sample have reduced their MMR by more than 5.5 per cent per year between 1990 and 2008. Bhutan is one of those 14 countries that have reduced its MMR by an estimated rate of 8.6 per cent per year. In doing so, Bhutan has achieved a 79 per cent decrease in its MMR and ranks fourth out of 172 countries for the most rapid decline in maternal mortality.

This report states that of the 87 countries that had an MMR greater than 100 in 1990, only 10 are on track to achieve MDG 5 of reducing maternal mortality by three-fourths. Bhutan is one of these countries and by these estimates, which report a 79 per cent decline by 2008, Bhutan has already achieved MDG 5 several years early. If this report's forecast for a MMR of 105 for the period 2011-2015 is accurate, Bhutan will have reduced its maternal mortality by 89 per cent in just one generation.

Data from BMIS 2010 on maternal mortality estimates, using the direct method provide point estimates for MMR for three five-year periods from 1996-2010. These estimates suggest that MMR has declined in Bhutan from 262 during the period 1996-2000 to 146 during the period 2006-2010.

This decline in MMR represents a 116 point (44 per cent) decrease in one decade, using a given year for each five-year period. Assuming a continual rate of logarithmic decline, this analysis forecasts a decrease in MMR to 105 deaths per 100,000 live births for the period 2011-2015. A new Reproductive Health Strategy has been developed recently and it is targeted towards this end along with addressing other reproductive health related issues.

[70] WHO, UNICEF, UNFPA, The World Bank (2010). Trends in Maternal Mortality: 1990 to 2008.

9. HIV and AIDS

9.1. Introduction

Occurrence of HIV in Bhutan is still at a comparatively low level. The HIV prevalence in the general population in Bhutan is below 0.03 per cent.[71]

UNAIDS estimates that about 1,000 people in Bhutan are currently HIV-positive. In 2012, the RGoB recorded a cumulative total of 270 confirmed HIV infections since the first case was detected in 1993. Out of the 270 cases, 22 are children and 207 individuals are still living. The discrepancy between these two numbers is likely a function of the low number of HIV cases that are detected and reported to the MOH. It is very likely that many HIV-positive individuals in Bhutan do not know that they have the virus. As a consequence, the true number of HIV-positive individuals in Bhutan is probably considerably higher than MOH reported cases and more in line with UNAIDS estimates.

More than one in four (30 per cent) of reported cases of HIV are housewives, and among young people aged 15-24 years, 31 per cent are women.[72] In total, 43 per cent of men and 29 per cent of women are more than 24 years of age. Among reported cases, while heterosexual contact is the main route of HIV transmission (90 per cent), vertical transmission accounts for another nine per cent. Cases have been confirmed among diverse demographic groups that include female sex workers, farmers, corporate employees, prison inmates, and uniformed service personnel. To date, however, there are no data available on HIV prevalence among most at risk people. Although sex work is illegal in Bhutan, its existence is well known. The drug using population is estimated to be small but findings from a rapid assessment conducted in 2006 among 200 drug users indicate that 19 per cent inject, which increases their risk of contracting HIV. Despite lack of accurate data, the RGoB has called for increased drug use prevention in schools and monastic communities. The third largest number of people living with HIV (PLHIV) is found among uniformed forces. Little data exist on same sex behaviour but an HIV and AIDS survey conducted in 2006 among 3,200 men and women aged 15-49 residing in urban and rural areas showed two per cent of married men report engaging in sex with male partners.

The Ministry of Health established the National HIV and AIDS & Sexually Transmitted Infections (STIs) Control Programme (NACP) in 1984 to prevent and control the spread of HIV and AIDS and STIs in Bhutan. Since then, Bhutan has given high priority to combatting the spread of HIV. The National Strategic Plan 2012-2016 has been developed with priority focus on reaching the target population with targeted intervention approach. The strategic information has been strengthened at all levels to facilitate evidence-based decision-making and to achieve result-based outcomes. However, there are certain gaps in addressing the programmatic interventions. Thematic analysis of the Bhutan Multiple Indicator Survey (BMIS) is expected to fill key data gaps to help guide programme planning in its efforts to achieve its goals and contribute globally to MDG 6.

[71] STI/HIV and AIDS Programme, Ministry Health 2011

[72] Global AIDS Response Progress Report 2012: Bhutan

9.2. Comprehensive knowledge of HIV transmission, literacy and education

Comprehensive knowledge of HIV transmission refers to the ability of individuals to correctly identify the two main ways of preventing HIV infection, to know that a healthy looking person can have HIV, and to reject the two most common local misconceptions about HIV transmission. The BMIS 2010 survey assessed the comprehensive knowledge of HIV of all women aged 15-49.

The survey shows that more than four out of five women who were interviewed have heard of HIV (84 per cent) but that only half of these women (51 per cent) know the two main ways to prevent transmission.[73]

This analysis tested whether knowledge of HIV transmission differs by women's literacy status. Table 56 shows that 32 per cent of women aged 15-49 who are literate have comprehensive knowledge of HIV transmission compared with only 10 per cent of women in the same age group who are not literate. This disparity in knowledge by women's literacy status holds across every demographic group, suggesting an impact of literacy on women's knowledge of HIV, separate from the impact of one's area of location, educational attainment, or wealth. It may be that some HIV and AIDS awareness campaign messages in the written are not understood by non-literate women. Part of the difference in comprehensive knowledge of HIV transmission between dzongkhags may be attributed to differences in methodology and the intensity with which HIV awareness campaigns are conducted at the dzongkhag-level, given the decentralized operational structure of the Multi-Sectoral Task Force (MSTF).

With regard to knowledge of prevention of mother-to-child transmission (PMTCT) of HIV, there is also a statistically significant difference by women's literacy status. Table 56 shows that 64 per cent of women who are literate exhibit proper PMTCT knowledge compared with 52 per cent of women who are not literate. As with comprehensive knowledge of HIV, knowledge of PMTCT among literate women is higher across all demographic groups, suggesting a separate positive effect of literacy on the knowledge of HIV transmission. Interestingly, the strongest gains in PMTCT knowledge by women's literacy status are among women from rural areas, the poorest wealth quintiles, and with no formal education. This suggests that the marginal benefit of literacy on women's knowledge of mother-to-child transmission is higher among these more vulnerable demographic groups. Given that these women also exhibit a lower overall level of knowledge of HIV, programming planners should place special emphasis on targeting women who are poor, rural, and/or have little to no formal education.

As with literacy above, comprehensive knowledge differs significantly by whether female youth are attending school. Table 57 shows that, among female youth aged 15-18, 31 per cent who are currently attending school have comprehensive knowledge of HIV transmission compared with only 12 per cent of those who are not in school. This is plausible given the formal introduction of HIV awareness into the secondary level education curriculum.[74] This difference is both statistically and practically significant and holds across all demographic groups, suggesting a positive effect of school attendance on knowledge of HIV.

Comprehensive knowledge of HIV transmission is higher in female youth in urban areas than in those from rural areas, regardless of their school attendance status. Of those females who are out of school, knowledge is higher in those in urban areas than in those in rural areas. This may be due to greater accessibility to HIV education in urban areas through various media to which rural females may not have access. However, the 16 percentage point gap in HIV knowledge between urban and rural girls who are out of school diminishes to only seven percentage points for those who attend school. The same closing of HIV knowledge gap exists by wealth quintile except for those young females from the poorest wealth quintile. These data suggest a positive effect of school attendance on ameliorating the disparity in HIV knowledge among female youth by area of location.

Table 58 presents data on comprehensive knowledge of HIV transmission for several demographic groups of women aged 15-49, controlling by their wealth status. As can be seen, comprehensive knowledge increases considerably with wealth, ranging from six per cent among women in the poorest quintile of households to 31 per cent for women in the richest quintile of households, a statistically significant factor of five. In every wealth quintile, women who have secondary level or above education and/or are literate exhibit the highest rates of knowledge of HIV transmission.

[73] See Table HA.1 in the BMIS 2010 Final Report.

[74] The Department of Youth and Sports, Ministry of Education formally introduced HIV education into the Teacher's Manual for School Health Programme in 2009 as an integral component of the secondary level education curriculum (Class VII to Class XII).

Table 56. Percentage of women aged 15-49 who know three ways HIV can be transmitted from mother to child and percentage of women aged 15-49 with comprehensive knowledge of HIV transmission by their literacy status, Bhutan, 2010

		Not literate			Literate			Total number of women aged 15-49
		% who know three ways HIV can be transmitted from mother to child	% who have comprehensive knowledge of HIV	Number of women aged 15-49	% who know three ways HIV can be transmitted from mother to child	% who have comprehensive knowledge of HIV	Number of women aged 15-49	
Dzongkhag	Bumthang	86.5	7.0	192	87.8	11.1	146	337
	Chhukha	34.3	5.5	928	54.6	29.3	622	1,550
	Dagana	50.0	6.8	405	58.7	18.3	104	509
	Gasa	62.3	26.1	91	*	*	16	107
	Haa	76.8	38.7	192	70.9	61.3	90	282
	Lhuntse	43.6	17.7	241	73.2	27.2	65	307
	Monggar	59.0	1.8	700	72.2	19.1	226	926
	Paro	56.7	16.8	456	51.7	36.6	343	799
	Pema Gatshel	48.2	6.0	394	56.5	15.1	95	489
	Punakha	67.8	8.8	325	66.0	23.7	181	506
	Samdrup Jongkhar	47.6	5.3	600	74.7	28.6	175	775
	Samtse	36.1	11.0	1,143	47.8	28.4	420	1,562
	Sarpang	44.1	9.8	584	54.7	38.8	340	924
	Thimphu	58	26.9	864	71.2	42.8	1,190	2,054
	Trashigang	66.3	3.6	764	81.5	14.9	176	940
	Trashi Yangtse	55.1	9.5	253	73.2	29.3	48	301
	Trongsa	56.7	6.0	202	56.2	33.9	91	294
	Tsirang	33.8	6.5	345	70.0	39.0	118	463
	Wangdue Phodrang	62.1	3.1	456	63.0	10.7	106	562
	Zhemgang	81.9	18.2	258	81.0	39.3	73	331
Area	Urban	57.0	17.2	1,937	64.6	36.8	2,510	4,448
	Rural	51.0	8.5	7,457	63.7	26.9	2,113	9,570
Education	None	51.7	9.8	8,306	67.5	20.3	280	8,585
	Primary	56.3	14.0	1,089	60.9	17.9	598	1,687
	Secondary +	.	.	-	64.4	35.4	3,746	3,746
Wealth index quintiles	Poorest	43.3	5	2,216	71.1	14.8	203	2,419
	Second	51.7	5.8	2,202	62.2	18.5	332	2,533
	Middle	56.3	9.2	2,069	68.4	24.3	590	2,659
	Fourth	58.3	19.6	1,860	63.7	32.6	1,181	3,040
	Richest	53.3	16.6	1,048	63	37.6	2,319	3,367
Motherhood status	Never given birth	44.4	9.2	1,413	63.9	30.8	2,473	3,886
	Has ever given birth	53.6	10.5	7,981	64.5	33.9	2,150	10,132
Total		**52.2**	**10.3**	**9,395**	**64.2**	**32.3**	**4,623**	**14,018**

Indeed, the steepest increase in knowledge of HIV by wealth occurs among literate women. The data also show that wealth has a dramatic effect on comprehensive knowledge among rural women, helping to completely close the urban-rural gap in HIV knowledge. Women who have no formal education and/or are illiterate have the least amount of gains in comprehensive knowledge of HIV from the poorest to wealthiest wealth quintiles. Knowledge among these women increases from five per cent in those from the poorest wealth quintile to only 16 per cent in the richest quintile. These data suggest that lack of education and illiteracy have a dampening effect on the positive effects of wealth on the knowledge of HIV.

