Level and trend of children's health and nutrition status in Nepal: Evidence from Demographic and Health Surveys (NDHS)

PREPARED BY: DR. SHARAD KUMAR SHARMA
UNDER SECRETARY (STATISTICS)

GOVERNMENT OF NEPAL
OFFICE OF THE PRIME MINISTER AND COUNCIL OF MINISTERS
RESULT MANAGEMENT DIVISION
STATISTICS SECTION
SINGHADURBAR KATHMAND

Abstract

This report summarizes the child health and nutrition finding from the 2016 Nepal Demographic and Health Survey and its past trend. The survey was conducted under the leadership of Ministry of Health and Population (MoHP), financial support from USAID and technical support from ICF International Inc., and New Era. The 2016 Nepal DHS was nationally representative survey conducted among sample of 12862 women age 15-49 and 4063 men age 15-49. The respondents were selected in order to provide estimate at the national as well as for urban-rural and seven provinces in Nepal. This report is focused on the children's health and nutrition status covering key indicators including childhood mortality, vaccination coverage, nutrition status, and other childhood illness such as diarrhea and Acute Respiratory Infection (ARI).

The finding of the assessment indicated that there have been substantial decline in under-five mortality from 118 to 39 deaths per 1000 live births between 1996 to 2016 (67% point decline). Level of infant and under-five mortality is relatively better in Nepal compared to other SAARC countries (except in Srilanka and Maldives). Full immunization coverage has reached to 78% in 2016 (slightly declined from the 2011 level). Boys are more likely to receive treatment of diarrhea (72%) compared to girls (56%). Most of the children (74%) were taken to private health facilities for treatment of ARI. Similarly, 36% of the child under-five were stunted, 25% underweight and 10% were wasted in 2016.

The children's health and nutrition status varied across geographical region (poor in Madhesh and Karnali and better in Gandaki and Bagmati). The children living with more educated mother and wealthier household are better off compared to those living with uneducated mother and poorer households in terms of all the child health and nutrition status. The targeted interventions towards improving vaccination coverage and nutrition status among hard to reach and needy population is required to further reduce childhood mortality to attain 2030 target for sustainable development Goal (SDG) in Nepal.

Table of content

Contents

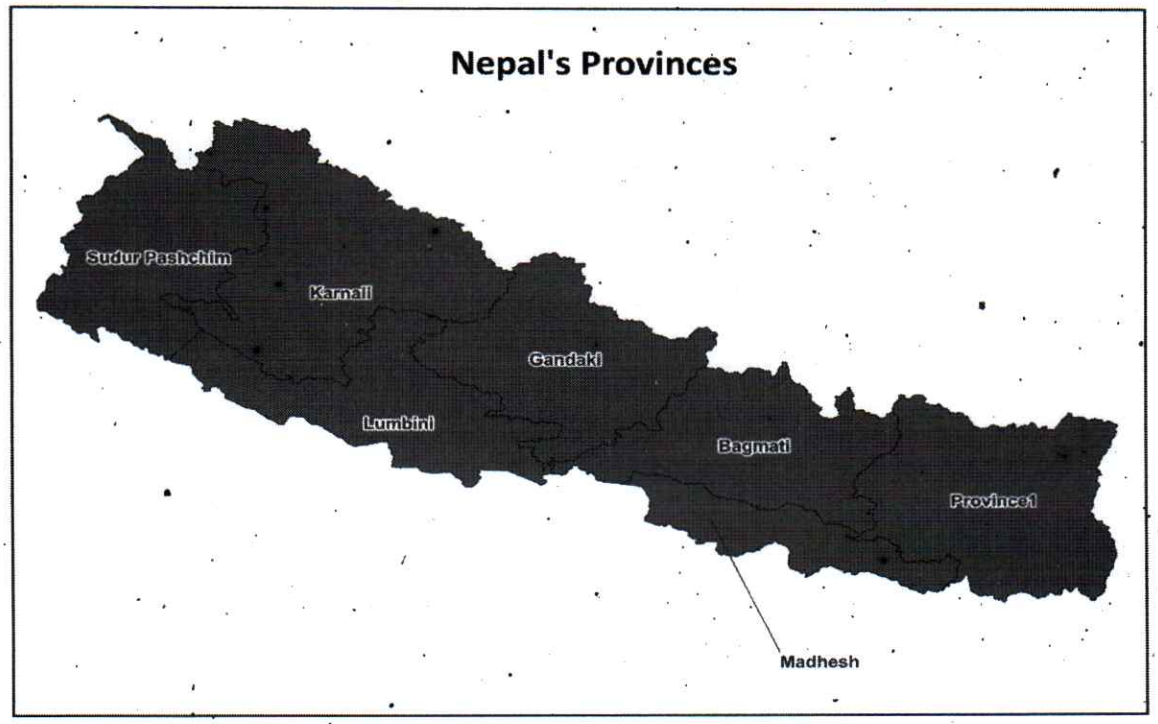
List of figures

1. Introduction

1.1. 2016 Nepal Demographic and Health Survey (NDHS)

Periodic demographic and health surveys have supplemented and complemented censuses. As part of the worldwide Demographic and Health Survey (DHS) program, the 1996 Nepal Family Health Survey (NFHS) was the first nationally representative survey of 8429 ever-married women age 15-49. Main purpose of the NFHS was to provide detailed information on fertility, family planning, infant and child mortality, and maternal and child health and nutrition. In addition, the NFHS included a series of questions of knowledge of AIDS [1].

Since 1996, the Nepal Demographic and Health Survey (NDHS) has been conducted every five year from Ministry of Health and Population (MoHP) with the technical and financial support from United States Agency for International Development (USAID). The 2016 NDHS is the fifth survey of this kind to be implemented in Nepal as part of worldwide DHS. The 2016 NDHS provides health indicators relevant to the Nepal Health Sector Strategy (NHSS) 2016-2021 and the Sustainable Development Goal (SDG) [2]. This survey was designed to measure levels, patterns and trends in demographic and health indicators. The most recent NDHS conducted in 2016 published a nationally representative sample of 12862 women age 15-49 and 4063 men age 15-49 interviewed in all selected households. This represents a response rate of 98% for women and 96% for men. The sample design for the 2016 NDHS provides estimates at the national, for urban and rural areas, and for the Nepal's seven provinces shown in the map below [2].



The Nepal DHS provides data on fertility, family planning, maternal and child health, maternal and child mortality, nutrition, malaria, human immunodeficiency virus (HIV) knowledge and behavior, and HIV prevalence. Women interviewed in NDHS were also asked questions about the health and nutrition of their children under age five.

1.2. Objective

This report aims to present the trend of health and nutrition status of children in Nepal and to provide policy recommendations.

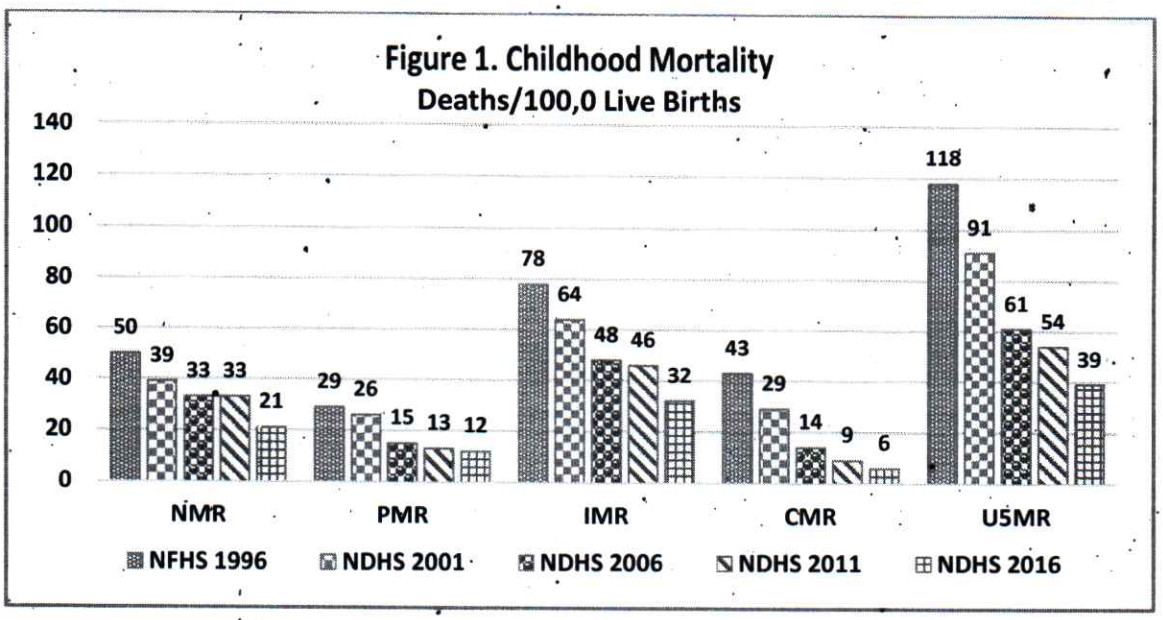
1.3. Methodology

Main source of data on child health and nutrition status are the census and surveys as well as routine health information. Nepal, Central Bureau of Statistics (CBS) conducts census only in 10 years of interval and detail information on health and nutrition stats are not collected. Routine health information is another important source of data for child health and nutrition. However, it provides information only at the aggregate level. Similarly, routine information system contains data only for those who have access of the health system and thus the indicators generated out of this source is not representative to population. NDHS and Nepal Multiple Indicator Cluster Survey (NMICS) produce nationally representative indicators for child health and nutrition status in Nepal. As NMICS in Nepal is conducted only twice, whereas NDHS 2016 was fifth round of its series in Nepal. To cover the wider interval, this report used on NDHS 2016 and earlier reports and for analysis. For this reason, the NDHS data remain a primary source for reviewing level and trends in child health and nutrition status in Nepal. This report reviewed NDHS 2016 to examine current level of child health and nutrition status and previous four round of NDHS 1996, 2001, 2006 and 2011 to examine trends. Childhood immunization, childhood illnesses (diarrhea, respiratory infection) and related treatment seeking behavior, childhood malnutrition, infant and young feeding practices, micronutrient supplementation, breast feeding and childhood mortality (neonatal, infant, child and under-five mortality) are the key indicators examined in this report.

2. Key findings

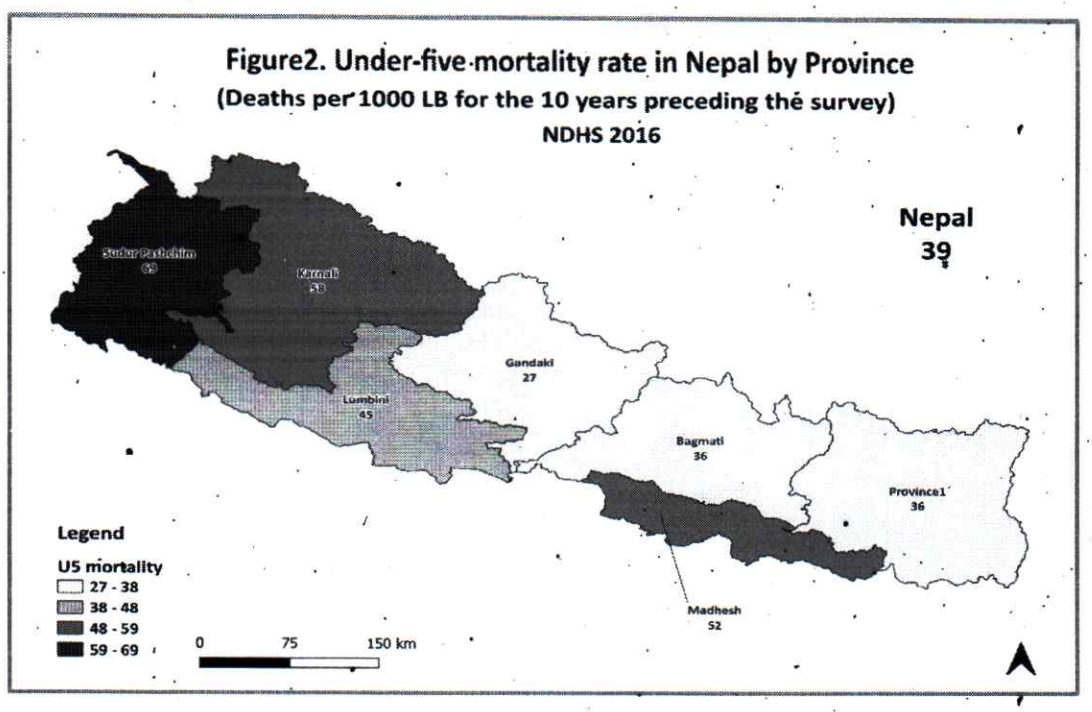
2.1. Child mortality

Information on neonatal, infant and child mortality rates are often used as an important indicator of the country's socioeconomic development and quality of life [2]. Government of Nepal aims at reducing neonatal mortality to at least as low as 12 per 1000 live births (LB) and under-5 mortality to at least as low as 25 per 1000 LB by 2030 to achieve target for sustainable development goal (SDG) [3].

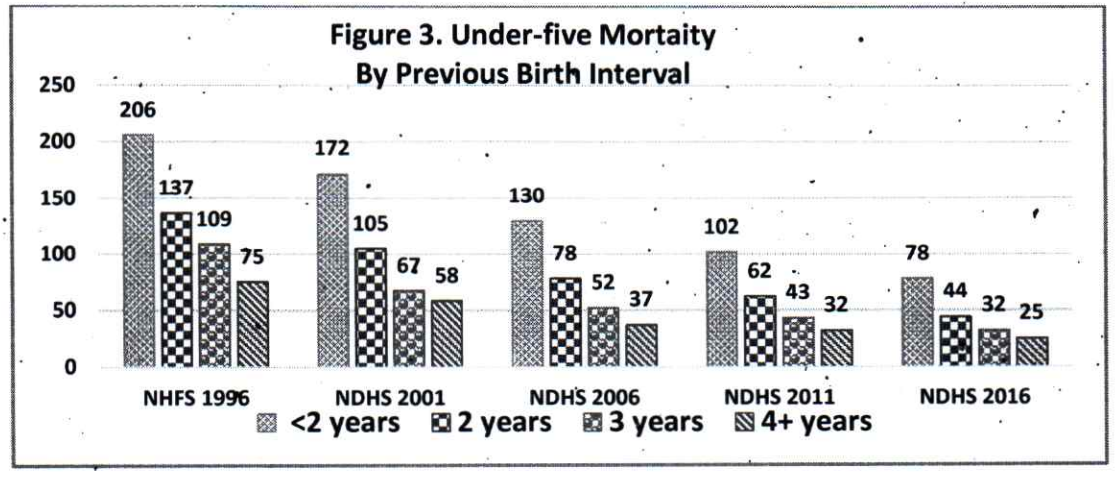


Exiting evidences show that childhood mortality levels are decreasing in Nepal. Currently (in 2016), infant mortality rate (IMR) (deaths to child under one year) is 32 deaths per 1000 LB for the 5-year period before the survey [1]. This is equivalent to 59% decline from the level of 78 per 1000 LB in 1996 [2]. Under-five mortality levels have also decreased from 118 deaths per 1000 LB in 1996 to the current level of 39 deaths per 1000 LB (67% decrease). This indicates that one in every 26 Nepal's children die before their fifth birthday. Results from the 2016 NDHS data show a remarkable decline in all levels of childhood mortality. Neonatal mortality has been declined by 58% over the 20 years period from 50 deaths per 1000 LB in 1996 to 21 deaths per 1000 LB in 2016. Furthermore, the post-neonatal mortality has declined by 59% over the same period from 29 deaths per 1000 LB to 12 per 1000 LB (Figure 1).

Mortality rates differ dramatically by region. The under-five mortality rate for the ten-year period before the survey ranges from 27 deaths per 1000 LB in Gandaki Province to 69 deaths per 1000 LB in Sudur Pashchim Province (Figure2). Under-five mortality also differs markedly by mother's level of education and household wealth quintile. Under-five mortality for children born to mother who has the secondary education (SLC and above) is 21 deaths per 1000 LB, compared to 60 deaths per 1000 LB among children whose mothers have no education. Similarly, under-five mortality for children living in household with highest wealth status is 24 deaths per 1000 LB compared to children belonging to household with lowest wealth status (62 deaths per 1000 LB) (figure not shown).

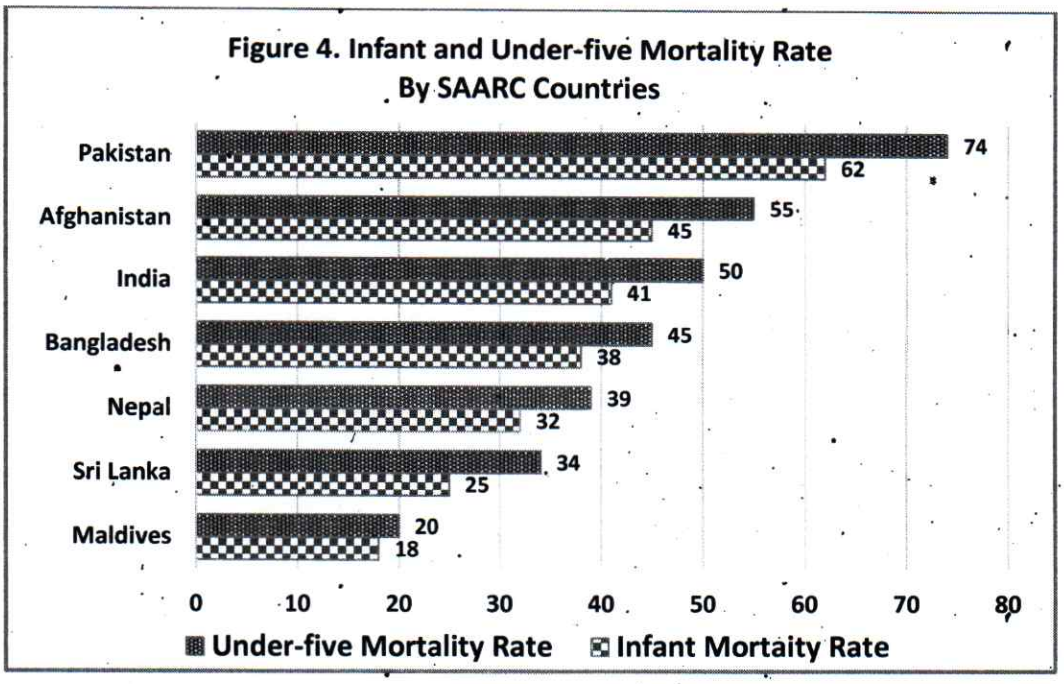


The World Health Organization (WHO) defines birth interval as critical determinant of risk of child mortality. WHO also suggests that three to five years of birth spacing reduce health risk to both the children and mothers [4]. In line with this statement, NDHS reports that infants born less than two years after a previous birth have higher under-five mortality. For example in 2016, the under-five mortality rate was 78 deaths per 1000 LB for children born within 2 years of a previous birth. The rate was much lower (25 deaths per 1000 LB) for children born at least 4 years after a previous birth (Figure 3).



Nepal's childhood mortality rates have decreased significantly in recent years, and are comparable to the mortality rates seen in other neighboring countries. Both the infant mortality rate (IMR) and under-five mortality rate (U5MR) (as per latest surveys) is lower in Nepal (IMR, 32/1000 LB, U5MR, 39/1000 LB) compared to Bangladesh, India,

Afghanistan, and Pakistan and it is higher in Nepal compared to Srilanka and Maldives (Figure 4).



2.2. Vaccination Coverage

Immunization is the most cost-effective and efficient way to control and eliminate the vaccine preventable diseases that contribute to childhood illness and deaths [2]. In 1979, the national immunization program (NIP), at that time known as the expanded program on immunization (EPI) was introduced in three districts with only two antigen (Bacillus Calmette-Guerin- BCG) and diphtheria pertussis and tetanus (DPT) and was rapidly expanded to all 75 districts with each of the six recommended antigens (BCG, DPT, oral polio vaccine- OPV, and measles by 1988. In 2003, the monovalent hepatitis B (Hep B) vaccine was introduced. Later in 2009, a vaccine against homophiles influenza type B (HIB) was also introduced. In addition, pneumococcal conjugate vaccine (PCV) and inactivated polio vaccine-intramuscular (IPV-IM) were introduced in 2015 in phases. All children in Nepal need to vaccine the recommended number of doses of BCG, DPT-HepB-HIB, OPV, PCV, IPV-IM and measles/rubella vaccine during the first year of life [5].