9.3. Comprehensive knowledge of HIV transmission and condom use

Over 20 years ago, the Ministry of Health (MOH) introduced the male condom as a form of contraception for family planning purposes. However, with the emergence of HIV and AIDS, the MOH began to promote the use of condoms in the early 1990s as an effective method with which to prevent the

Table 57. Comprehensive knowledge of HIV transmission among young women aged 15-18 by school participation status, Bhutan, 2010

		Currently out of school		Currently in school		Number of female youth aged 15-18
		% who have comprehensive knowledge of HIV	Number of female youth aged 15-18	% who have comprehensive knowledge of HIV	Number of female youth aged 15-18	
Area	Urban	23.5	161	34	427	588
	Rural	8.2	558	27.3	463	1,021
Education	None	6.4	398	.	0	398
	Primary	9.8	160	11.6	92	252
	Secondary +	26.7	160	32.7	798	958
Wealth index quintiles	Poorest	4.5	190	13.9	65	256
	Second	8.6	169	28.8	80	249
	Middle	9.7	122	26.8	133	255
	Fourth	18.5	90	35.9	260	350
	Richest	21.8	147	31.4	352	499
Total		**11.6**	**719**	**30.5**	**890**	**1,609**

Table 58. Comprehensive knowledge of HIV and AIDS among women aged 15-49 by household wealth quintile, Bhutan, 2010

		Wealth index quintiles										Total number of women 15-49
		Poorest		Second		Middle		Fourth		Richest		
		% with comprehensive knowledge of HIV	Number of women 15-49	% with comprehensive knowledge of HIV	Number of women 15-49	% with comprehensive knowledge of HIV	Number of women 15-49	% with comprehensive knowledge of HIV	Number of women 15-49	% with comprehensive knowledge of HIV	Number of women 15-49	
Area	Urban	*	9	[0.0]	29	17.8	395	26.4	1,417	31.2	2,598	4,448
	Rural	5.8	2,409	7.6	2,504	11.7	2,264	23.1	1,623	30.6	769	9,570
Education	None	5.2	2,126	5.7	2,050	9.6	1,883	19.5	1,681	16.2	846	8,585
	Primary	5.3	208	8.3	282	11.2	380	21.2	397	23.3	420	1,687
	Secondary+	23.0	85	24.2	201	28.0	396	35.1	963	38.6	2,100	3,746
Literacy	Illiterate	5.0	2,216	5.8	2,202	9.2	2,069	19.6	1,860	16.6	1,048	9,395
	Literate	14.8	203	18.5	332	24.3	590	32.6	1,181	37.6	2,319	4,623
Total		**5.8**	**2,419**	**7.5**	**2,533**	**12.6**	**2,659**	**24.6**	**3,040**	**31.1**	**3,367**	**14,018**

transmission of HIV and AIDS and other STIs. At that time, use of condoms was minimal due to lack of knowledge of its benefits and accessibility. According to BMIS data, only 5.5 per cent of women aged 15-49 use condoms. This analysis considers the relationship between use of the male condom by whether women have comprehensive knowledge of HIV or not, irrespective of their overall level of contraception use.

Table 59 shows that women aged 15-49 exhibit a similar overall level of contraception use regardless of whether they have comprehensive knowledge of HIV transmission or not. 65 per cent of women who do not have knowledge of HIV use some form of contraception compared with 67 per cent of women with comprehensive knowledge of HIV, a difference that is not statistically significant.

However, Table 59 shows that women's preferred method of contraception differs by their knowledge of HIV. The data indicate that women with knowledge of HIV use condoms at two and a half times the rate of women without knowledge (11 per cent versus 4.5 per cent, respectively). This difference is both statistically and practically significant and signifies that knowledge of HIV appears to positively affect women's behaviour in their choice of contraception to protect themselves from possible infection.

The rate of condom use by women from the poorest quintile of households does not differ by knowledge of HIV, which may be attributed to lack of accessibility or affordability. Table 59 also shows that female youth aged 15-19 who have knowledge of HIV are no more likely to choose condoms than those females in the same age group without knowledge. However, women aged 20-39 with knowledge of HIV show significant behavioural change in their increased preference for condom use.

Among all unmarried women aged 15-49, six per cent report being sexually active, defined as having had sex within the 12 months prior to the survey. Women who are unmarried and do not have comprehensive knowledge of HIV are not only vulnerable to unwanted pregnancy but are also at a higher risk of contracting HIV. Table 60 shows that

Table 59. Percentage of married women aged 15-49 years who are using a contraceptive method as a function of their HIV knowledge, Bhutan, 2010

		Women who do not have comprehensive knowledge of HIV, who use:			Women who have comprehensive knowledge of HIV, who use:			Total number of currently married women aged 15-49
		Male condom	Any method of contraception	Number of currently married women aged 15-49	Male condom	Any method of contraception	Number of currently married women aged 15-49	
Area	Urban	9.4	62.4	2,185	15.8	68.3	801	2,986
	Rural	2.7	66.3	6,227	6.3	66.1	817	7,043
Age	15-19	2.7	29.4	279	[2.2]	[37.0]	32	312
	20-24	5	55.8	1,286	10.7	59.9	282	1,568
	25-29	6.6	63.9	1,794	16.3	58.5	463	2,257
	30-34	4.7	73.2	1,586	9.4	75.2	337	1,923
	35-39	4.7	74.5	1,414	12.1	77.2	236	1,650
	40-44	2.8	69.7	1,179	4.4	78.7	184	1,363
	45-49	1.3	58.3	872	3.9	66.8	85	957
Education	None	2.6	66.7	6,343	5.6	74.3	743	7,087
	Primary	5.4	65.9	968	7.3	68	196	1,165
	Secondary +	14.6	56.8	1,100	18	59.2	678	1,778
Wealth index quintiles	Poorest	1.3	68.8	1,757	0.8	73.6	98	1,855
	Second	1.3	65.3	1,765	5.4	69.8	124	1,888
	Middle	3.3	64.6	1,712	5.5	69	225	1,937
	Fourth	5.6	65.1	1,684	7.3	70.9	505	2,189
	Richest	12	62.2	1,494	18.2	62.4	666	2,160
Total		**4.5**	**65.3**	**8,411**	**11**	**67.2**	**1,618**	**10,029**

Table 60. Contraceptive use among currently unmarried sexually active women as a function of their HIV knowledge, Bhutan, 2010

	% of currently unmarried women who have had sexual intercourse aged 15-49 who:								
	do not have comprehensive knowledge of HIV, who use:			have comprehensive knowledge of HIV, who use:			Total		
	Male condom	Any method of contraception	Number of women 15-49	Male condom	Any method of contraception	Number of women 15-49	Male condom	Any method of contraception	Number of women 15-49
Total	4.3	25.9	217	[6.1]	[28.1]	27	4.5	26.2	245

only 26 per cent of unmarried, sexually active women report using any form of contraception compared with 66 per cent of currently married women. The data also show that only 4.5 per cent of unmarried, sexually active women aged 15-49 use condoms compared with 5.5 per cent among all women. Another concern is that this estimate for unmarried women does not differ statistically by their knowledge of HIV.

9.4. Knowledge of HIV transmission and early marriage

Table 61 presents data on knowledge of HIV among women aged 15-49 by their age at first marriage. The data show that comprehensive knowledge of HIV increases with age at first marriage. Whereas 18 per cent of ever married women who married at or after the age of 18 have knowledge of HIV, only 7.5 per cent of women who married before age 15 have comprehensive knowledge, a difference that is both statistically and practically significant. While this gap in knowledge by age of marriage holds across most demographic groups, it is particularly large among women in urban areas and from the richest households. This suggests the additional positive impact of wealth and living in urban areas on knowledge of HIV.

Another indicator of knowledge about HIV is knowledge of the three ways in which HIV can be transmitted from mother-to-child. Prevention of mother-to-child transmission knowledge (PMTCT) for ever married women who married at or after the age of 18 is 58 per cent compared with only 49 per cent among women who first married before the age

Table 61. Percentage of ever married women aged 15-49 who know three ways HIV can be transmitted from mother to child and percentage of these women with comprehensive knowledge of HIV transmission by their age at first marriage, Bhutan, 2010

		% of women married before the age of 15, who:			% of women first married at the age of 15-17, who:			% of women married at or after the age of 18, who :			Total number of women
		know three ways HIV can be transmitted from mother to child	have comprehensive knowledge of HIV	Number of women	know three ways HIV can be transmitted from mother to child	have comprehensive knowledge of HIV	Number of women	know three ways HIV can be transmitted from mother to child	have comprehensive knowledge of HIV	Number of women	
Area	Urban	57.6	13.8	227	58.5	23	756	62.1	28.8	2,195	3,178
	Rural	46.7	5.6	718	53	10.1	2,242	55.8	12.8	4,800	7,760
Education	None	47.5	5.3	768	51.6	10.7	2,373	55	10.8	4,597	7,738
	Primary	56.2	16.2	135	60.6	18.6	423	60.2	15.6	752	1,309
	Secondary	[60.6]	[20.3]	43	73.6	33.9	201	64.1	38.8	1,646	1,891
Wealth index quintiles	Poorest	39.8	4.2	252	46.6	7.4	622	46.1	4.2	1,142	2,016
	Second	40.9	3.7	216	54.4	5.8	644	56.2	7.3	1,251	2,111
	Middle	55.7	7.5	179	55.1	9.6	634	61.6	13.2	1,363	2,176
	Fourth	60.5	9.6	180	60.9	23.4	638	60.8	23.6	1,526	2,344
	Richest	58.5	18.6	119	54.9	23.3	459	60.8	33.3	1,714	2,292
Total		**49.3**	**7.5**	**946**	**54.4**	**13.4**	**2,998**	**57.7**	**17.9**	**6,995**	**10,939**

Table 62. Accepting attitudes towards people living with HIV and AIDS among women aged 15-49 by whether they have comprehensive knowledge of HIV transmission, Bhutan, 2010

		Women aged 15-49 who do not have comprehensive knowledge of HIV			Women aged 15-49 who have comprehensive knowledge of HIV			Total number of women 15-49 who have heard of AIDS
		Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators (%)	Number of women 15-49 who have heard of AIDS	Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators (%)	Number of women 15-49 who have heard of AIDS	
Area	Urban	97.4	27.8	2,886	99.8	53.6	1,256	4,142
	Rural	97.1	20.2	6,388	99.8	42.4	1,203	7,592
Education	None	96.4	19.3	5,668	99.6	45.2	872	6,540
	Primary	97.9	24.6	1,226	100.0	46.0	259	1,486
	Secondary +	98.6	29.3	2,380	99.9	50.5	1,328	3,708
Wealth index quintiles	Poorest	95.6	14.6	1,468	98.5	31.9	140	1,609
	Second	96.5	18.4	1,701	100.0	42.8	189	1,890
	Middle	97.6	21.0	1,910	100.0	45.1	335	2,245
	Fourth	97.9	28.5	2,029	99.8	54.2	749	2,778
	Richest	97.6	27.0	2,167	99.8	47.9	1,046	3,212
Total		**97.2**	**22.6**	**9,275**	**99.8**	**48.1**	**2,459**	**11,734**

of 15. Despite women's age at first marriage, those in rural areas, with no education and from the poorest households, have less comprehensive and PMTCT knowledge than their counterparts in urban areas, with secondary-level education, and from wealthier households. This lack of knowledge among the most marginalized women increases their risk of contracting HIV and also the risk of transmitting the virus to their children in the future.

In terms of sexual behaviour, sex with older men is thought to reflect vulnerability among young women, and is known to increase the risk of contracting HIV.[75] A separate test, not shown here, analysed the percentage of female youth aged 15-24 who had sex with a man 10 or more years older by whether they have comprehensive knowledge of HIV. The data show no difference in the likelihood of having sex with an older man by knowledge of HIV.[76]

9.5. Knowledge of HIV transmission and acceptance of PLHIV

The BMIS survey asked women aged 15-49 several questions about their attitudes towards people living with HIV as a measure of stigma and discrimination.[77] Among all women aged 15-49, 98 per cent agree with at least one of the four accepting attitudes and 28 per cent express accepting attitudes on all four indicators. Table 62 disaggregates the percentage of women who express accepting attitudes by whether they have comprehensive knowledge of HIV prevention. It shows that women express near universal acceptance on at least one indicator regardless of their knowledge of HIV. 99.9 per cent of women with comprehensive knowledge of HIV agree with at least one accepting attitude compared with 97 per cent of women without comprehensive knowledge.

However, there is a substantial difference in the percentage of women who express acceptance on all four indicators by whether they have comprehensive knowledge of HIV. 48 per cent of women with comprehensive knowledge agree with all four accepting indicators compared with 23

[75] Young People and HIV and AIDS, Opportunity in Crisis. (2002). UNICEF, UNAIDS, WHO.