Universal immunization against vaccine-preventable diseases is crucial to reducing infant and child mortality. According to WHO guidelines, to have received all basic vaccines, a child must receive at least [2];

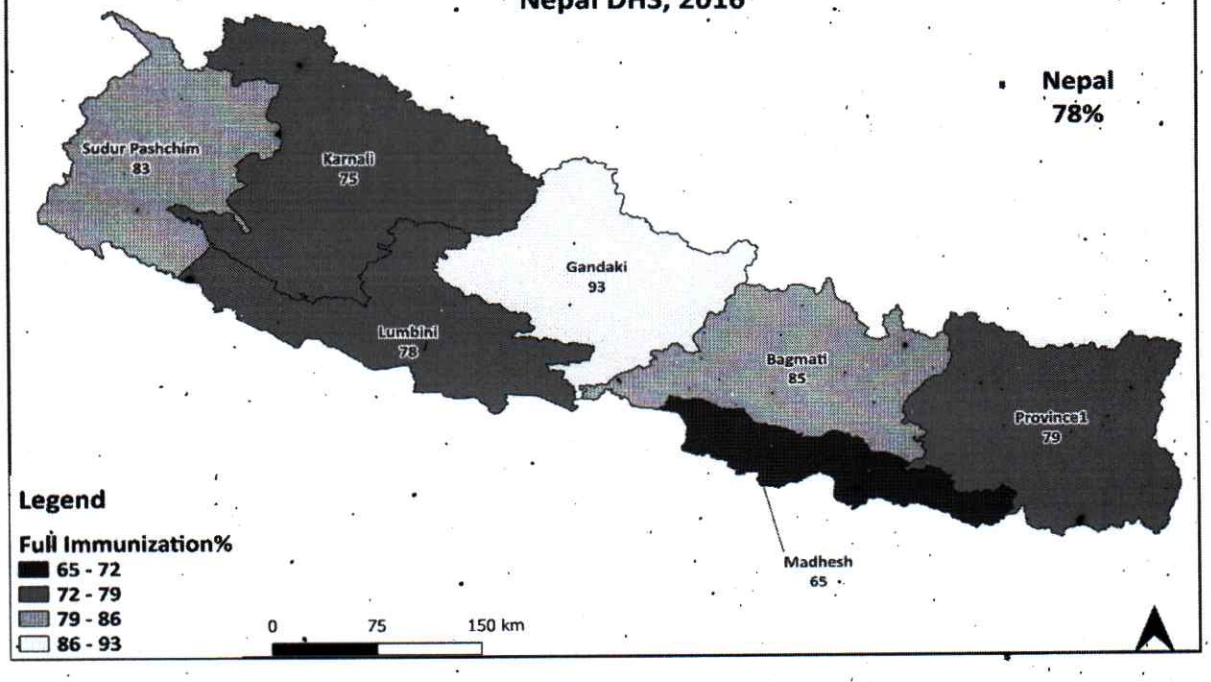
- One dose of BCG vaccine, which protects against Tuberculosis
- Three doses of DPT, which protects against diphtheria, pertussis (whooping cough), and tetanus
- Three doses of polio vaccine
- One doses of measles vaccine

Figure 5. Trend in Vaccination Coverage
Percent of Children Age 12-23 Months

	NHFS 1996	NDHS 2001	NDHS 2006	NDHS 2011	NDHS 2016
BCG	76	85	93	97	98
DPT 3	54	72	89	92	86
Polio 3	51	92	91	93	88
Measles	57	71	85	88	90
All basic vaccinations	43	66	83	87	78
No vaccinations	20	1	3	3	1

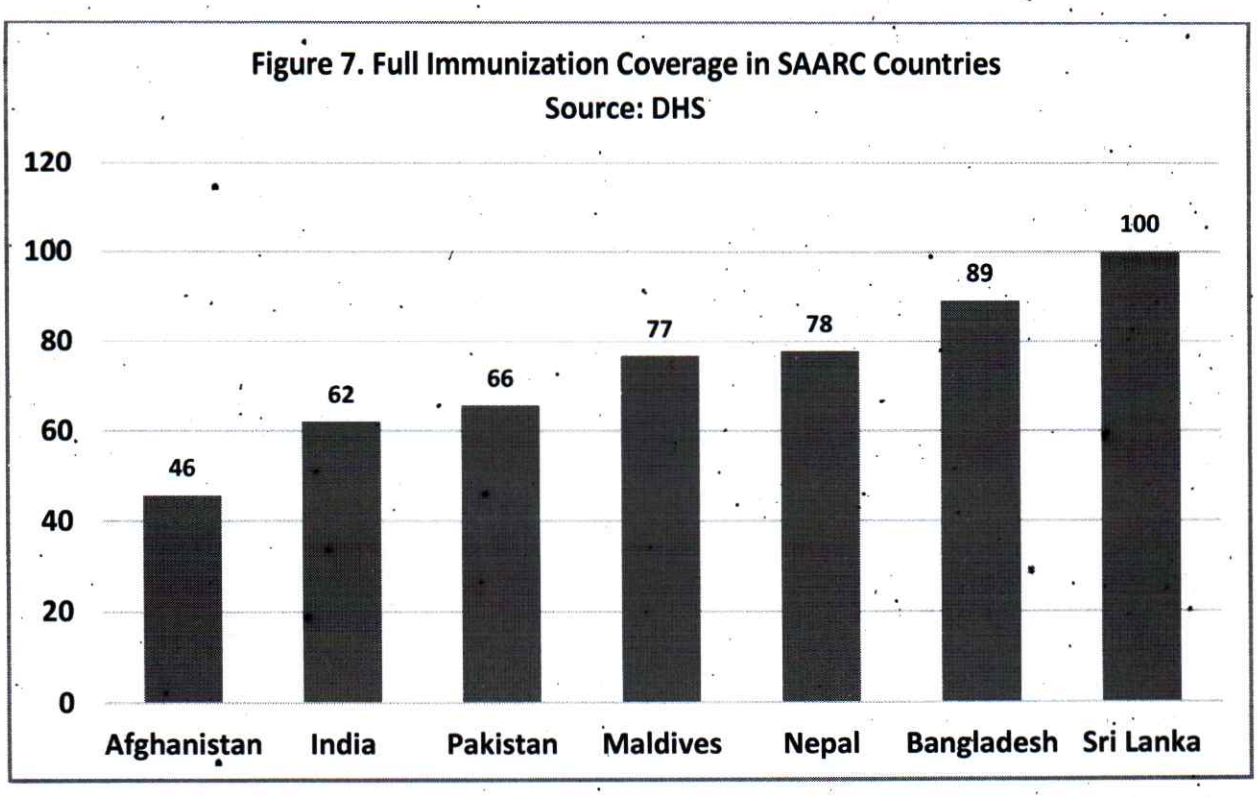
According to the 2016 NDHS, 78% of Nepalese children age 12-23 months have received all recommended vaccines. One percent of the children did not receive any of the vaccines. Full vaccination has increased since 1996, when only 43% of children were fully vaccinated and reached to 87% in 2011. However, it has been slightly decreased to 78% in 2016. There have been sizable improvements in coverage for specific vaccines, especially Measles, which has increased from 57% in 1996 to 90% in 2016. Substantial increases in coverage are also seen for BCG and DPT3 (Figure 5).

Figure 6. Percent distribution of children age 12-23 months who have received all basic vaccination in Nepal by Province Nepal DHS, 2016



Full vaccination coverage is almost equal in urban area (78.5%) and in rural area (77%). The percentage of children age 12-23 months who received all vaccination increases with increase in mother's educational attainment. Vaccination coverage is lowest among children whose mothers have no education (68%) and highest among those whose mothers have SLC or higher-level education (91%).

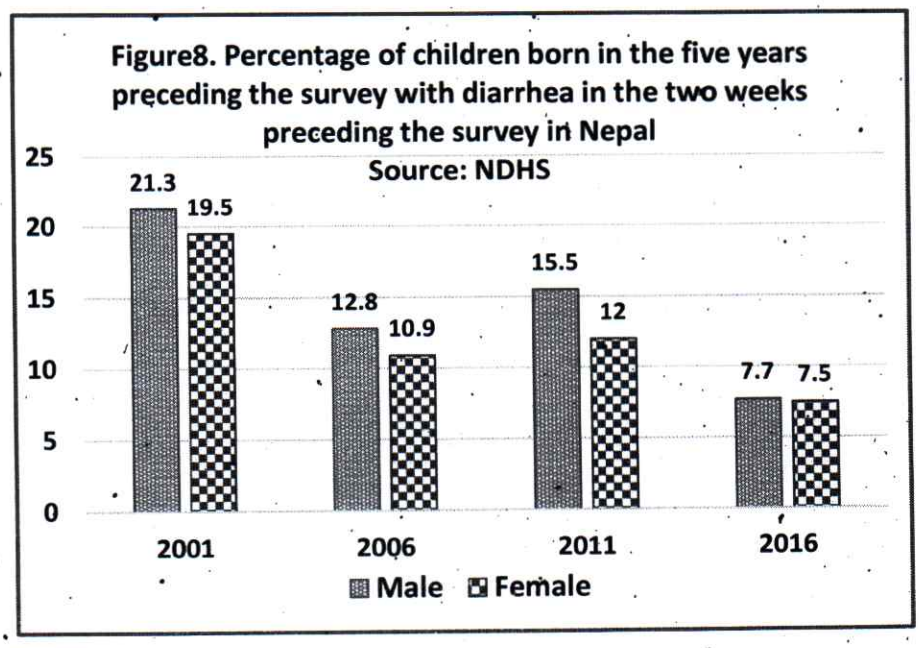
Vaccination coverage among children age 12-23 months for all basic vaccine varies across Nepal, ranging from 65% in Madhesh to 93% in Gandaki (Figure 6). Vaccination coverage in Nepal is found to be relatively better among SAARC countries. While Afghanistan has one of the lowest full vaccination coverage (46%), Srilanka has the highest level of full vaccination (100%). Vaccination coverage of Nepal (78%) is higher than that of India (62%), Pakistan (66%), and Maldives (77%). However, it is lower than Bangladesh (89%) (Figure 7).



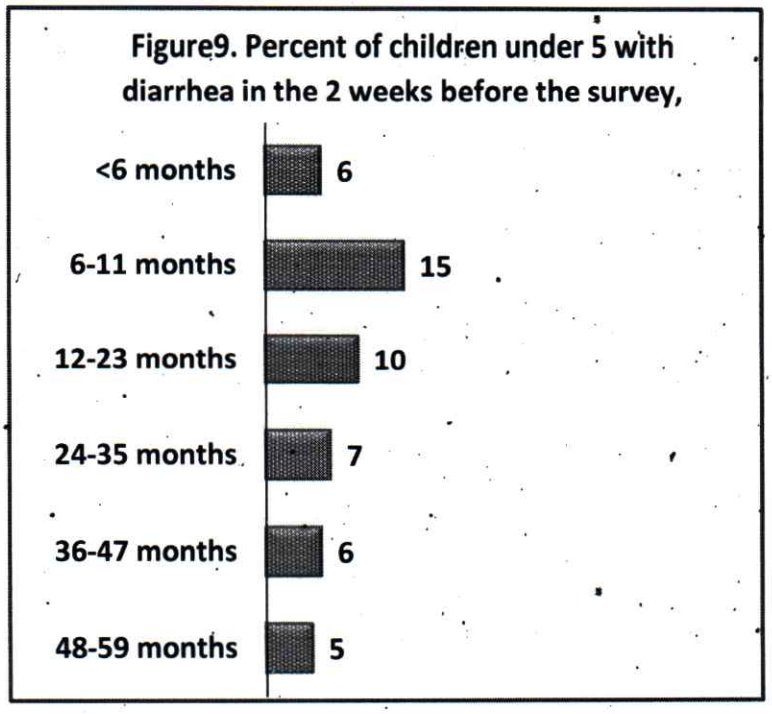
2.3. Childhood illness

In Nepal, diarrhea is one of the most common illness among children and continues to be a major cause of childhood morbidity and mortality, although the condition can be easily treated. Treatment includes oral rehydration therapy that is oral rehydration salt (ORS) packets, recommended home fluids of an increase in fluids.

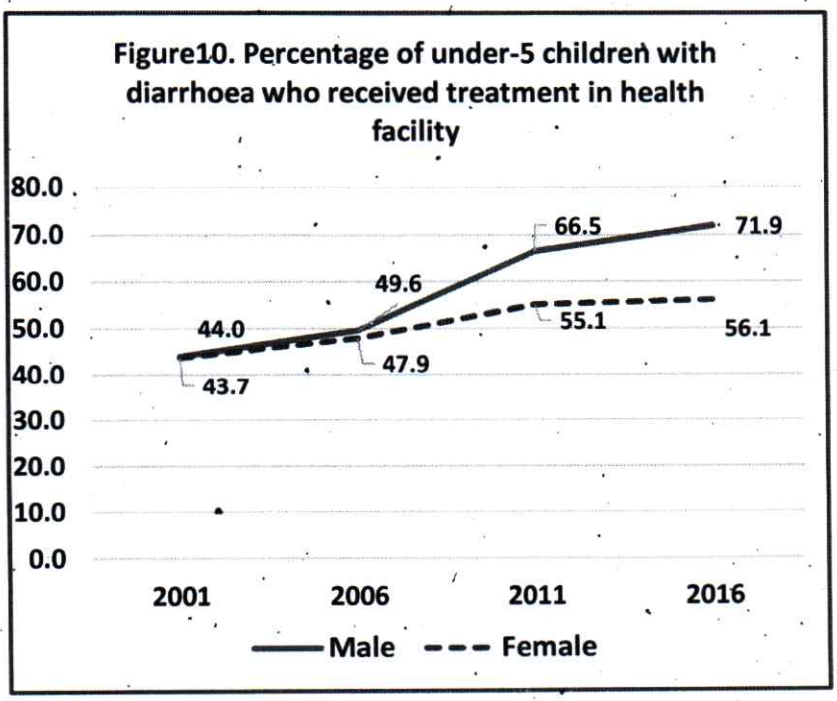
During the two weeks before the survey, 8% of Nepalese children under age five had diarrhea in 2016 (Figure 8). Both male and female children have almost equal prevalence of diarrhea in Nepal. The prevalence of diarrhea decreased from about 20% in 2001, 11% in 2006 and about 14% in 2011 to 8% in 2016 (Figure 8).



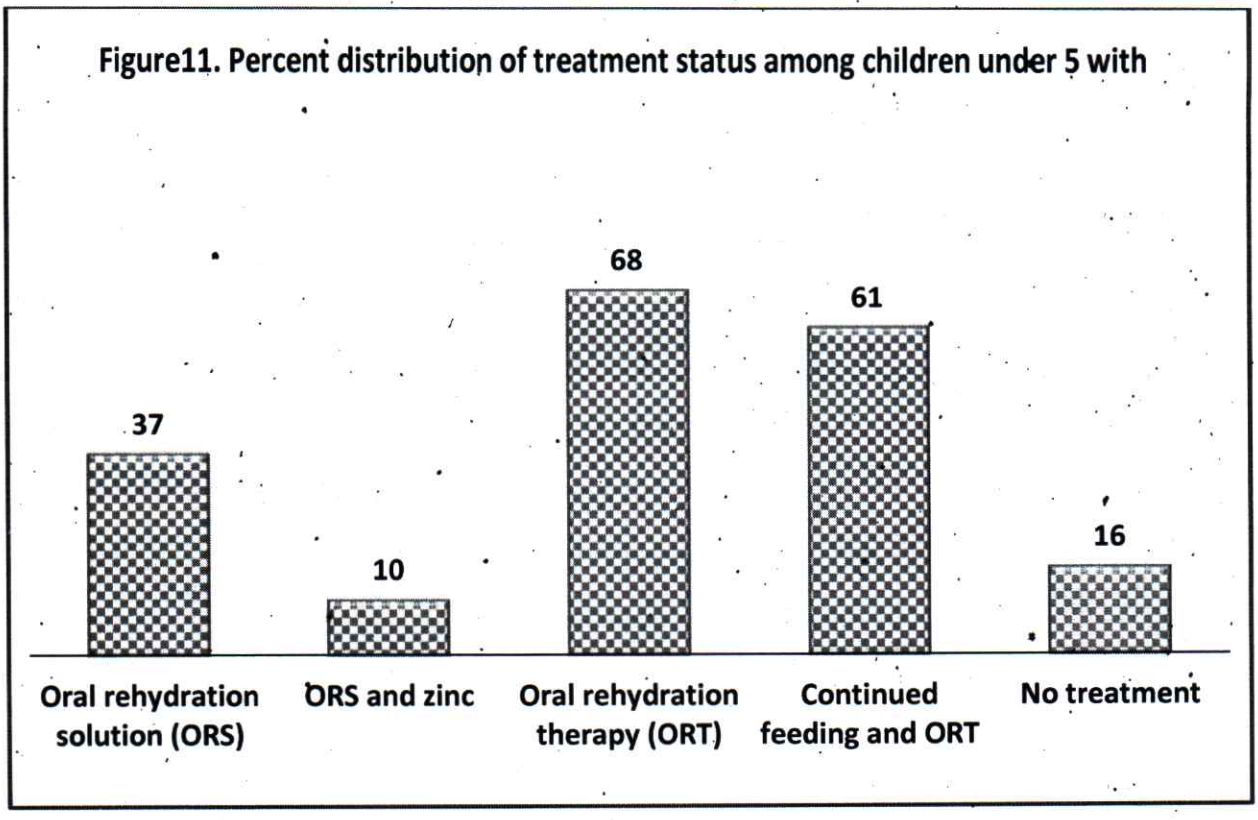
The prevalence of diarrhea increases sharply from 6% among children less than age 6 months to 15% among those age 6-11 months, when children are typically introduced to complementary foods. The percentage of diarrhea decreases gradually after age 1 year (Figure 9).



Among those children under age 5 year with diarrhea in two weeks preceding the survey, 64% were taken to a health facility or provider advice or treatment. Among children age five with diarrhea, boys (72%) are more likely than girls (56%) to be taken to health facility or provider for advice or treatment (Figure 10).



The CB-IMCI program focuses on addressing diarrhoeal disease based on standard protocol recommended by WHO [2]. The protocol suggest to provide increased fluid made from a special packet of oral rehydration salt (ORS) or government recommended homemade fluid (RHF). Overall, 68% of children with diarrhea were given oral rehydration therapy (ORT), 37% of the children were given oral rehydration solution (ORS), 61% were given continued feeding and ORT, 10% were given ORS and Zink and 16% children did not get any treatment (Figure 11) shown below.



2.4. Acute respiratory infection (ARI)

Acute respiratory infection are a major public health problem among children under-5 in Nepal and pneumonia has emerged as the leading cause of death among children in that age group [6].

The community based integrated management of childhood illness program was initiated in 1995 to address the management of diseases such as pneumonia, diarrhea, malaria, measles and malnutrition among children age two months to age five year through an integrated approach. Later in 2014, this package was integrated with community-based newborn care package to form the community-based integrated management of neonatal and childhood illness (CB-IMCI) program, which follows WHO guideline on standard ARI case management. The newly integrated package is being rolled out in the phases across the country. The program also promotes the important role of mothers and caretakers in identifying differences between cough and cold symptoms that necessitate home care and symptoms that require a referral to a health facility in the case of deteriorating health of child. Under the CB-IMNCI program, female community health volunteer (FCHV) are trained to assess, identify, and treat children under age 5 suffering from pneumonia at the ward level with antibiotics [2].

Symptoms of ARI (that is cough), accompanied by short rapid breathing that is chest-related, and/or difficult breathing that is chest related are considered to be a proxy to pneumonia, a major cause of death of young children through the world. Early diagnosis

and treatment with antibiotics can prevent a large proportion of deaths due to pneumonia [5].