[76] 14 per cent of female youth aged 15-24 who do not have knowledge of HIV had sex with a man ten or more years older in the year prior to the survey compared with 11 per cent of female youth who have knowledge of HIV. Conversely, among those female youth who had sex with a man ten or more years older, 14 per cent have comprehensive knowledge of HIV compared with 17 per cent of those who did not have sex with an older man. These differences are not statistically significant and their statistical equivalence may partly be a function of the fact that urban and wealthy women are more likely to have sex with a man ten or more years older than rural and poorer women.

[77] The questions regard a) purchasing fresh vegetables from a shopkeeper known to have HIV, b) whether a female teacher who has HIV should be allowed to teach, c) caring for a family member that has been sickened because of HIV, and d) whether the respondent would keep it a secret if a family member got infected with HIV.

per cent of women without knowledge. The increase in level of acceptance of persons with HIV by knowledge of HIV is disproportionately strong among women with no education. This indicates that raising awareness about HIV to those without formal education pays particularly strong dividends for desired outcomes.

It is good to note that young women aged 15-24 demonstrate a higher level of acceptance than their peers aged 25-49 on each of the four indicators and the two noted in Table 62: agreeing with at least one accepting attitude and expressing accepting attitudes on all four indicators. In each case, the difference is significant.

A related test of knowledge on acceptance of PLHIV is presented in Table 63. This table shows the association between acceptance of PLHIV among female youth aged 15-18 by whether they attend secondary school or not.

The table also shows that irrespective of whether female youths attend school, agreement with at least one accepting attitude is nearly universal. However, significant differences in acceptance on all four indicators exist between female youths aged 15-18 who attend secondary school versus those who do not. Whereas 34 per cent of female youths who attend school expressed acceptance on all four indicators, this figure is only 20 per cent for those who do not attend school. As with the table 62, this disparity in acceptance by school attendance is strongest for females in rural areas and from the poorest quintile of households, indicating that school attendance, and the knowledge of HIV that comes from it, has a stronger impact on acceptance of PLHIV in rural and/or poorer female youth. For this reason, the government has instituted education on HIV from the secondary level of school system using life-based interventions, and through extracurricular activities.

HIV counselling and testing (HCT) is an important and long-standing component of the Ministry of Health's HIV prevention programme. HCT provides clients with critical information on HIV in order to make an informed choice to be tested. As the HCT programme communicates knowledge of how HIV is transmitted to women, Table 64 tests whether the percentage of women aged 15-49, who express accepting attitudes towards PLHIV, differs by whether they have ever been tested for HIV.

The data indicate that women aged 15-49 who have ever been tested for HIV express a slightly higher level of acceptance on all four indicators than those who have never been tested (30 per cent versus 27 per cent, respectively). This may be because women who opt to get tested are provided pre-test counselling on HIV that covers basic information on the importance of the HIV test and the modes of transmission, including stigmatization that result from misconceptions.

Table 63. Accepting attitudes towards people living with HIV and AIDS among young women aged 15-18 against their attendance in secondary school, Bhutan, 2010

		Not in secondary school			Attending secondary school			Total number of women 15-18
		Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators (%)	Number of women 15-18	Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators (%)	Number of women 15-18	
Area	Urban	100.0	34.4	111	98.8	34.5	450	560
	Rural	98.0	16.1	456	99.1	33.9	404	861
Age at beginning of school year	15	97.5	17.5	104	98.0	28.0	218	322
	16	98.3	16.6	125	98.9	35.7	252	377
	17	98.6	24.8	166	99.5	38.2	215	381
	18	98.8	16.3	162	99.8	38.0	123	285
Mother's education	None	97.7	19.3	287	98.8	31.0	479	766
	Primary	*	*	18	99.5	39.8	84	102
	Secondary +	[100.0]	[29.0]	64	98.0	38.5	121	186
Wealth index quintiles	Poorest	96.9	17.7	155	[100.0]	[30.3]	33	188
	Second	97.6	16.3	127	100.0	37.7	62	189
	Middle	98.8	11.6	116	96.8	41.6	114	230
	Fourth	100.0	31.6	68	98.9	36.8	267	335
	Richest	100.0	28.1	101	99.4	30.0	377	479
Total		**98.4**	**19.6**	**567**	**99.0**	**34.2**	**854**	**1,421**

Data for 10 cases in which the education of the mother is not known because she is not in the household are not shown; 55 cases in which the age of the girl at the beginning of the school year was 14 are not shown.

Table 64. Accepting attitudes towards people living with HIV and AIDS among women aged 15-49 against their HIV testing take-up, Bhutan, 2010

		Never tested			Tested		
		Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators (%)	Total women 15-49	Agree with at least one accepting attitude (%)	Express accepting attitudes on all four indicators	Total women 15-49
Area	Urban	97.9	34.4	2,767	98.6	38.3	1,375
	Rural	97.1	23.2	5,384	98.4	24.9	2,208
Education	None	96.3	21.8	4,480	98.0	24.9	2,060
	Primary	98.1	28.4	1,068	98.9	28.1	417
	Secondary +	98.9	35.4	2,603	99.3	40.3	1,105
Wealth index quintiles	Poorest	95.6	16.3	1,164	96.5	15.5	445
	Second	96.4	19.6	1,326	98.0	24.0	564
	Middle	97.6	24.5	1,587	98.9	24.7	658
	Fourth	98.3	34.7	1,908	98.8	37.1	870
	Richest	98.0	32.3	2,166	99.1	36.9	1,046
Total		**97.4**	**27.0**	**8,151**	**98.5**	**30.0**	**3,583**

9.6. Summary of section on HIV and AIDS

Occurrence of HIV in Bhutan is still at a comparatively low level, with 270 reported cases, including 22 children. However, Based on this figure, UNAIDS estimates a total of 1,000 infected individuals in Bhutan, which is considerably more. As early as 1988, the Ministry of Health established the National HIV and AIDS & Sexually Transmitted Infections Control Programme (NACP). Since then, the Government of Bhutan has given high priority to combatting the spread of HIV.

The BMIS 2010 data was analysed in order to look in-depth into factors that influence the knowledge required to prevent transmission of HIV, with special attention to PMTCT.

According to the BMIS (2010), more than four out of five women interviewed had heard of HIV, with only 51 per cent of them knowing the two main ways of preventing HIV transmission. Overall, 81 per cent of women aged 15-49 years know that HIV can be transmitted from mother to child, and 56 per cent know all three ways of mother-to-child transmission. Knowledge of ways of mother-to-child transmission varies by age, with the highest level of knowledge found among 25-29 years old (60.3 per cent) and the lowest among 40-49 years old (50 per cent). The data show that 55 per cent of women knew where to get tested, while 26 per cent reported to have been tested for HIV.

Women's education level clearly affects knowledge on HIV transmission. Among women in the age group of 15-49 years, comprehensive knowledge of HIV is significantly higher among literate women (30 per cent) than among non-literate women (10 per cent). However, the level of knowledge regarding PMTCT is the same in both the groups. Among female youth aged 15-18 comprehensive knowledge of HIV is positively correlated with their level of education. Female youth in this age group who are currently in school are nearly three times as likely to have comprehensive knowledge (31 per cent) as those who are currently out of school (11 per cent).

Wealth also influences the level of knowledge of HIV, independent of literacy status. The data show that the percentage of women aged 15-49 with comprehensive knowledge on HIV is six per cent for those in the poorest wealth group compared with 31 per cent for those from the richest wealth group of households. Women in better economic conditions and in urban areas also have greater knowledge of where they can get tested for HIV.

BMIS data indicate that 66 per cent of women aged 15-49 know that using a condom every time during sex can prevent HIV transmission. Women who are unmarried

and sexually active and do not have this knowledge are vulnerable to unwanted pregnancy and are at higher risk of contracting HIV. Knowledge of how HIV is transmitted may also contribute to mitigating HIV-related stigma and discrimination. Of the women who have comprehensive knowledge of HIV, 48 per cent express accepting attitudes towards people living with HIV and AIDS as compared with only 23 per cent of those who do not have comprehensive knowledge. Acceptance of PLHIV is also correlated with education and exposure to testing for infection. Women who have more education express higher acceptance rates of acceptance of PLHIV than those with little to no education. In addition, women who have undergone a HIV test and received the result have a more accepting attitude than the ones who have never been tested.

The findings indicate that while knowledge on HIV may positively influence the use of contraceptives, there is a group of women who have not been reached by formal or non-formal education. These are mainly the young, unmarried and uneducated women. Efforts should be increased to address these groups. Programmes for incorporating lessons on STD in the current curriculum of secondary education need to be developed. In order to reach women with no formal education, knowledge on HIV can be incorporated in the Non-formal Education programmes (NFE).

10. Water, Sanitation and Hygiene

10.1. Introduction

The Rural Water Supply and Sanitation Programme (RWSS) began in 1974 with the mandate to provide safe drinking water supply to all rural areas in the country. Although Bhutan's 2002 Sector Policy provides a clear directive to improve access to safe water supplies, it lacks sufficient detail on sanitation and hygiene, which are key components of the programme. Currently, the Public Health Engineering Division (PHED) is in the process of reformulating the RWSS Sector Policy to explicitly address issues of sanitation and hygiene. In addition, the Ministry of Health has made sanitation and hygiene a priority in the agenda for the upcoming 11th FYP.

The long-term objective of the RWSS programme is to improve the health of the rural population by reducing the incidence of water borne and related diseases through the provision of safe drinking water and the promotion of improved sanitation. Specifically, the programme aims to provide universal access to safe drinking water to the whole population to promote improved sanitary latrines and ensure their proper use, and to ensure that more than 90 per cent rural water schemes are functioning and have regular water quality monitoring systems.

Diarrhoea is one of the leading causes of under-five morbidity in Bhutan although it is in decline. According to the 2011 Annual Health Bulletin (AHB), the most common diseases among the total population include pneumonia, the common cold, skin infections, and diarrhoea.[78] The AHB cites diarrhoeal incidence for children under the age of five as 24 per cent for the year 2010. The BMIS estimates diarrhoeal incidence to be 25 per cent for the same year.

This chapter analyses BMIS 2010 data to assess the extent to which various populations have access to improved drinking water sources, improved sanitation facilities, and the means with which to practice proper hygiene. It then correlates these data with those related to diarrhoeal incidence. These findings will enable RWSS programme staff and government planners to design the right set of interventions directed towards communities most in need, to meet programme objectives and improve the health and well-being of all people in Bhutan.

10.2. Drinking water facilities

Households in Bhutan receive their drinking water from various supply sources, which are categorized as either 'improved' or 'unimproved'. Improved drinking water sources[79] include piped water (into one's dwelling, yard or plot), public tap stands, protected dug wells, protected springs, and rainwater collection.[80]

Bhutan has made remarkable progress in expanding access to improved drinking water sources since 1990. At that time, less than half (45 per cent) of the population had

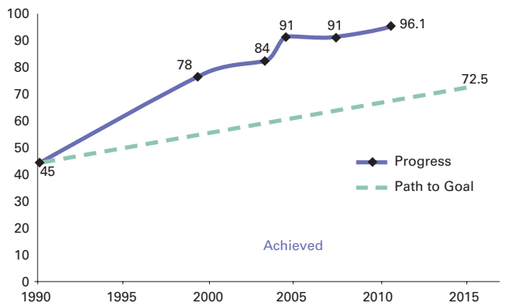
[78] Annual Health Bulletin, 2011- Health Indicator Table, p.1.

[79] Both the Joint Monitoring Programme (JMP) and the BMIS employ the terms "use" and "access to" interchangeably. While BMIS 2010 enumerators officially assessed "access", data in the report refer to "use". This document maintains this equivalency of terms, using "access" and "use" interchangeably.

[80] If the household's main source of water supply is one of those on the improved list and its drinking water is "bottled water", the household is categorised as having an improved drinking water source.

access to improved drinking water sources. According to BMIS 2010 data, this figure has more than doubled to 96 per cent in the year 2010. This achievement represents a 93 per cent decline in the percentage of the population without improved drinking water sources. Figure 41 illustrates how this progress has resulted in early achievement of MDG 7 target to reduce by half those without access to safe drinking water by 2015.[81]

Figure 41. Proportion of population using an improved drinking water source, Bhutan, 2010



Sources: National MDG Progress Report baseline, 2000 and target, Global Estimates (UNSD) 2005, BLSS 2007, BMIS 2010

Nevertheless, an estimated four per cent of the population still does not have access to improved drinking water sources. These individuals live in households in rural and remote areas and are overwhelmingly from the poorest wealth quintile. These are the same households that often lack improved sanitation facilities.

The functionality of the piped water supply schemes requires improvement. Analysis of the RWSS Management Information System (MIS) administrative data from 15 dzongkhags in 2006 revealed that while 40 per cent of the RWSS schemes were functioning very well, 33 per cent were working well with some minor problem, 17 per cent were functioning with a need for improvement and 10 per cent were non-functional. The analysis of the inventory revealed that dzongkhags with high functional schemes had high coverage of trained caretakers compared with dzongkhags with least functional schemes. The analysis therefore concluded that functionality of water supply schemes is positively impacted by the presence and maintenance of trained caretakers.

[81] BMIS 2010 for 2010, Global (UNSD) estimates for 2000, 2005 and 2008 & National MDG progress reports for baseline and target.

10.2.1. Drinking water facilities and diarrhoeal incidence

Ample evidence shows that quality drinking water reduces the risk of acquiring diarrhoea. UNICEF research indicates that improved water sources reduce diarrhoeal incidence by approximately 25 per cent.[82] The Royal Government of Bhutan has defined safe drinking water as a basic necessity and has consequently accorded high priority to providing safe drinking water to all households in Bhutan.[83] Given the strong relationship between the quality of a household's water source and diarrhoea, this analysis assessed the percentage of children under the age of five who had diarrhoea in the two weeks preceding the survey by whether the household uses an improved drinking water source. Table 65 shows that 32 per cent of children in households without an improved water source had diarrhoea in the two weeks prior to the survey compared with 25 per cent of children in households with an improved water source. This difference is statistically and practically significant in that it indicates that children living in households without an improved drinking water source have 30 per cent higher likelihood of having diarrhoea than those who have an improved source.

Table 65 also examines diarrhoeal incidence among children by type of drinking water, controlling for type of sanitation facilities. Controlling for use of improved sanitation in the home the data show that diarrhoeal incidence of children in households with an unimproved drinking water source is statistically higher than in homes without an improved drinking water source,(35 per cent versus 25 per cent, respectively).

Overall, the RGoB has achieved significant progress in realizing its goal to provide safe drinking water to the Bhutanese population. BMIS 2010 reveals that 96 per cent of all households have an improved drinking water source. However, those without improved drinking water source are disproportionately those from the two poorest wealth quintiles, rural areas, and those without improved sanitation facilities. Children in these homes face multiple vulnerabilities and deprivations that compound their

[82] Cited in UNICEFs WASH Position Paper 2011, "Lorna Fewtrell, Rachel B Kaufmann, David Kay, Wayne Enanoria, Laurence Haller and Jr, John M Colford, 2005.Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. The Lancet Infectious Diseases, Volume 5, Issue 1, January 2005, pp. 42-52.

[83] 10th FiveYear Plan, Royal Government of Bhutan, 2008-2013 Volume 2, Programme Profile, p. 312

Table 65. Percentage of children who had diarrhoea in the two weeks preceding the survey, according to availability of improved drinking water in the household, Bhutan, 2010

		Household has unimproved drinking water sources		Household has improved drinking water sources		Total number of children under-five
		Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	
Area	Urban	*	8	25.4	1,833	1,841
	Rural	33.2	236	24.6	4,220	4,456
Wealth index quintiles	Poorest	33.1	110	25.7	1,184	1,294
	Second	22.8	69	25.2	1,090	1,159
	Middle	[39.0]	39	27.7	1,158	1,197
	Fourth	*	22	26.7	1,416	1,438
	Richest	*	3	18.8	1,205	1,208
Mother's education	None	30.7	218	26.3	3,989	4,207
	Primary	*	20	26.1	762	781
	Secondary	*	6	19.7	1,303	1,309
Sanitation facilities	Use of Unimproved Sanitation Facilities	30.8	155	24.5	1,949	2,104
	Use of Improved Sanitation Facilities	35	89	25	4,104	4,193
Total		**32.3**	**244**	**24.8**	**6,053**	**6,297**

Table 66. Percentage of children under-five who had diarrhoea in the two weeks preceding the survey type of treatment used for drinking water in households without improved drinking water sources, Bhutan, 2010

		Boil		Use water filter		Household does not use appropriate water treatment method		Number of children under-five
		Had diarrhoea in last two weeks %	Number of children under-five	Had diarrhoea in last two weeks %	Number of children under-five	Had diarrhoea in last two weeks %	Number of children under-five	
Area	Urban	25.3	1,705	18.6	957	*	1	1,841
	Rural	23.7	3,127	23.7	541	34.4	116	4,456
Wealth index quintiles	Poorest	25.1	778	*	8	33.7	49	1,294
	Second	24.2	740	[23.5]	30	[31.2]	35	1,159
	Middle	27.2	908	29.2	118	[33.0]	26	1,197
	Fourth	26.9	1,295	25.4	442	*	7	1,438
	Richest	18.4	1,110	16.7	900	*	0	1,208
Education of head of household	None	26.2	2,666	23.8	394	34.8	105	3,847
	Primary	26.3	845	29.7	240	*	12	1,024
	Secondary +	19.0	1,319	16.4	864	*	1	1,423
Total		**24.3**	**4,832**	**20.4**	**1,498**	**34.1**	**117**	6,297

Households may use more than one water treatment method; Data for two cases in which the education of the household head is not known are not shown.

risk of illness. These data indicate that achieving 100 per cent coverage of improved drinking water sources to all households is one mechanism by which to mitigate diarrhoeal incidence among children and as such, remains a worthy policy objective.

The most significant public health concern about the drinking water supply in Bhutan is microbiological contamination. Water-related diseases caused by ingestion broadly falls in the water borne and water washed categories. Water borne diseases are caused by the ingestion of water contaminated by human or animal faeces or urine that contains pathogens. Water washed diseases are caused by inadequate use of water for domestic and personal hygiene. Diarrhoea falls in both of these categories.

This analysis tested diarrhoeal incidence in households that use unimproved drinking water sources, by the type of treatment used to improve water quality. BMIS data show that boiling and filtering are the most common treatments used at the household level to improve water quality. Diarrhoeal incidence was tested by whether a household boils its water, uses a filter, or uses another inappropriate treatment option.[84] As shown in Table 66, diarrhoeal incidence stands at 34 per cent for households using inappropriate treatment method, which is 10 percentage points higher compared with households that uses boiling and 14 percentage points higher for households that use a filter. While there is no statistically significant difference between filtering and boiling, it is evident that the use of an appropriate water treatment option reduces the prevalence of diarrhoeal diseases among children.

10.2.2. Time to collect water and diarrhoeal incidence

One of the key factors that compromises water quality is the unsafe transport and storage of water. A household with water on premises is one that has water piped directly into the dwelling, compound, or to a neighbour or uses a public tap or standpipe. A household that obtains its water off-premises is the one in which the water source is located outside its dwelling or compound. Households that collect and transport water from an off-premises site risk more exposure to fecal contamination at the water source than those with an on-premises water source. For this reason, this analysis tests whether the incidence of diarrhoea among children under the age of five differs by whether the household has water on or off-premises.

Table 67. Percentage of children under-five who had diarrhoea in the two weeks preceding the survey by whether household has water on the premises, Bhutan, 2010

		Water on premises		Water off-premises		Number of children under-five
		Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	
Area	Urban	25.2	1,791	29.5	49	1,841
	Rural	24.4	4,036	30.9	418	4,456
Drinking water	Not using improved sources	32.5	56	31.8	187	244
	Using improved sources	24.6	5,772	30.0	280	6,053
Sanitation facilities	Not using improved facilities	24.0	1,850	31.5	254	2,104
	Using improved facilities	24.9	3,978	29.9	214	4,193
Education of household head	None	26.0	3,503	34.7	343	3,847
	Primary	27.5	933	20.9	91	1,024
	Secondary +	19.3	1,389	[17.3]	33	1,423
Wealth index quintiles	Poorest	25.4	1,147	32.5	146	1,294
	Second	23.6	1,016	35.2	143	1,159
	Middle	28.4	1,095	24.6	103	1,197
	Fourth	27.0	1,368	27.1	70	1,438
	Richest	18.7	1,201	*	6	1,208
Total		**24.7**	**5,827**	**30.8**	**467**	**6,297**

Data for two cases in which the education of the household head is not known are not shown.

[84] Inappropriate treatment methods include: no treatment, straining through cloth, letting it stand and settle, and any other treatment besides boiling, adding bleach or chlorine, using a water filter, or solar disinfection.

Table 68. Percentage of children under-five who had diarrhoea in the two weeks preceding the survey, by the time needed to collect water, Bhutan, 2010

		Time to source of drinking water				Total number of children under-five
		Less than 30 minutes		30 minutes or more		
		Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	
Area	Urban	[35.1]	40	*	9	49
	Rural	32.2	304	27.5	115	418
Education of household head	None	35.7	251	32	92	343
	Primary	25.7	67	*	25	91
	Secondary +	[19.7]	26	*	7	33
Wealth index quintiles	Poorest	33.3	103	[30.7]	43	146
	Second	37.7	103	[28.6]	40	143
	Middle	26.2	80	*	23	103
	Fourth	28.6	55	*	15	70
	Richest	*	2	*	4	6
Drinking water	Not using improved sources	38	110	23.1	77	187
	Using improved sources	30	234	30.3	46	280
Sanitation facilities	Not using improved facilities	30.5	193	34.4	61	254
	Using improved facilities	35.1	151	17.6	63	214
Total		**32.5**	**344**	**25.8**	**124**	**467**

Data for 2 cases in which the education of the household head is missing are not shown

Table 67 shows that 25 per cent of children in households with water on premises experienced diarrhoea in the two weeks preceding the survey compared with 31 per cent of children in households with water off-premises. This difference is statistically significant and indicates that children in households with water off-premises are 25 per cent more likely to experience diarrhoea in than children in household with water on premises.

Even when controlling for the household having access to improved sanitation facilities, the difference in the incidence of diarrhoea by whether the household has an on- or off-premises water source holds. The diarrhoeal incidence rate of children in households with an improved sanitation facility and an on-premises water source is estimated at 25 per cent compared with 30 per cent for children in households with improved sanitation but with the water source located off-premises. Continued efforts to provide a piped water supply to households will contribute to a reduction in the incidence of diarrhoeal and other water-related illnesses. However, the finding above which estimates the diarrhoeal incidence rate of children in households with an improved sanitation facilities and improved water source to be 25 per cent indicates that factors other than water and sanitation contribute to the significant prevalence of diarrhoea among young children.

For households that obtain water off-premises, it is customary to categorize the time required to collect and transport water as being between 0-30 minutes or 30 minutes or more, round-trip. Table 68 shows that for households which require less than 30 minutes to collect water, the diarrhoeal incidence of children under the age of five is 33 per cent compared with 26 per cent for children in households that require 30 minutes or more for water collection. One may expect that water contamination would increase in line with the time required to collect water, thus raising the incidence of diarrhoeal diseases. However, the findings indicate that the diarrhoeal incidence of children in households that require more time to collect water is lower than for children in households in which the water collection time is under 30 minutes. One possible explanation for this may be that households that require

less time to collect water may use a source that is in closer proximity to human settlements, which increases the likelihood of contamination. Households that require more time to collect water may use more remote sources that have a lower likelihood of contamination.

Table 69 looks a little more closely at the types of water sources used for households that take less than 30 minutes to collect water. 56 per cent of these households use the public tap stand, making it their most common source of water. Another 20 per cent use surface water, making this the only other significant source for these households.

Figure 42 illustrates the distribution of type of water source for households that require less than 30 minutes to collect water. It shows that the clear majority obtain water from a public tap stand, indicating the likelihood these households live in close proximity to human settlements.

Table 70 shows the distribution of the types of water sources of households whose members have to travel 30 minutes or more to collect water. These households are more likely to represent the poorest wealth quintile than those that take less time to collect water. It shows that these households obtain water in a very different manner than households that require less time to collect water. The majority of households use surface water at their main source (31 per cent). This is followed by the use of unprotected springs (23 per cent) and public outdoor taps (17 per cent).

Figure 43 illustrates the distribution of the types of water sources of households whose members travel 30 minutes or more to collect water. The majority of households obtain water from surface water and unprotected springs, which is a very different pattern than Figure 42. These data alongside the higher likelihood that these households are very poor, suggest that they may be from more remote communities in the country.