Figure12. Percentage of children born in the five years preceding the survey with Accute Respiratory Infection (ARI) in the two weeks preceding the survey and sought care in Nepal, Source: NDHS 2016

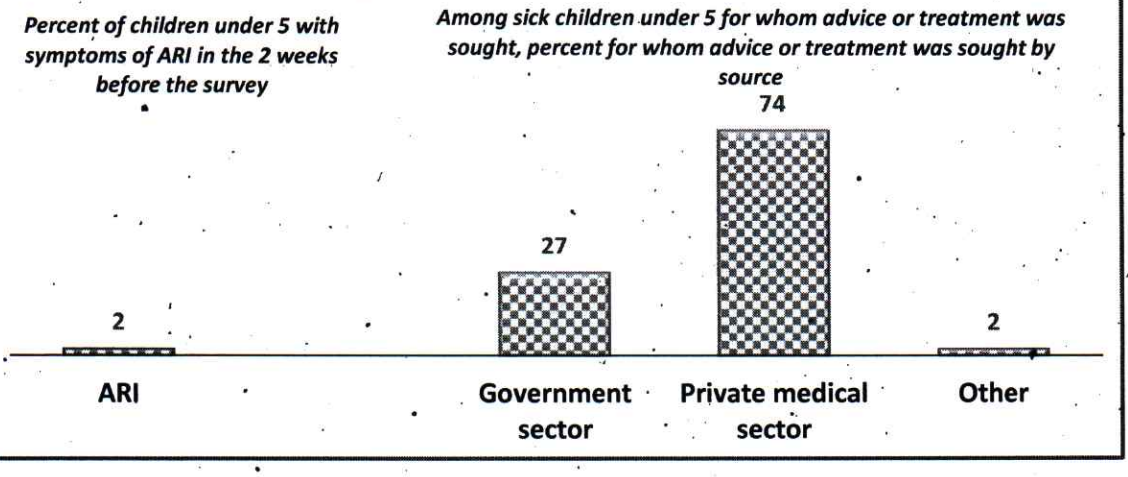
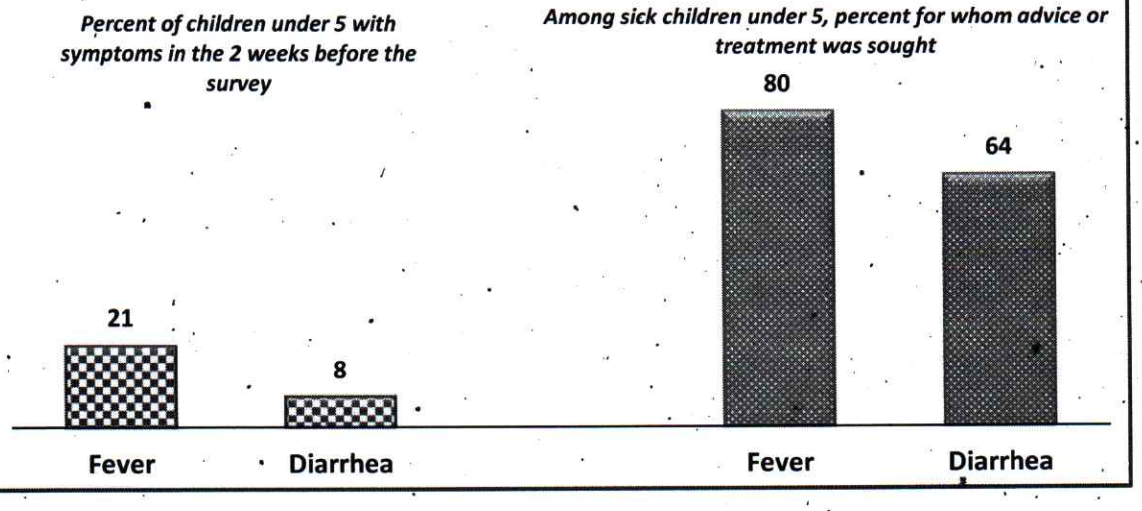


Figure13. Prevalence and Treatment of Childhood Illness, Source: NDHS 2016



Two percent of children under-five had symptoms of ARI in the two weeks before the survey in 2016 in Nepal (Figure 12). Eighty-five percent of children who had ARI symptoms were taken to a health facility or provider for advice or treatment (data not shown). The prevalence of symptoms of ARI among children under age five in Nepal fell from 5% in 2011 [7] to 2% in 2016 [2]. Similarly, as per NDHS 2016, the prevalence of symptoms of ARI was highest among children age 6-11 months and age 12-23 months (4% each) followed by children age 24-35 months (2%). Likewise, the percentage of ARI decreases with increasing household wealth from 3% among children in household in the bottom two wealth quintiles to 1% among children in households in the highest quintile.

Advice or treatment for children under age 5 with symptoms of ARI was most commonly sought from the private medical store (74%). Only 27% of children were taken to government sector facility (Figure 12) shown above. About one-third of the children under age 5 with ARI symptoms for whom treatment or advice was sought were taken to pharmacies (34%) or private clinics (32%) (Not shown in figure).

Fever is the most common illness among children in Nepal. It can be the result of mild illness such as common cold or severe illness such as malaria, measles, pneumonia or Japanese Encephalitis [2]. Twenty-one percent, of children under age, 5 had a fever and eight percent had diarrhea in the two weeks preceding the survey. Eighty percent of the children with symptom of fever were taken to health facility or provider for advice or treatment. Likewise, 64% of the children with diarrhea had sought treatment or advice from health facility or provider [Figure 13]. About 35% of the children with fever had received antibiotics for treatment (not shown in figure). The prevalence of fever among children under age 5 has been increased from 19% in 2011 to 21% in 2016, but the prevalence of diarrhea has been decreased to 8% in 2016 from 14% in 2011 (data not shown in figure).

The NDHS 2016 also indicates the pattern of fever and diarrheal diseases as follows [2].

2.5. Pattern of fever by background characteristics

- The prevalence of fever increased from 16% among children under age 6 months to 30% among those age 6-11 months and declined there after
- The prevalence of fever among children under age five is highest in province1 (31%) and lowest in Province4 (15%)
- The percentage of children under age 5 with a fever for whom advice or treatment was sought was highest in Madhesh (89%) and lowest in Karnali (62%).
- The percentage of children with a fever who took antibiotics is highest in Madhesh (42%) and lowest in Gandaki and Lumbini (27% each)
- Children with a fever were more likely to be taken to a health facility or provider for advice or treatment if their mother had at least some secondary education (83%) than if their mother had only primary education (76%).
- The proportion of children with a fever for whom advice or treatment was sought was highest amongst from household in the middle wealth quintile (91%) and lowest among those from households in the lowest wealth quintile (59%)

2.6. Pattern of diarrhoeal diseases by background characteristics

Among children under age 5 suffering from diarrhea, boys (12%) were more likely to be given ORS and zinc than girls (8%) were in 2016

The percentage of children with diarrhea who were given fluid from ORS packet and given an ORS and zinc vary considerably according to mother's education. For example, the percentage of children with diarrhea who were given fluid from an ORS

packet was highest among those whose mother had SLC or higher education (50%) and lowest among those whose mothers had no education (30%)

Notably, the percentage of children with diarrhea who were given ORS and zinc was much lower among those from household in the lowest wealth quintile (20%) than among those from household in the other wealth quintile.

2.7 Nutrition status of children

Child malnutrition continues to be a major public health problem in developing countries. Nutrition status is primarily determined by a child's growth in height and weight and is directly influenced by food intake and the occurrence of infections [8]. Stunting (chronic malnutrition), wasting (acute malnutrition) and underweight (a general measure of health and nutrition status) were assessed at the population level through DHS data. The anthropometric data on height and weight measurement collected in the 2016 NDHS permits the assessment and evaluation of the nutrition status of young children in Nepal. This assessment allow identification of subgroups of the child population that are at increased risk of fettered growth, disease, impaired mental condition.

Children's height, weight and age data were used to calculate three indicators: height-for-age, weight-for-height, and weight-for-age. Each one provided different information about growth and body composition and was helpful for assessing nutrition status.

Stunting or low height-for-age is a sign of chronic under nutrition that reflects failure to receive adequate nutrition over long period. Stunting can also be affected by recurrent and chronic illness. Wasting or low weight-for-height is a measure of acute under-nutrition and represents the failure to receive adequate nutrition in the period immediately before the survey. Wasting may result from inadequate food intake or from a recent episode of illness causing weight loss. The opposite of wasting is overweight high weight-for-height, a measure of over nutrition. Weight-for-age is composite index of weight-for-height and height-for-age. Both acute (wasting) and chronic (stunting) occur as an indicator of overall nutrition [2].

2.8. Stunting (assessed via height-for-age)

Height-for-age is measure of linear growth retardation and cumulative growth deficits. Children whose height-for-age z-score is below -2 standard deviation (-2SD) from the median of the reference population are considered short for their age (stunted) or chronically under nourished. Children who are below minus 3 standard deviation (-3SD) are considered severely stunted [2].

2.9. Wasting (assessed via weight-for-height)

The weight-for-height index measures body mass in relation to body height or length and describes current nutrition status. Children whose z-score is below minus 2 standard deviation (-2SD) from the median of reference population are considered thin (wasted) or acutely undernourished. Children whose weight-for-height z-score is below

minus 3 standard deviation (-3SD) from the median reference population are considered severely wasted [2].

2.10. Underweight (assessed via weight-for-age)

Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both acute and chronic undernutrition. Children whose weight-for-age z-score is below minus 2 standard deviation (-2SD) from the median of the reference population are classified as under-weight children. Children whose weight-for-age z-score is below minus 3 standard deviation (-3SD) from the median are considered as severely under-weight [2].