Table 69. Distribution of type of drinking water facilities for households that do not have water on the premises and for which the time to collect water is less than 30 minutes, Bhutan, 2010

		Main source of drinking water									
		Public outdoor tap (%)	Protected well (%))	Unprotected well (%)	Spring (%)	Unprotected spring (%)	Cart with small tank/drum (%)	Surface water (%)	Other (%)	Total	Number of children under-five
Area	Urban	92.9	0.0	0.0	1.6	0.0	0.0	5.5	0.0	100	65
	Rural	52.5	3.5	1.8	10.1	9.7	0.5	21.3	0.7	100	653
Education of head of household	None	54.6	3.9	2.0	9.0	8.6	0.5	21.0	0.4	100	564
	Primary	57.4	0.0	0.3	9.2	12.2	0.8	20.2	0.0	100	104
	Secondary	71.2	0.8	0.0	13.5	4.4	0.0	5.6	4.5	100	50
Wealth index quintiles	Poorest	45.9	2.7	2.0	12.3	12.5	0.2	23.7	0.7	100	221
	Second	53.7	5.3	0.9	5.9	11.8	0.6	21.7	0.1	100	194
	Middle	61.7	2.5	2.9	11.3	4.3	0.0	16.7	0.7	100	199
	Fourth	73.0	0.0	0.0	5.5	4.6	1.7	14.0	1.2	100	97
	Richest	*	*	*	*	*	*	*	*	*	7
Total		**56.1**	**3.2**	**1.6**	**9.3**	**8.8**	**0.5**	**19.8**	**0.6**	**100**	**718**

Figure 42. Distribution of type of drinking water facilities for those households that do not have water on the premises and the time to collect water is less than 30 minutes, Bhutan, 2010

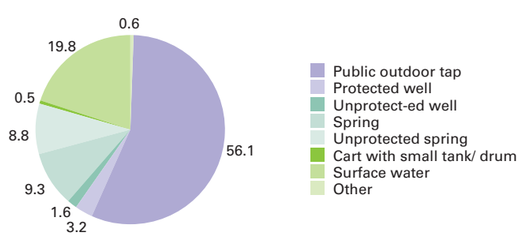


Figure 43. Distribution of type of drinking water facilities for those households that do not have water on the premises and for which the time to collect water is 30 minutes or more, Bhutan, 2010

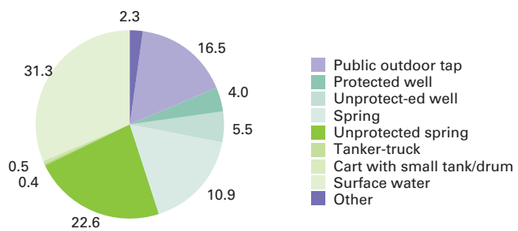


Table 70. Distribution of type of drinking water facilities for those households that do not have water on the premises and the time to collect water is 30 minutes or more, Bhutan, 2010

		Main source of drinking water										
		Public outdoor tap (%)	Protected well (%)	Unprotected well (%)	Spring (%)	Unprotected spring (%)	Tanker-truck (%)	Cart with small tank/ drum (%)	Surface water (%)	Other (%)	Total	Number of children under-five
Area	Urban	*	*	*	*	*	*	*	*	*	*	16
	Rural	16.9	4.3	5.9	15.9	23.7	0.4	0.0	30.6	2.5	100	240
Education of household head	None	20.4	4.9	6.8	17.3	18.8	0.0	0.0	29.0	3.0	100	201
	Primary	[2.2]	[1.3]	[1.2]	[8.2]	[44.6]	[2.2]	[0.0]	[40.4]	[0.0]	100	42
	Secondary +	*	*	*	*	*	*	*	*	*	*	13
Wealth index quintiles	Poorest	15.9	2.2	9.8	12.1	23.8	0.0	0.0	31.8	4.6	100	101
	Second	24.1	3.6	4.2	19.8	27.1	0.0	0.0	20.3	0.9	100	77
	Middle	[10.4]	[5.4]	[2.1]	[17.0]	[18.9]	[0.0]	[0.0]	[44.8]	[1.4]	100	46
	Fourth	[9.3]	[7.8]	[0.0]	[25.3]	[18.4]	[0.0]	[5.5]	[33.5]	[0.0]	100	23
	Richest	*	*	*	*	*	*	*	*	*	*	9
Total		**16.5**	**4.0**	**5.5**	**16.9**	**22.6**	**0.4**	**0.5**	**31.3**	**2.3**	**100**	**256**

Data for 2 cases in which the education of the household head is missing are not shown

Of the households in this sample, none source drinking water from piped facilities or from rainwater collection, tanker trucks, or bottled water (except for 0.4 per cent of households who take 30 minutes or more to collect water who obtain water from tanker trucks.

10.3. Sanitation

Inadequate disposal of human excreta and personal hygiene is associated with a range of diseases, including diarrhoeal diseases. An improved sanitation facility is defined as one that hygienically separates human excreta from human contact and is not shared by more than one household. Improved sanitation can reduce diarrhoeal disease by more than a third[85] and can significantly lessen the adverse health impacts of other disorders responsible for death and disease among millions of children in developing countries. Improved sanitation facilities for excreta disposal include flush or pour flush to a piped sewer system, septic tank, or latrine, ventilated improved pit latrine, pit latrine with a slab, and composting toilet.

Historically, however, the definition of an improved sanitation facility in rural areas of Bhutan has included pit latrines without slabs. Under this definition that includes pit latrines without slabs, the 2011 AHB estimates that 91 per cent of the population has access to improved sanitation. The 2005 PHCB, which uses the same definition, estimated improved sanitation coverage at 84 per cent in that year.

However, the 2010 Joint Monitoring Programme (JMP) report, which excludes pit latrines without slabs from the definition, estimates that in 2008, 65 per cent of the population had access to improved sanitation. Using the same globally recognized definition, the BMIS 2010 estimates that 58 per cent of the population has access to improved sanitation. The higher estimates of the AHB and PHCB are due to the exclusion of pit latrines without slabs and shared facilities from the global definition of improved sanitation employed by the JMP and BMIS.[86]

BMIS estimates of access to improved sanitation facilities show a considerable disparity by area of location. 78 per cent of the urban population has access to improved sanitation compared with only 51 per cent of the rural population. This inequality in access to improved sanitation is even more pronounced by wealth status. The population in the richest households is three times as likely to have access to improved sanitation than those from the poorest wealth quintile (95 per cent and 32 per cent, respectively).

In summary, the MDG 7 target for sanitation is to reduce by half the proportion of population without access to basic sanitation between 1990 and 2015. Although, JMP does not have baseline data for Bhutan in 1990, Bhutan's progress on access to improved sanitation is considered insufficient.

[85] Fewtrell et al. (2005), cited in Global Handwashing Day Planner's guide,2nd edition, p. 14.

[86] Using the definition of improved sanitation facility historically employed by the RGoB, BMIS would provide an estimate of 95 per cent access to improved sanitation (inclusive of pit latrines without slabs and not controlling for whether the facility is shared).

10.3.1. Sanitation and diarrhoeal incidence

Another cause of diarrhoea among children is unsafe disposal of their faeces. Safe disposal of child faeces includes the child using a toilet or latrine or putting or flushing the faeces into the latrine or toilet. All other methods are considered unsafe and include putting the child's faeces into a drain, throwing it into the garbage, burying the faeces in any way, or leaving it in the open.

Table 71 shows the difference in diarrhoeal incidence among children under the age of three by whether their faeces are disposed of in a safe or unsafe method. The data indicate that 35 per cent of children in homes with unsafe disposal of their faeces had diarrhoea as compared with 27 per cent among children in households with safe disposal of diarrhoea, a difference that is statistically significant. In other words, unsafe disposal of child faeces is associated with a 30 per cent higher risk of children under the age of three having diarrhoea.

Figure 44 illustrates the data presented in Table 71, showing the higher rate of diarrhoea among children under the age of three who live in households in which the child's stool is disposed of in an unsafe manner.

Table 72 looks more closely at the diarrhoeal incidence rate of children under the age of three by the exact method used by the household to dispose of their stools. It shows a near equivalent rate of diarrhoea among children who use a toilet or latrine and those whose stools are disposed of directly into a toilet and latrine (27 per cent and 26 per cent, respectively). These figures stand in contrast to the statistically higher rates of diarrhoea among children whose stools were disposed of by any of the unsafe methods. Of the methods for which there was a sufficient sample size to generate a robust estimate, throwing faeces into the garbage produced the highest incidence of diarrhoea (38 per cent).

Figure 44. Percentage of children under-three who had diarrhoea in the last two weeks, by whether their stool was disposed of safely, Bhutan, 2010

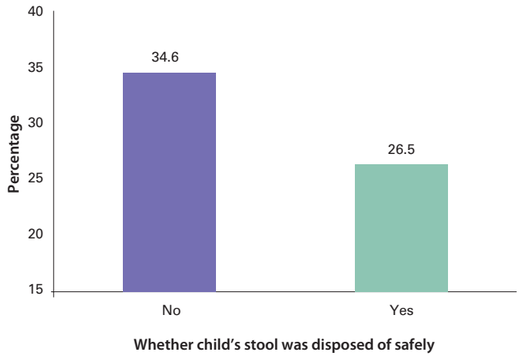


Table 71. Percentage of children under-three who had diarrhoea in the two weeks preceding the survey, by whether their stool was disposed of safely, Bhutan, 2010

		Was stool disposed of safely?				Number of children under-three
		No		Yes		
		Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three	
Area	Urban	38.1	256	26.5	874	1,130
	Rural	34	1,360	26.5	1,308	2,668
Mother's education	None	34.5	1,176	29.1	1,299	2,474
	Primary	35.2	205	32.4	251	457
	Secondary	34.9	235	18.9	633	867
Wealth index quintiles	Poorest	30.2	454	31.9	299	753
	Second	33.7	396	25.2	296	692
	Middle	38	419	28.6	335	754
	Fourth	40.8	251	28.1	610	862
	Richest	28.2	96	22	642	738
Total		**34.6**	**1,616**	**26.5**	**2,182**	**3,798**

Figure 45 illustrates the data presented in Table 72, clearly showing that children under the age of three whose stools were disposed of safely have a lower rate of diarrhoeal incidence than those whose stools were disposed of by any one of the unsafe methods.

Figure 46 shows the diarrhoeal incidence of children under the age of five by the quality of sanitation facilities and by whether the child practices open defecation. This analysis observed a slightly higher percentage of diarrhoea for children under the age of five in households with improved sanitation facilities than for children in households with unimproved sanitation facilities. While the observed rate of diarrhoeal incidence in children who openly defecate is higher, none of the observed differences between these three categories are statistically significant. In addition, BMIS 2010 estimates that three per cent of the population engages in open defecation in Bhutan, making this practice relatively rare and in decline.[87] The Ministry of Health's objective is to eradicate the practice entirely and to expand access to improved sanitation facilities for all.

This may indicate that improved sanitation facility alone cannot reduce diarrheal incidence. In addition, the sanitation facilities categorised as an improved facility may not be functionally sanitary and/or of the required

Table 72. Percentage of children under three who had diarrhoea in the two weeks preceding the survey, by the method by which their stool was disposed, Bhutan, 2010

	Place of disposal of child's stool											
	Child used toilet / latrine		Put / Rinsed into toilet or latrine		Put / Rinsed into drain or ditch		Thrown into garbage (solid waste)		Buried		Left in the open	
	Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three	Had diarrhoea in last two weeks (%)	Number of children under-three
Total	26.7	687	26.4	1,496	35.3	1,187	37.9	145	*	39	32.4	194

Only 21 children (unweighted) had stool that was buried. For this reason, it is not possible to provide a robust estimate. However, for those 21 cases, the estimate is 42%

Figure 45. Percentage of children under-three who had diarrhoea in the last two weeks, by whether their stool was disposed of safely, Bhutan, 2010

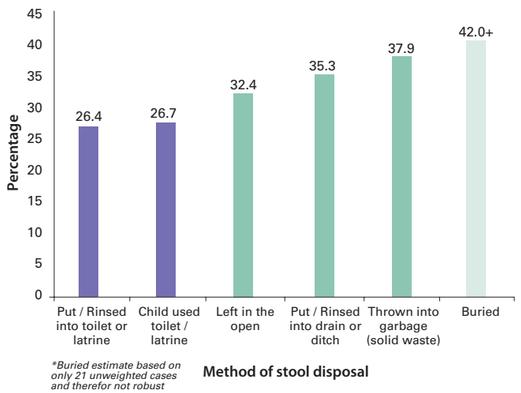
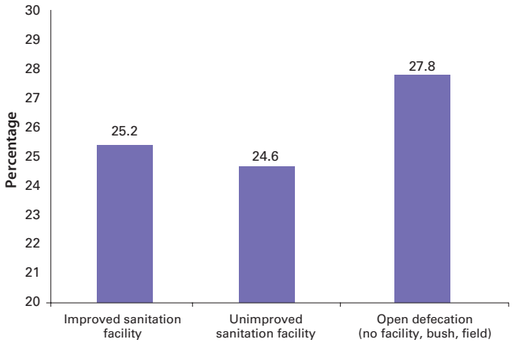


Figure 46. Percentage of children under-five who had diarrhoea in the last two weeks, against the type of toilet facility used in the household



[87] The Joint Monitoring Programme (WHO and UNICEF) 2010 estimated open defecation in Bhutan to be 9 per cent in the year 2008.

Table 73. Percentage of children under-five who had diarrhoea in the two weeks preceding the survey, by availability of handwashing facilities at household, Bhutan, 2010

		Both water and soap available		Water available, but not soap		Soap available, but not water		Neither water nor soap available		Number of children under-five
		Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	Had diarrhoea in last two weeks (%)	Number of children under-five	
Area	Urban	25	1,613	36.1	74	19.4	116	[35.6]	38	1,841
	Rural	24.6	3,318	20.8	461	32.2	409	26.4	267	4,456
Wealth index quintiles	Poorest	25.4	935	26.4	149	32.3	129	27.8	82	1,294
	Second	25.6	878	16	106	32.5	112	18.5	63	1,159
	Middle	28.2	842	23.8	158	29.7	99	31.7	98	1,197
	Fourth	26.8	1,165	25.8	103	28.3	119	31	51	1,438
	Richest	18.8	1,111	*	19	19.7	66	*	11	1,208
Total		**24.8**	**4,931**	**23**	**536**	**29.4**	**525**	**27.5**	**305**	**6,297**

standardand quality. In addition to the quality of sanitation facilities, there are many factors that contribute to diarrhoeal diseases such as personal hygiene, safe drinking water, and hand washing practices amongst others. To address this issue, PHED, with technical assistance from Netherlands Development Organization (SNV), has been implementing the Rural Sanitation and Hygiene Promotion programme to bring about sustainable improvement in rural sanitation and hygiene behaviour.

10.4. Hygiene

10.4.1. Hand washing facilities and diarrhoeal incidence

It is very difficult to measure whether individuals practice hand washing with soap on a regular basis. For this reason, household surveys routinely use the availability of hand washing facilities with water and soap as a proxy indicator for proper hygienic practices. This analysis considered whether the incidence of diarrhoea among children under the age of five differed by the extent to which hand washing facilities, soap and water were available in the household at the time of the survey. These findings should be treated with caution as presence of a hand washing place does not necessary translate into practice of hand washing with soap.

Table 73 shows no significant difference in the incidence of diarrhoea among children under the age of five between those who live in a household with both water and soap (25 per cent), and those in households with water but no soap (23 per cent). Children in households with soap but no water had a statistically higher level of diarrhoea than children in the former two groups (29 per cent). Although soap was not available at the hand washing place, almost 100 per cent of the households in Bhutan had soap available in their dwelling.[88] Therefore, from a programmatic perspective, it is very important to ensure that clean water is available to promote hand washing practices.

The analysis also considered the association between access to an improved drinking water source and the availability of a hand washing facility equipped with water and soap. Table 74 shows that 80 per cent of households with an improved drinking water source also have a hand washing facility with soap and water. This compares to only 42 per cent of households that do not have an improved source of drinking water. In other words, a clear positive correlation exists between having an improved source of drinking water and the presence of facilities needed to practice good hygiene.

Table 74 also shows this relationship by whether the household has an improved sanitation facility. As with drinking water, households with an improved sanitation facility are more likely to have hand washing facilities with soap and water than households without improved sanitation (83 versus 70 per cent, respectively). Together,

[88] See Table WS 10, Bhutan Multiple Indicator Survey (BMIS, 2010)

these data suggest that the presence of improved water and/or sanitation facilities encourage investment in hand washing facilities with soap and water.

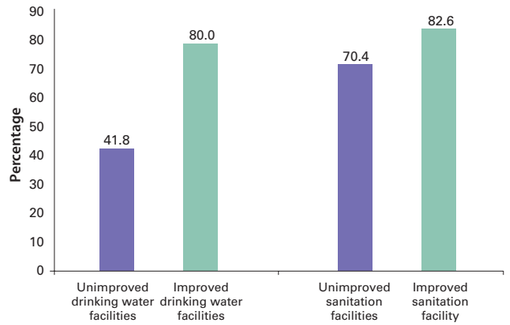
Figure 47 illustrates the data presented in Table 74. It shows the strong association between having an improved drinking water source and/or improved sanitation facility, and the presence of hand washing facilities with soap and water.

10.5. Summary of section on water, sanitation and hygiene

Safe drinking water is a key factor for good health in general, and in particular, for children's health. The situation of access to safe drinking water in Bhutan has improved considerably since 1990. According to BMIS 2010, the proportion of the population without access to safe drinking water declined from 55 per cent in 1990 to only four per cent in 2010. The findings indicate that children who live in households without an improved water source are at a greater risk of experiencing diarrhoea than children in households with an improved water source.

Although people may have access to an improved

Figure 47. Percentage of households with hand-washing facilities by quality of drinking water and sanitation facilities, Bhutan, 2010



drinking water supply, if the source is off-premises, water is often contaminated during transportation and storage. Controlling for the availability of improved sanitation facilities, the diarrhoeal incidence rate of children in households with an on-premises water source is lower than for children in households with an off-premises water source. This indicates that continued efforts to provide a piped water supply to households will contribute to a reduction in the

Table 74. Percentage of households with hand-washing facilities by quality of drinking water and sanitation facilities, Bhutan, 2010

		Not using improved sources of drinking water		Using improved sources of drinking water		Unimproved sanitation facilities		Improved sanitation facilities		Number of households
		% of households with water & soap	Number of households	% of households with water & soap	Number of households	% of households with water & soap	Number of households	% of households with water & soap	Number of households	
Area	Urban	*	15	87.8	4,305	71	247	88.6	4,073	4,320
	Rural	42.6	502	76.6	9,854	70.4	4,508	78.5	5,849	10,356
Education of household head	None	42.2	405	76.4	8,859	69.8	4,044	78.8	5,220	9,265
	Primary	40.6	94	81.7	2,040	73	508	82.1	1,627	2,134
	Secondary+	*	17	88.9	3,258	75.9	202	89.5	3,073	3,275
Wealth index quintiles	Poorest	45.6	224	72	2,538	67.1	1,867	75.6	895	2,762
	Second	41.6	146	75.9	2,703	70.6	1,493	78	1,355	2,849
	Middle	36.1	103	76.2	2,890	73.9	1,072	75.4	1,920	2,992
	Fourth	[41.3]	38	83	3,049	75.9	299	83.2	2,788	3,087
	Richest	*	6	91.2	2,980	[88.7]	23	91.1	2,963	2,986
Sanitation facilities	Unimproved	43.8	308	72.2	4,447	43.8	308	38.7	208	4,755
	Improved	38.7	208	83.6	9,713	72.2	4,447	83.6	9,713	9,921
Total		**41.8**	**516**	**80**	**14,160**	**70.4**	**4,755**	**82.6**	**9,921**	**14,676**

incidence of diarrhoea and other water-related illnesses. In the absence of a piped water supply, the data suggest that use of an appropriate water treatment reduces the prevalence of diarrhoeal disease among children.

The data also show that diarrhoeal incidence among children in households that require under 30 minutes to collect water is higher than in households in which the water collection time is higher. This suggests that off-premises water sources close to homes are more likely to be contaminated by sources originating from nearby human settlements.

Diarrhoeal incidence among children whose faeces are unsafely disposed of is higher than among children whose faeces are safely disposed of. Unsafe disposal of child faeces increases the risk of diarrhoeal disease for children under three by 30 per cent. No difference was observed, however, in diarrhoeal incidence among children under the age of five between improved sanitation facilities, unimproved sanitation facilities, and open defecation, suggesting that access to improved sanitation facilities alone cannot reduce diarrhoeal incidence.

There is a positive correlation between having an improved source of drinking water and the presence of facilities needed to practice good hygiene: The analysis showed that 80 per cent of households with access to improved water sources also have facilities for hand washing compared with 42 per cent that do not have an improved source of drinking water. Likewise, households with an improved sanitation facility are more likely to have hand washing facilities with soap and water than households without improved sanitation. Together, these data suggest that the presence of improved water and or sanitation facilities encourage investment in hand washing facilities with soap and water. Almost 100 per cent of the households in Bhutan had soap available in their dwelling.[89] Therefore, from a programmatic perspective, it is very important to ensure that clean water is available to promote hand washing practices. Children in households with soap but no water had a statistically higher incidence of diarrhoea than children in households where water was available but not soap, and households with both soap and water available. This underpins, once more, the importance of making clean water available in the households.

Overall, Bhutan has achieved remarkable progress in delivering safe water supplies to the population. However, Bhutan's progress on access to improved sanitation facilities is considered insufficient by JMP standards, which exclude pit latrines without slabs and shared toilets. Increased investment in the promotion of hygiene practices will also be required as safe water supplies and improved sanitation facilities without appropriate hygiene practices will not significantly decrease disease related to water and sanitation. More effort will be required in order to achieve MDG 7 by 2015.

[89] See Table WS 10, Bhutan Multiple Indicator Survey (BMIS, 2010)

Annex 1.

This annex gives additional background information on the profile of children and other background information.

1.1 Distribution of child population by wealth quintiles, Bhutan, 2010

		Wealth index quintiles					Total	Number of individuals
		Poorest	Second	Middle	Fourth	Richest		
Sex	Male	20.4	19.6	19.5	21.1	19.4	100	12,847
	Female	20.1	18.5	19.5	21.5	20.4	100	12,923
Dzongkhag	Bumthang	8.7	25.3	30.0	19.5	16.5	100	619
	Chhukha	15.0	16.4	15.1	23.9	29.6	100	2,631
	Dagana	47.0	22.3	14.1	11.1	5.5	100	993
	Gasa	27.5	35.8	26.3	6.3	4.0	100	175
	Haa	7.0	8.3	24.7	41.5	18.4	100	500
	Lhuntse	34.8	27.3	24.0	9.7	4.2	100	585
	Monggar	36.5	28.2	13.8	8.5	13.0	100	1,843
	Paro	0.4	7.8	28.8	36.8	26.2	100	1,397
	Pema Gatshel	25.4	34.2	20.7	10.5	9.2	100	942
	Punakha	3.4	15.4	31.7	32.2	17.3	100	996
	Samdrup Jongkhar	34.4	17.0	15.5	22.7	10.4	100	1,667
	Samtse	27.7	17.7	16.7	23.6	14.4	100	2,878
	Sarpang	12.2	12.1	21.5	28.7	25.5	100	1,518
	Thimphu	0.1	1.1	12.0	32.5	54.3	100	3,216
	Trashigang	21.3	33.0	31.9	8.7	5.2	100	2,086
	Trashi Yangtse	15.1	38.9	23.8	10.9	11.4	100	654
	Trongsa	25.7	28.2	20.6	16.4	9.1	100	581
	Tsirang	47.1	27.9	8.2	8.1	8.7	100	797
	Wangdi	12.8	22.5	28.1	24.3	12.2	100	1,030
	Zhemgang	46.3	22.6	12.5	10.6	8.0	100	664
Area	Urban	0.4	1.1	10.6	36.2	51.7	100	7,410
	Rural	28.3	26.2	23.1	15.3	7.0	100	18,361
Age group	0-4 years	20.7	18.3	19.1	22.8	19.1	100	6,514
	5-9 years	21.7	19.0	19.7	21.5	18.2	100	7,386
	10-17 years	19.1	19.5	19.6	20.4	21.3	100	11,870
Total		**20.3**	**19.0**	**19.5**	**21.3**	**19.9**	**100**	**25,770**