2.11. Overweight (assessed via weight-for-height)

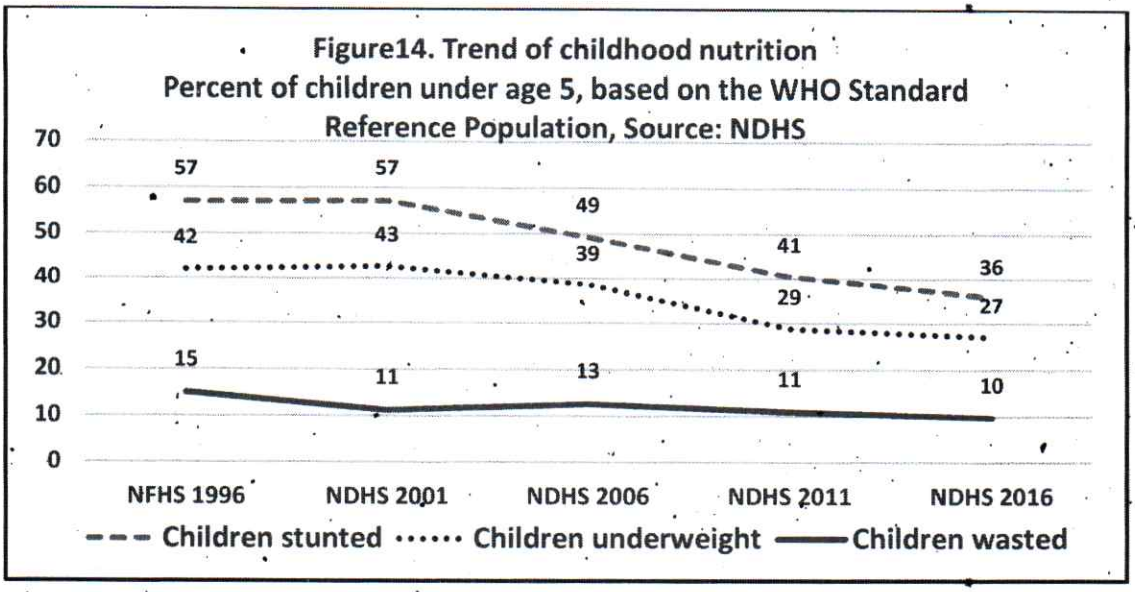
Children whose weight-for-height z-score is more than 2 standard deviation (+2SD) above the median of the reference population are considered overweight. The means of the z-score for height-for-age, weight-for-height, and weight-for-age are also calculated as summary statistics representing the nutritional status of children in a population. These mean scores describe the nutrition status of the entire population of children without the use of a cut-off point.

A mean z-score of less than 0 (that is negative mean value for stunting, wasting or underweight) suggest a downward shift in the entire sample population's nutrition status relative to the reference population. The lower the mean z-score are from 0, the higher is the prevalence of undernutrition. Similarly, the values above zero indicate over nutrition [2].

2.12. Level and trend of child malnutrition

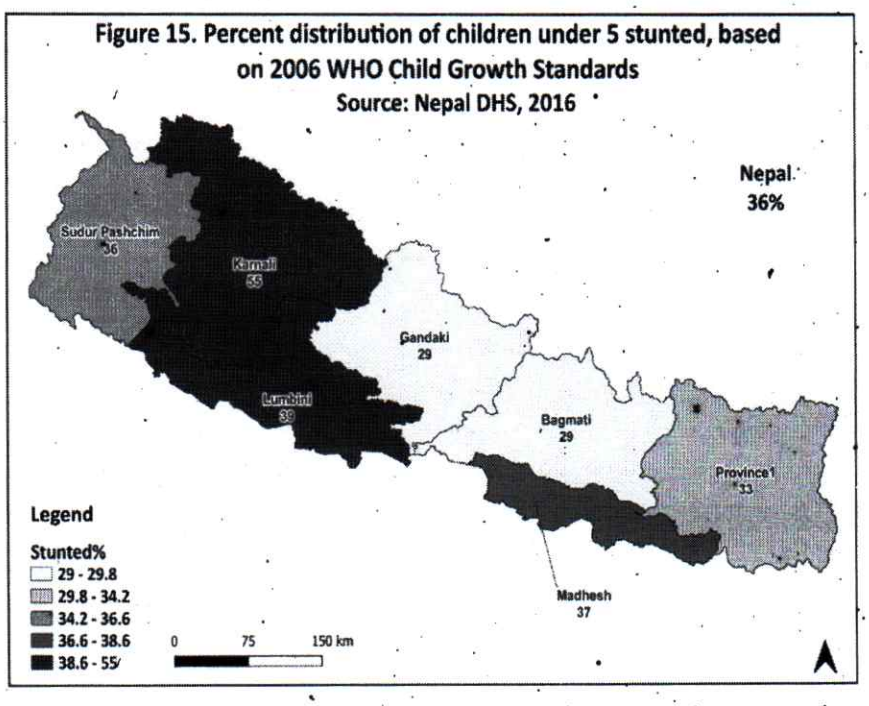
According to the NDHS 2016, 36% of the children under 5 are stunted or too short for their age. This indicate chronic malnutrition. Similarly, one in ten (10%) children under five year were wasted, that is, they were too thin for their height. Wasting reflects the failure to receive adequate nutrition in the period immediately preceding the survey. It is a measure of acute malnutrition. Likewise slightly over a quarter (27%) children under age 5 were under weight, or too thin for their age. Underweight is a composite indicator combining both chronic and acute malnutrition (Figure 14).

Though it is still high, the prevalence of stunting and underweight among children under age 5 have markedly decreased, from 57% to 36% and from 42% to 27% respectively in the last 20 years (1996-2016). This is equivalent to 37% point decline in stunting and 36% point decline in underweight over the period. However, in the same time period changes in wasting is minimal (27%) point decline over 1996-2001 and remained same after 2001 until 2016 (Figure 14).



The prevalence of stunting and underweight increased with age of the children, peaking at age 24-35 months, while wasting was more prevalent among children younger than age 2 (data not shown in figure) [2].

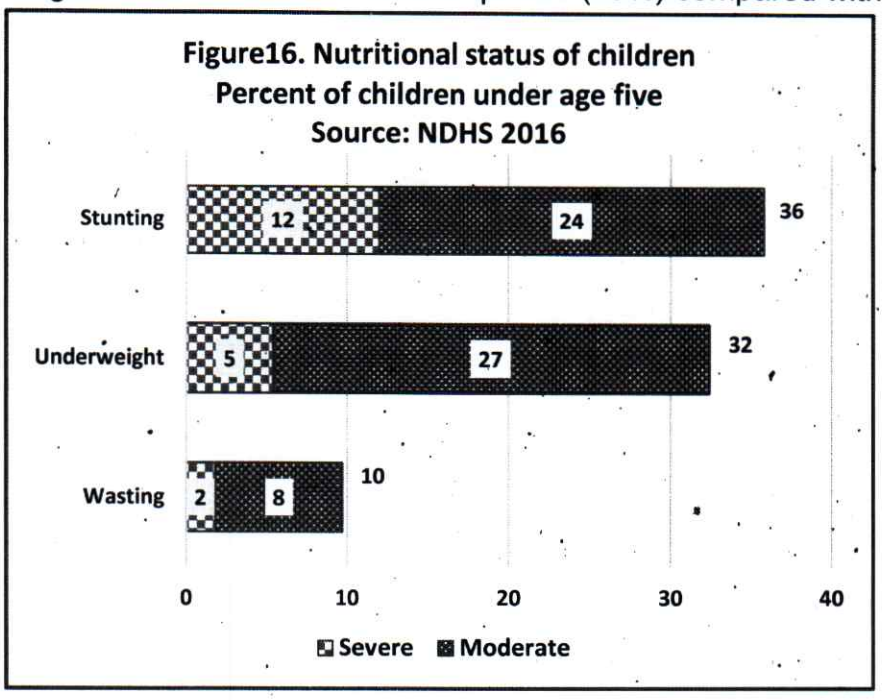
NDHS 2016 also indicates that almost half of the children reported to be very small at birth are stunted (49%) and underweight (45%). Wasting is also common among children who were born smaller. In contrast, only one-third (34%) of the children reported to be average or larger at birth were stunted and only 2% were underweight [2].



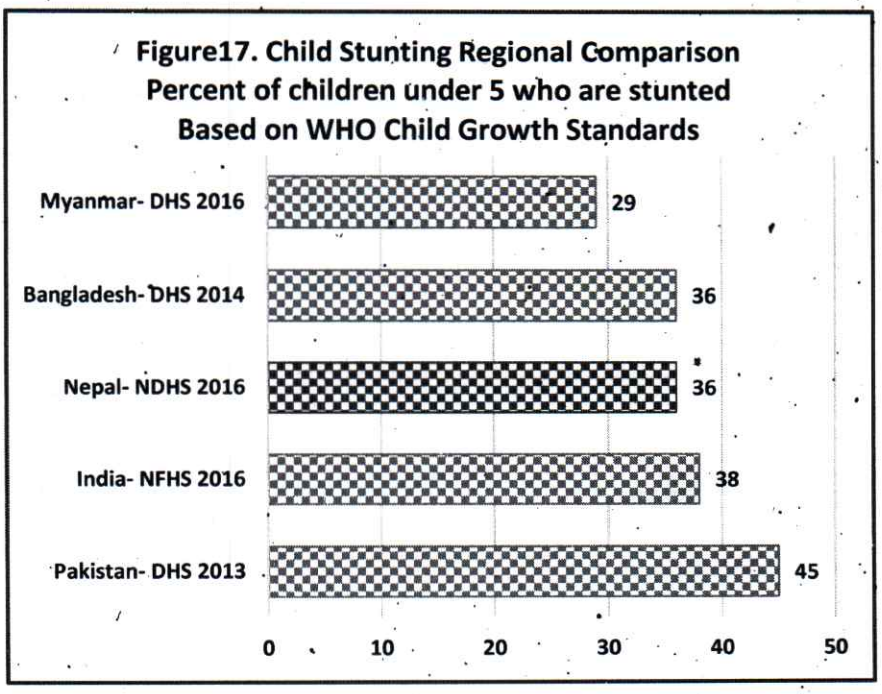
The chronic malnutrition affects children across whole Nepal. The highest rate of stunting are in Karnali Province (55%) followed by Lumbini Province (39%), and Madhesh Province (37%) and it was least in Gandaki Province and Bagmati Province (29% each) (Figure 15).

A higher proportion of children to mothers with no education are undernourished compared with children whose mothers have secondary level of education (stunting 46% vs 23%, wasting 13% vs 8%; and underweight 37% vs 16%). Similarly, stunting was relatively higher among children from lowest wealth quintile (49%) compared with the highest wealth quintile (17%) (Data not shown in figure) [2].

Figure 16 indicates that as per NDHS 2016, slightly more than one in ten (12%) children under 5 were severely stunted, about one in ten (9%) children were severely underweight and 2% children under age 5 were severely wasted (Figure 16).