1.2 Percentage of households members that use improved quality of drinking water, improved sanitation facilities, have electricity, faced food insecurity in the past 12 months, and number of persons per sleeping room for households with and without at least one individual under the age of 18, Bhutan, 2010

	Household has at least one individual under the age of 18				
	No		Yes		
	Percentage of households members	Number of households members/ households	Percentage of households members	Number of households	Number of households members/ households
Use of improved drinking water facilities	96.6	8,938	96.1	58,382	67,320
Use of improved sanitation facilities	58.4	8,938	58.5	58,382	67,320
Household has electricity	71.8	8,938	71.6	58,382	67,320
Household faced food insecurity	9.1	8,938	12.3	58,382	67,320
Household density	1.8*	3,672	3.5*	11,004	14,676

** persons per sleeping room*

1.3 Data on Siblings

Indicators on Data Quality, Bhutan 2010		
	Respondents	Siblings
Year of Birth		
Before 1950	0	1.1
1950-54	0	1.9
1955-59	0	4.1
1960-64	5.9	5.9
1965-69	10.5	8.3
1970-74	13.1	11.7
1975-79	15	14.6
1980-84	19.2	16.3
1985 or later	36.4	36
Total	**100**	**100**
Lower year of birth	1,960	1,925
Upper year of birth	1,995	2,010
Median	1,973	1,972
No of Cases	13,989	60,559

1.4 Data on Sibship size

Respondents year of birth	Evolution	
	Mean sibship size	Sex ratio at birth
1960-64	5.2	110.2
1965-69	5.3	110.8
1970-74	5.6	103.2
1975-79	5.6	106.2
1980-84	5.6	103.5
1985-89	5.3	109.1
1990-95	4.7	102.7

1.5 Percentage distribution of women aged 15-49 years by background characteristic, Bhutan, 2010

Percentage distribution of women aged 15-49 years by background characteristic, Bhutan,2010			
	Weighted percentage	Number of women	
		Weighted	unweighted
Residence			
Urban	32.7	4,448	3,487
Rural	68.3	9,570	10,531
Age			
15-19	14.6	2,052	1,974
20-24	17.9	2,052	2,435
25-29	19.4	2,721	2,651
30-34	15.8	2,219	2,261
35-39	13.2	1,856	1,872
40-44	11.1	1,561	1,651
45-49	7.9	1,106	1,174
Marital/Union status			
Currently married/in union	71.5	10,029	10,051
Widowed	1.6	218	223
Divorced	4.2	584	708
Separated	0.8	108	110
Never married/in union	22	3,079	2,925
Missing	*	-	1
Motherhood status			
Ever gave birth	72.3	10,132	10,356
Never gave birth	27.7	3,886	3,662
Birth in last two years			
Had a birth in last two years	16.9	2,368	2,465
Had no birth in last two years	83.1	11,650	11,553
Education			
None	61.2	8,585	8,903
Primary	12	1,687	1,716
Secondary+	26.7	3,746	3,399
Wealth index quintiles			
Poorest	17.3	2,419	2,617
Second	18.1	2,533	2,907
Middle	19	2,659	2,955
fourth	21.7	3,040	2,876
Richest	24	3,367	2,663
Total	**100**	**14,018**	**14,018**

Annex 2. Additional notes on mortality estimates

2.1. The different sources for the underlying data in the IGME estimates and their limitations

The underlying data for the IGME trend estimates are derived from the following sources:

- Vital registration systems are the preferred source of data on child mortality because they collect information prospectively and cover the entire population. However, many developing countries lack fully functioning vital registration systems that accurately record all births and deaths. Under-reporting of deaths and births are common in vital registration systems of developing countries.
- Household surveys, such as MICS and DHS, are the primary source of data on child mortality in developing countries; but there are some limits to their quality. Estimates obtained from household surveys have uncertainty ranges that need to be considered when comparing values over time or between countries. These estimates are often affected by sampling and non-sampling errors that may affect levels and trends of child mortality.
- Like census data, survey data on child mortality may omit births and deaths, include stillbirths along with live births, and suffer from survivor selection bias and age truncation, resulting in errors in the mortality figures.
- Direct estimates of child mortality based on survey data may also suffer from mothers misreporting their children's birth dates, current age or age at death — perhaps more so if the child has died. The heaping of deaths at age 12 months is especially common. Age heaping may result in a transfer of deaths across the one-year boundary and lead to underestimates of infant mortality rates. However, it has little effect on under-five mortality rates; making the under-five mortality rate a more robust estimate than the infant mortality rate if the information is drawn from household surveys.
- Censuses are another source for child mortality data. Information on child mortality is usually collected through questions on household deaths in the last 12 months prior to the census or the number of children ever born and the number of children surviving among women aged 15 to 49. Child mortality estimates obtained from a census usually suffer from underreporting of deaths or violation of the assumptions of the indirect method if questions on the number of children ever born and surviving are used to collect the information.

IGME child mortality estimates are important for following reasons:

- Many developing countries lack a single source of high quality data covering the last several decades.
- Available data collected by countries are also often inconsistent from one data source to another. It is important to analyse, reconcile and evaluate all data sources simultaneously for each country. Each new survey or data point must be examined in the context of all other sources, including previous data.
- Data sources suffer from sampling or non-sampling errors (e.g., misreporting of age, survivor selection bias). Under-reporting of child deaths are common.
- Additionally, the latest data sources produced by countries often are not current estimates, but refer to several years in the past. For this reason, IGME also needs to project estimates to a common reference year.
- A consistent and comparable trend line from 1990 is needed for monitoring MDG 4.
- The IGME aims to minimise the errors for each estimate and harmonise trends over time.
- Applying a consistent methodology also allows for comparisons between countries, despite the varied number and types of data sources. The IGME uses original empirical data from the country to derive child mortality estimates.

Annex 3. List of contributors

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Annex 4. Summary table

Category	Indicator		Total	Sex		Area		Wealth Quintile				
				Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest
Child Health	IMR		47	54	40	31	54	68	58	50	*	28
	U5MR		69	79	58	41	81	106	88	74	*	39
	Neonatal tetanus protection		73.0%	*	*	74.5%	72.4%	71.1%	70.9%	70.0%	75.7%	77.2%
Nutritional status	Nutritional status and mother's literacy											
	Underweight prevelance	Illiterate mothers	14.3%	15.0%	13.5%	11.8%	14.9%	16.7%	16.9%	14.6%	10.8%	7.7%
		Literate mothers	8.2%	8.7%	7.7%	8.9%	7.3%	5.3%	8.4%	11.9%	8.8%	7.1%
	Stunting prevelance	Illiterate mothers	36.8%	37.0%	36.5%	33.2%	37.7%	41.3%	41.5%	38.3%	29.9%	24.1%
		Literate mothers	24.2%	23.4%	25.1%	21.9%	26.7%	42.5%	24.6%	39%	20.6%	20.3%
	Wasting prevelance	Illiterate mothers	5.8%	6.1%	5.6%	6.5%	5.7%	4.9%	6.8%	6.2%	6.0%	4.8%
		Literate mothers	5.9%	6.7%	5.0%	6.4%	5.2%	7.3%	4.6%	7.3%	4.9%	5.9%
Exclusive Breastfeeding and Mother's Antenatal Care	Milk Feeding freguency for non-breastfed child		36.3%									
	Did not receive antenatal care 4+ times		32.2%	33%	31.5%	*	32.2%	*	*	*	*	*
	Received antenatal care 4+ times		55.1%	53.5%	56.5%	63.6%	50.1%	*	*	*	*	*
Treatment of Diarrhoea for under-five children	ORS or increased fluids		73.6%	73.3%	74.0%	78.8%	71.4%	69.1%	72.0%	70.5%	78.9%	78.0%
	ORT(ORS or recommended homemade fluids or increased fluids		85.4%	86.7%	83.9%	86.6%	84.9%	83.5%	86.1%	85.6%	88.2%	82.6%
	ORT with continued feeding		61.6%	63.0%	60.0%	60.0%	62.3%	60.9%	64.6%	61.5%	60.8%	60.4%
	Not given any treatment		10.7%	9.6%	12.0%	10.7%	10.7%	12.3%	10.7%	11.0%	7.5%	13.2%
Children who had diarrhoea in the last two weeks, according to availability of improved drinking	Had diarrhoea in last two weeks	Household has unimproved drinking water sources	32.3%			*	33.2%	33.1%	22.8%	[39.0%]	*	*
		Household has improved drinking water sources	24.8%			25.4%	24.6%	25.7%	25.2%	27.7%	26.7%	18.8%
Under-five Children who had diarrhoea in the last two weeks by type of treatment used for drinking water in household without improved drinking water sources	Had diarrhoea in last two weeks	Boil	24.3%			25.3%	23.7%	25.1%	24.2%	27.2%	26.9%	18.4%
		Used water filter	20.4%			18.6%	23.7%	*	[23.5%]	29.2%	25.4%	16.7%
		Household doesnot use appropriate water treatment method	34.1%			*	34.4%	33.7%	[31.2%]	[33.0%]	*	*
Under-five children who had diarrhoea in the last two weeks by whether household has water on the premises	Had diarrhoea in last two weeks	Water on premises	24.7%			25.2%	24.4%	25.4%	23.6%	28.4%	27.0%	18.7%
		Water off premises	30.8%			29.5%	30.9%	32.5%	35.2%	24.6%	27.1%	*
Under-five children who had diarrhoea in the last two weeks, against the time to collect water, controlling for improved drinking water and sanitation facilities	less than 30 minutes:	Had diarrhoea in last two weeks	32.5%			[35.1%]	32.2%	33.3%	37.7%	26.2%	28.6%	*
	30 minutes or more	Had diarrhoea in last two weeks	25.8%			*	27.5%	[30.7%]	[28.6%]	*	*	*
Water and Sanitation	Use of improved drinking water sources		96.1%			99.6%	94.8%	91.8%	94.6%	96.2%	98.4%	99.8%
	Water treatment		55.8%			98.6%	54.7%	49.5%	55.0%	57.5%	81.2%	100%
	Use of improved sanitation facilities (not shared)		58.4%			77.9%	51.0%	31.6%	47.3%	50.6%	68.0%	94.5%
	Safe disposal of child's faeces		57.5%			77.4%	49.0%	39.7%	42.8%	44.4%	70.8%	87.0%

Summary table cont...

Category	Indicator		Total	Sex		Area		Wealth Quintile				
				Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest
Distribution of type of drinking water facilities for those households that do not have water on the premises												
Time to collect water: less than 30 minutes and main source of drinking water	Public outdoor tap		56.1%			92.9%	52.5%	45.9%	53.7%	61.7%	73%	*
	Protected well		3.2%			0.0%	3.5%	2.7%	5.3%	2.5%	0.0%	*
	Unprotected well		1.6%			0.0%	1.8%	2.0%	0.9%	2.9%	0.0%	*
	Spring		9.3%			1.6%	10.1%	12.3%	5.9%	11.3%	5.5%	*
	Unprotected spring		8.8%			0%	9.7%	12.5%	11.8%	4.3%	4.6%	*
	Cart with small tank/drum		0.5%			0%	0.5%	0.2%	0.6%	0.0%	1.7%	*
	Surface water		19.8%			5.5%	21.3%	23.7%	21.7%	16.7%	14%	*
	Other		0.6%			0.0	0.7%	0.7%	0.1%	0.7%	1.2%	*
Time to collect water: 30 minutes or more and main source of drinking water	Public outdoor tap		16.5%			*	16.9%	15.9%	24.1%	[10.4%]	[9.3%]	*
	Protected well		4.0%			*	4.3%	2.2%	3.6%	[5.4%]	[7.8%]	*
	Unprotected well		5.5%			*	5.9%	9.8%	4.2%	[2.1%]	0.0%	*
	Spring		16.9%			*	15.9%	12.1%	19.8%	[17.0%]	[25.3%]	*
	unprotected spring		22.6%			*	23.7%	23.8%	27.1%	18.9%	[18.4%]	*
	Tanker-truck		0.4%			*	0.4%	0.0%	0.0%	0.0%	0.0%	*
	Cart with small tank/drum		0.5%			*	0.0%	0.0%	0.0%	0.0%	[5.5%]	*
	Surface water		31.3%			*	30.6%	31.8%	20.3%	[44.8%]	[33.5%]	*
	Other		2.3%			*	2.5%	4.6%	0.9%	[1.4%]	0.0%	*
Under-five children who had diarrhoea in the last two weeks, according to the availability of handwashing facilities at household	Both water and soap available		24.8%			25.0%	24.6%	25.4%	25.6%	28.2%	26.8%	18.8%
	water available, but not soap		23.0%			36.1%	20.8%	26.4%	16.0%	23.8%	25.8%	*
	Soap available, but not water		29.4%			19.4%	32.2%	32.3%	32.5%	29.7%	28.3%	19.7%
	Neither water nor soap available		27.5%			[35.6%]	26.4%	27.8%	18.5%	31.7%	31.0%	*
Households with hand-washing facilities by quality of drinking water and sanitation facilities	Notusing improved sources of drinking water		41.8%			*	42.6%	45.6%	41.6%	36.1%	[41.3%]	*
	Using improved sources of drinking water		80.0%			87.8%	76.6%	72.0%	75.9%	76.2%	83.0%	91.2%
	Unimproved sanitation facilities		70.4%			71.0%	70.4%	67.1%	70.6%	73.9%	75.9%	[88.7%]
	Improved sanitation facilities		82.6%			88.6%	78.5%	75.6%	78.0%	75.4%	83.2%	91.1%
Handwashing	Place for handwashing (Water and soap are available)		80.9%			88.2%	77.8%	73.1%	77.7%	77.6%	83.7%	91.5%
	Availability of soap		99.4%			99.9%	99.2%	98.3%	99.0%	99.9%	99.9%	100%
Reproductive Health	Contraception and unmet need	Adolescent fertility rate	59			30	77	112	95	97	36	10
		Early childbearing	15.3%			10.3%	18.0%	21.1%	17.7%	16.8%	17.1%	6.3%
		Contraceptive prevalence rate	65.6%			64%	66.3%	69.0%	65.6%	65.1%	66.4%	62.3%
		Unmet need	11.7%			10.4%	12.2%	11.1%	12.5%	13.1%	10.3%	11.6%
Number of antenatal care visit received by mothers by place of delivery	No. of antenatal care visits by women who did not deliver in a health facillity	No. of antenatal care visit (0-3 times)	31.3%			19.8%	32.4%	38.6%	32.2%	25.4%	22.0%	7.7%
		No. of antenatal care visit (4-5 times)	47.5%			43.5%	47.9%	47.5%	45.7%	51.2%	47.0%	43.3%
		No. of antenatal care visit (6-7 times)	14.4%			20.7%	13.8%	9.0%	18.3%	12.1%	21.1%	33.2%
		No. of antenatal care visit (8+ times)	6.7%			15.9%	5.9%	4.9%	3.9%	11.3%	9.9%	15.7%
	No. of antenatal care visits by women who delivered in a health facillity	No. of antenatal care visit (0-3 times)	13.9%			10.6%	16.3%	21.7%	19.8%	17.2%	13.3%	7.1%
		No. of antenatal care visit (4-5 times)	40.2%			36.4%	42.9%	50.6%	44.0%	40.8%	41.4%	33.4%
		No. of antenatal care visit (6-7 times)	29.4%			33.8%	26.2%	19.4%	24.9%	27.8%	28.3%	36.9%
		No. of antenatal care visit (8+ times)	16.5%			19.2%	14.6%	8.3%	11.3%	14.2%	17.1%	22.7%

Summary table cont...

Category	Indicator	Total	Sex		Area		Wealth Quintile				
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest
Antenatal Care and Comprehensive Knowledge of HIV and AIDS	Women who did not receive antenatal care 4+ who										
	Know three ways HIV can be transmitted from mother to child (PMTCT)	58.3%			65.0%	56.9%	43.5%	62.6%	71.7%	61.3%	[63.9%]
	Have comprehensive knowledge of HIV	11.0%			22.5%	8.6%	4.5%	12.2%	7.6%	17.7%	[29.3%]
	Women who received antenatal care 4+, who;										
	Know three ways HIV can be transmitted from mother to child (PMTCT)	61.7%			65.8%	59.8%	54.0%	60.4%	61.8%	66.1%	63.7%
	Have comprehensive knowledge of HIV	20.7%			34.5%	14.0%	4.3%	8.7%	13.3%	28.0%	40.5%
Antenatal care and literacy	Illiterate mother who received skilled antenatal care at least once	96.7%			99.8%	95.9%	95.6%	94.5%	96.9%	99.6%	99.5%
	Illiterate mother who received skilled antenatal care at least four times	73.9%			83.2%	71.7%	64.0%	67.9%	77.7%	84.7%	92.3%
	Literate mother who received skilled antenatal care at least once	98.7%			98.4%	98.9%	[97.5%]	99.3%	99.4%	98.3%	98.6%
	Literate mother who received skilled antenatal care at least four times	86.3%			91.3%	81.1%	[71.3%]	85.1%	79.2%	83.7%	91.6%
Post- natal care for mothers	Women who received postnatal care from a skilled provider	61.0%			81.9%	52.5%	39.7%	47.5%	62.9%	69.7%	84.7%
Maternal Mortality	Maternal Mortality Ratio	146									
HIV and AIDS knowledge and attitude	Comprehensive knowledge about HIV prevention	17.5%			28.2%	12.6%	5.8%	7.5%	12.6%	24.6%	31.1%
	Knowledge of mother-to-child transmission of HIV	56.2%			61.3%	53.8%	45.7%	53.1%	59%	60.4%	60.0%
	Accepting attitude towards people with HIV	27.9%			35.7%	23.7%	16.1%	20.9%	24.6%	35.5%	33.8%
	Women who know where to be tested for HIV	54.5%			69.0%	47.8%	35.7%	44.3%	50.5%	62.4%	71.9%
	Women who have tested for HIV and know the results	9.8%			11.6%	9.0%	6.0%	8.9%	9.4%	11.3%	12.3%
	Sexually active young women who have been tested for HIV and know the results	13.3%			16.8%	12.0%	8.4%	13.1%	12.1%	16.8%	16.6%
	HIV counselling during antenatal care	53.9%			67.4%	48.4%	36.2%	47.2%	56.0%	59.3%	70.7%
	HIV testing during antenatal care	46.9%			66.2%	39.0%	24.1%	33.8%	46.4%	57.4%	72.2%
Women age 15-49 with comprehensive knowledge of HIV transmission by their literacy status	Illiterate women who know three ways HIV can be transmitted	52.2%			57.0%	51.0%	43.3%	51.7%	56.3%	58.3%	53.3%
	Illiterate women with comprehensive knowledge of HIV	10.3%			17.2%	8.5%	5.0%	5.8%	9.2%	19.6%	16.6%
	Literate women who know three ways HIV can be transmitted	64.2%			64.6%	63.7%	71.1%	62.2%	68.4%	63.7%	63.0%
	Literate women with comprehensive knowledge of HIV	32.3%			36.8%	26.9%	14.8%	18.5%	24.3%	32.6%	37.6%
Comprehensive knowledge of HIV and AIDS transmission among women age 15-18 by school participation status	Currently out of school, who have comprehensive knowledge of HIV	11.6%			23.5%	8.2%	4.5%	8.6%	9.7%	18.5%	21.8%
	Currently in school, who have comprehensive knowledge of HIV	30.5%			34.0%	27.3%	13.9%	28.8%	26.8%	35.9%	31.4%
Married Women age 15-49 who are using contraceptive method as a function of their HIV knowledge	Women who do not have comprehensive knowledge of HIV, who use male condom	4.5%			9.4%	2.7%	1.3%	1.3%	3.3%	5.6%	12.0%
	Women who do not have comprehensive knowledge of HIV, who use any contraceptive method	65.3%			62.4%	66.3%	68.8%	65.3%	64.6%	65.1%	62.2%
	Women who have comprehensive knowledge of HIV, who use male condom	11.0%			15.8%	6.3%	0.8%	5.4%	5.5%	7.3%	18.2%
	Women who have comprehensive knowledge of HIV, who use any contraceptive method	67.2%			68.3%	66.1%	73.6%	69.8%	69.0%	70.9%	62.4%

Summary table cont...

Category	Indicator	Total	Sex		Area		Wealth Quintile				
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest
Unmarried women who have had sexual intercourse age 15-49 who:	Use male condom	4.5%									
	Any contraceptive method	26.2%									
	Do not have comprehensive knowledge of HIV, who use male condom	4.3%									
	Do not have comprehensive knowledge of HIV, who use any contraceptive method	25.9%									
	Have comprehensive knowledge of HIV, who use male condom	[6.1%]									
	Have comprehensive knowledge of HIV, who use any contraceptive method	[28.1%]									
Ever married women age 15-49 with comprehensive knowledge of HIV transmission by their age at first marriage	Women married before 15, who:										
	Know three ways HIV can be transmitted from mother to child	49.3%			57.6%	46.7%	39.8%	40.9%	55.7%	60.5%	58.5%
	Have comprehensive knowledge of HIV	7.5%			13.8%	5.6%	4.2%	3.7%	7.5%	9.6%	18.6%
	Women first married at age 15-17, who:										
	Know three ways HIV can be transmitted from mother to child	54.4%			58.5%	53.0%	46.6%	54.4%	55.1%	60.9%	54.9%
	Have comprehensive knowledge of HIV	13.4%			23.0%	10.1%	7.4%	5.8%	9.6%	23.4%	23.3%
	Women married at or after 18, who:										
	Know three ways HIV can be transmitted from mother to child	57.7%			62.1%	55.8%	46.1%	56.2%	61.6%	60.8%	60.8%
	Have comprehensive knowledge of HIV	17.9%			28.8%	12.8%	4.2%	7.3%	13.2%	23.6%	33.3%
Accepting attitudes towards people living with HIV and AIDS among women age 15-49 by their comprehensive knowledge of HIV and AIDS transmission	Women who do not have comprehensive knowledge of HIV										
	Agree with at least one accepting attitude	97.2%			97.4%	97.1%	95.6%	96.5%	97.6%	97.9%	97.6%
	Express accepting attitudes on all four indicators	22.6%									
	Women who have comprehensive knowledge of HIV										
	Agree with at least one accepting attitude	99.8%			99.8%	99.8%	98.5%	100%	100%	99.8%	99.8%
	Express accepting attitudes on all four indicators	48.1%			53.6%	42.4%	31.9%	42.8%	45.1%	54.2%	47.9%
Accepting attitudes towards people living with HIV and AIDS among young women age 15-18 against their attendance in secondary school	Not in secondary school:										
	Agree with at least one accepting attitude	98.4%			100%	98.0%	96.9%	97.6%	98.8%	100%	100%
	Express accepting attitudes on all four	19.6%			34.4%	16.1%	17.7%	16.3%	11.6%	31.6%	28.1%
	Attending secondary school:										
	Agree with at least one accepting attitude	99.0%			98.8%	99.1%	[100%]	100%	96.8%	98.9%	99.4%
	Express accepting attitudes on all four	34.2%			34.5%	33.9%	[30.3%]	37.7%	41.6%	36.8%	30.0%
Contraceptive Prevelance and Early Marriage (20-49 Years)	Married women (before age 18) not using any contraceptive method	28.3%			28.5%	28.3%	24.8%	28.2%	26.5%	32.0%	30.6%
	Married women (before age 18) using any modern method	71.6%			71.3%	71.7%	75.2%	71.8%	73.5%	67.9%	69.0%
	Married women (before age 18) using any method	71.7%			71.5%	71.7%	75.2%	71.8%	73.5%	68.0%	69.4%
	Married women (at or after age 18) not using any method	35.9%			38.9%	34.5%	33.4%	34.4%	36.6%	33.9%	39.7%
	Married women (at or after age 18) using any modern method	63.8%			60.6%	65.3%	66.3%	65.5%	62.8%	65.8%	59.9%
	Married women (at or after age 18) using any method	64.1%			61.1%	65.5%	66.6%	65.6%	63.4%	66.1%	60.3%
Contraceptive Prevelance and Literacy	Not literate and using male condom	2.9%			6.4%	2.0%	1.1%	1.4%	2.7%	4.2%	7.9%
	Not literate and using any method	67.9%			67.9%	67.9%	69.5%	67.3%	66.9%	68.7%	66.4%
	Literate and using male condom	13.9%			17.1%	9.9%	4.5%	3.6%	8.8%	11.3%	17.7%
	literate and using any method	58.1%			59%	57%	59.4%	44.9%	54.5%	59.7%	59.6%