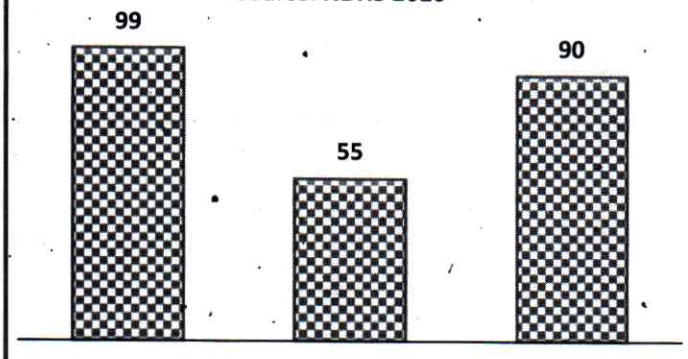


Prevalence of stunting is relatively lower (36%) in Nepal compared to the prevalence of stunting in India (38%) and in Pakistan (45%), while it was relatively higher in Nepal compared to the stunting prevalence in Myanmar (29%) among the selected Asian countries (Figure 17).



2.13. Infant and young child feeding

Figure18. Initiation of Early Breastfeeding
Percent of last-born children born in the past 2 years:
Source: NDHS 2016



Breast-feeding is very common in Nepal, with 99% of children ever breastfed in 2016, more than a half (55%) breastfed within an hour of birth and 90 breastfed within one day of birth [Figure 18).

WHO recommends that children receive nothing but breast milk (exclusive breast-feeding) for the first six month of life [2]. However only about two third (66%) of children under six months in Nepal are being exclusively breastfed old are exclusively breastfed (Figure 19).

On average, children are breastfed in Nepal until the age of 31 months and are exclusively breastfed for 4.3 months only (Figure 20). Early breast-feeding is more common among children born at a health facility (59%) than among those at home (47%). The percentage of children breastfed within an hour of birth is higher in mountain zone (61%) and Sudur Pashchim Province (71%) and among those born in lowest wealth quintile (data not shown) [2].

Figure19. Exclusive breast feeding by age
Percent of children exclusively breastfed
Source: NDHS 2016

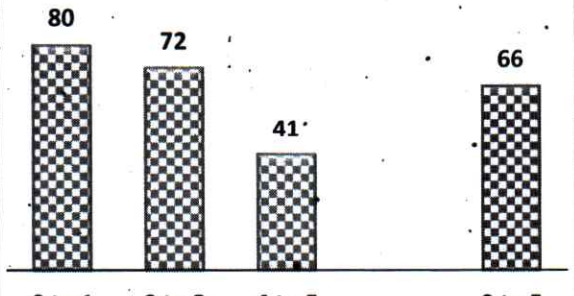
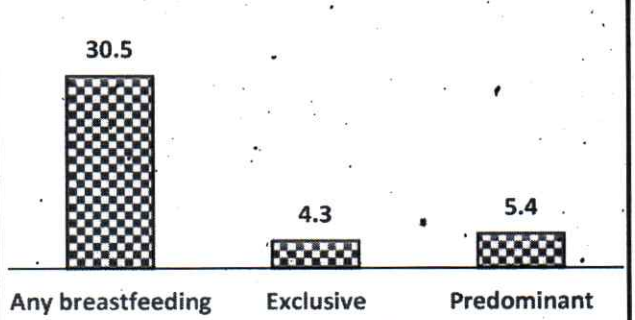


Figure20. Duration of Breastfeeding
Mean duration of breastfeeding in months among children born in the last 3 years
Source: NDHS 2016



2.14. Micronutrient Intake

Micronutrient deficiency is a serious contributor to childhood morbidity and mortality. Vitamin A deficiency can cause eye damage and can increase severity of infections such as measles. Iron deficiency can impair cognitive development, stunt, growth, and increase morbidity from infectious disease [8]. A lack of Iodine in the diet can cause mental and neurological disorders in children. Children can receive micronutrient from foods, including fortified foods (such as iodized salt) and through direct supplementation [8].

Overall, 63% of Nepalese children age 6-23 months ate vitamin A rich foods such as meat, fish, eggs, carrots, pumpkins and dark green leafy vegetables in the 24 hours before the survey. Similarly, 35% had consumed food rich in Iron and more than four-fifth (86%) of children aged 6-59 months were given a vitamin A supplementation (Figure 21). Over the past 20 years, Nepal has been carrying out a semi-annual high dose vitamin A capsule supplementation campaign for children age 6-59 months together with distribution of deworming tablets for children age 12-59 months [2]. Similarly about one in ten (8%) children age 6-59 months received iron supplementation in past seven days of survey in 2016 in Nepal (Figure 21). The proportion of children consuming vitamin A and iron-rich food increases with increasing age. The coverage of both vitamin A supplementation and deworming medication was lowest in Madhesh compared with other Provinces. Children of younger mothers and mothers with no education were less likely to have received vitamin A capsule and deworming medication (data not shown) [2].

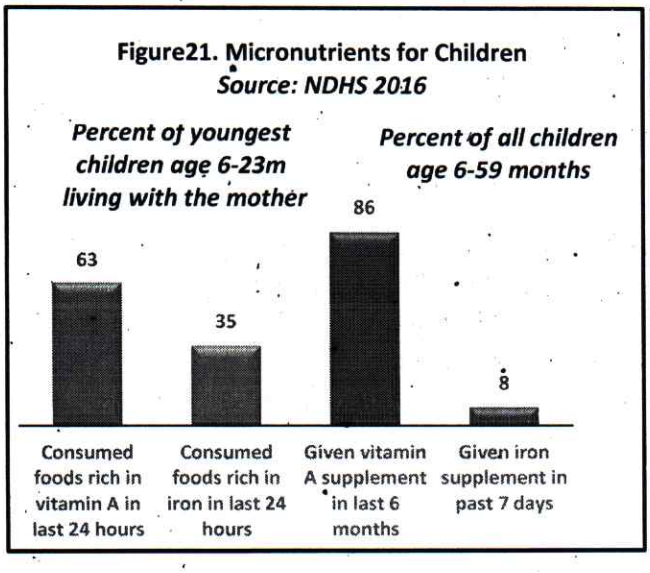


Figure21. Micronutrients for Children
Source: NDHS 2016

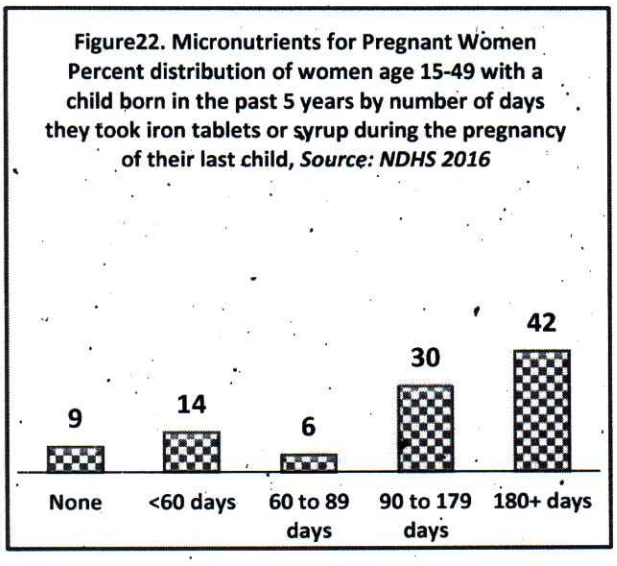


Figure22. Micronutrients for Pregnant Women
Percent distribution of women age 15-49 with a child born in the past 5 years by number of days they took iron tablets or syrup during the pregnancy of their last child, *Source: NDHS 2016*

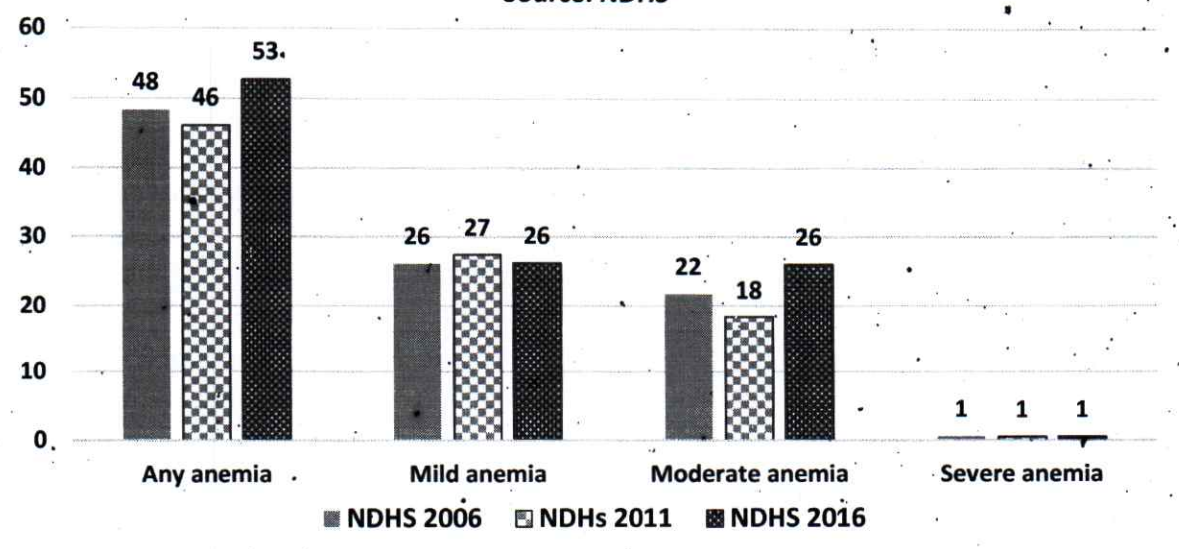
2.16. Anemia

Anemia among children is a condition marked by low levels of hemoglobin in the red blood cells. Iron is a key component of hemoglobin and iron deficiency is estimated to be responsible for half of all anemia globally. Other causes of anemia include malaria, hookworm, and other helminths, other nutritional deficiencies, chronic infections, blood disorders and genetic conditions [2]. Anemia is a serious concern for children because it impair congenital development with associated long-term health and economic consequences. Severe anemia leads to increased mortality [2].

The NDHS 2016 used the HemoCue (Hb201 photometer) device to determine anemia levels. A total of 2272 children were eligible for hemoglobin testing and of these, 95% were successfully tested [2].

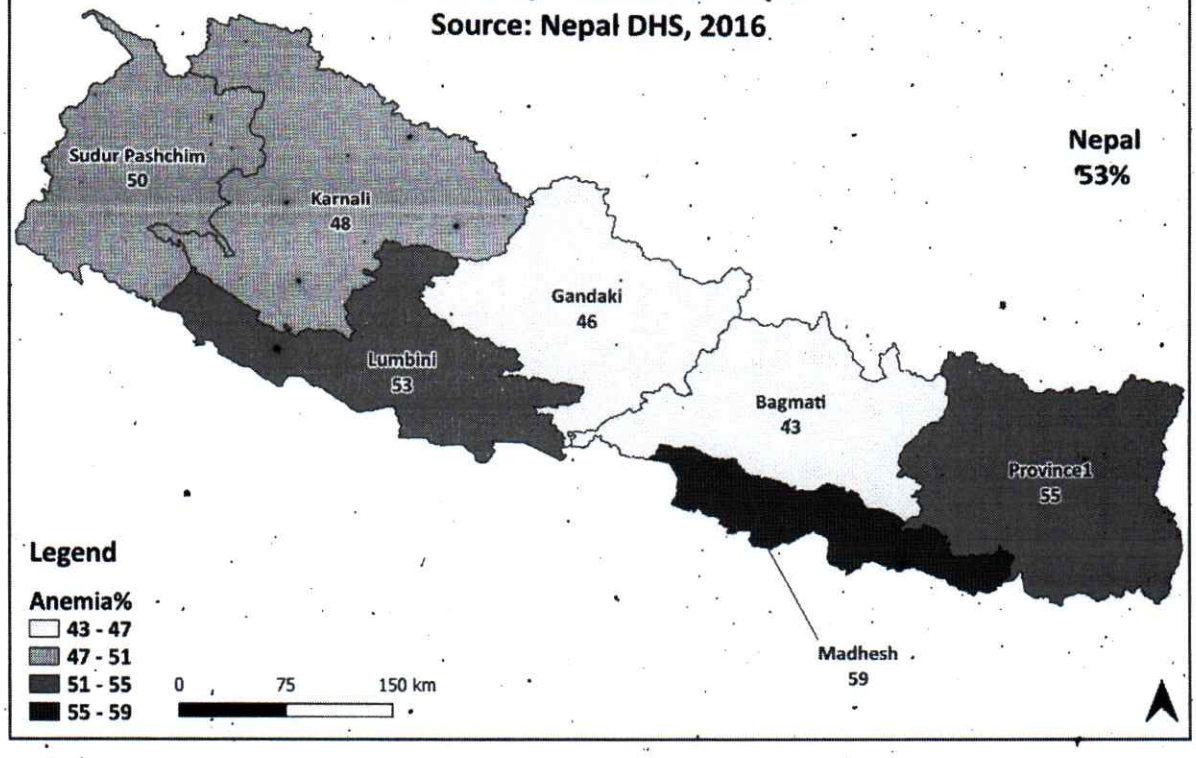
Overall, the prevalence of anemia among children 6-59 months is 53%, with 26% mildly anemic, 26% moderately anemic and 1% severely anemic in 2016 in Nepal (Figure 23). Prevalence of anemia among children under 5 declined by 2% points from 2006 to 2011, however, over the past 5 years, it has increased by 7% points (from 46% in 2011 to 53% in 2016). Over the past 5 years, the prevalence of mild anemia and severe anemia have been almost stagnant, while a notable increase in moderate anemia was observed (from 18% to 26%) (Figure 23).

Figure23. Trend of anemia status among children
Percent of children age 6-59 months with anaemia
Source: NDHS



Prevalence of anemia was higher among children age 6-23 months (68%) than among older children age 24-25 months (52%), 36-47 months (45%), and 48-59 months (36%) (Data not shown). Similarly, prevalence of anemia was higher among children who did not receive deworming medication in the past 6 months than in children who received deworming medication (57% vs 45%) (Data not shown).

Figure 24. Percent distribution of children age 6-59 months with any anemia by Province in Nepal
Source: Nepal DHS, 2016



Anemia prevalence was also higher in rural (56%) compared with urban (49%) areas (data not shown). Likewise, prevalence of anemia was highest in Madhesh Province (59%) and Bagmati Province had the lowest anemia prevalence (Figure 24).

Mother's education was associated with the anemia status of her children. For example in 2016, about 57% of children of mothers with no education were anemic compared with 44% of children of mothers with secondary and higher level of education (data not shown) [2].

3. Conclusion and recommendations

3.1. Conclusion

This report presents mainly the trend of children's health and nutrition status based on NDSH data. As infant and child mortality continues to decrease, vaccination coverage is slowly rising and fewer children are malnourished, Nepalese children are living healthier lives than before. However, Nepal's child health indicators fall below some of the South Asian countries including Sirlanka, Maldhives, Bangladesh. Data from NDHS 2016 describes the current health and nutrition status of children and examines at the differential in child health and nutrition across the population. Together with data from the 1996, 2001, 2006 and 2011 NDHS, the 2016 NDHS tracks changes in newborn health and nutrition status over the last two decades in Nepal.

Despite the gradual improvement in national child health and nutrition status, their disparities over geographic region, educational level, wealth status are the matter of concern for program managers and policy makers. For example, rural areas, Karnali and Madhesh Provinces have relatively higher childhood mortality. Children living in these areas are less likely to be vaccinated and more likely to have poor nutrition status.

While more than half of the children in Karnali Province are stunted compared to less than one-third of the stunted children in Gandaki and Bagmati provinces, vaccination coverage is also lower in Madhesh and Karnali and higher in Gandaki and Bagmati Provinces. Similarly, children of educated mothers and children from wealthier households are better off in-terms of child health and nutrition status. Children from poor and less educated families continue to face poor health and nutrition status. For example, children with diarrhea should be treated with oral rehydration therapy. However, children with educated mothers and those from wealthiest households have higher proportion of receiving recommended treatment compared to their peers from poorer and less educated households. Following section summarizes key findings and related policy recommendations.

3.2 Summary of findings and recommendations

3.2.1. Childhood mortality

Summary of findings

- Neonatal mortality rate (NMR) has been decreased to 21 per 1000 LB in 2016 from 50 per 1000 LB in 1996 (a 58% point reduction; Annual Rate of Reduction, ARR-2.9%)
- Under-five mortality rate (U5MR) decreased to 39 per 1000 LB in 2016 from 118 per 1000 LB in 1996 (a 67% point decrease; ARR-3.3%)
- To achieve the SDG target by 2030 Nepal has to decrease under-five mortality rate by 49% (at ARR of 3.5%) and neonatal mortality rate by 43% (at ARR of 3.1%) from 2016 level
- It is a challenge for GoN to meet the SDG targets of neonatal and under-five mortality and need to accelerate implementation of targeted interventions

Recommendations.

Common cause of neonatal mortality are infection, birth asphyxia and prematurity and that of under-five mortality are respiratory infection, diarrhea, malaria and birth complications, to prevent deaths from these causes following actions should be taken.

- Expand birthing centers (BC) up to remote and hard to reach areas to substantially increase institutional delivery
- Establish BC in strategic locations and make them functional either for basic or for comprehensive emergency obstetric care service
- Implement well known newborn interventions such as, application of chlorhexidine for chord care, resuscitation for newborn, management of newborn infection, use of antenatal corticosteroids and kangaroo mother care
- Re-inforce behavior change communication through various channel to improve parenting skill for newborn care, particularly among poor, uneducated, minority and hard to reach population
- Prepare a focused and sustained quality improvement action plan to make facilities ready for critical care these actions include quality antenatal, delivery, postnatal and neonatal care, supply of well-trained health care professional, low-cost medicines and access to water and sanitation

3.2.2. Immunization services

Summary of findings

- Over the last two decades, full immunization in Nepal has been increased from 43% in 1996 to 78% in 2016 (81.4% point increase; annual rate of increase, ARI-4%) however, the full immunization coverage has been declined by almost 10% point (from 87% in 2011 to 78% in 2016)
- To meet the SDG target of full immunization (95% by 2030), Nepal has to increase the full immunization coverage by annual rate of increase (ARI) of 1.5% during 2016-2030
- Full immunization coverage varied across provinces (highest in Gandaki-93%) and lowest in Madhesh (65%)
- Full immunization coverage among children age 12-23 months increased with mother's education (68% among uneducated mother and 91% among mother with SLC or higher education)

Recommendations

Immunization is key to child survival and missing routine immunization can be life threatening to infant and child, therefore MoHP should continuously implement innovative interventions to accelerate full immunization in Nepal.

- Work closely with development partners and other government stakeholders to narrow the full immunization gaps particularly among poor, marginalized and less educated groups in all geographical areas

- Make sure that every child who come for vaccination is not turned away and receive desired vaccine at appropriate time
- Ensure that all level of health facilities have the required resources such as skilled and motivated vaccinators, supply of vaccine and supportive community engagement
- Pay more attention to communicate the benefits and risk of vaccines and to gain sustained public trust in vaccination
- Create awareness to educate family members and parents on when and where to bring their children for vaccination, duration between doses and importance of not missing
- Integrate immunization program with other maternal and newborn health program to increase full immunization and reduce disparity of full immunization across socio-demographic groups

3.2.3. Childhood illness: Diarrhoea

Summary of findings

- Nepal has experienced an impressive reduction in prevalence of diarrhea among under-five children (from 21.3% in 2001 to 7.7% in 2016 among male and from 19.5% to 7.5% among female) but only 72% male child and 56% female child sought treatment from health facilities and 16% children did not get any treatment (even oral rehydration solution, ORS)

Recommendations

- Explore further to examine reasons for poor treatment of diarrhea and develop strategy towards achieving universal use of ORS for treatment of diarrhoeal diseases
- The interventions related to universal use of ORS should be focused on female, uneducated and poor households
- Improve access to medicine (ORS, Zinc and antibiotics etc.), food, and clean water as well as public education through health worker and community health volunteer (CHV) to prevent deaths of children under-five due to diarrhoea

3.2.4. Childhood illness: ARI & Pneumonia

Childhood illness: ARI/Pneumonia

- Prevalence of ARI among children under-five in Nepal decreased from 5% in 2011 to 2% in 2016 (a 60% reduction), however ARI and pneumonia are still a major public health problem and leading cause of death among these children
- ARI prevalence is highest among children age 6-23 months (8%) and decrease with household wealth (3% among children living in household with bottom two wealth quintile and 1% in highest wealth quintile) and varies across provinces and educational status of mothers

- Treatment for ARI was most commonly sought from private medical store (74%) and only 23% were taken to government facilities

Recommendations

- Treatment of ARI and pneumonia using the antibiotics is the key strategy for preventing death due to respiratory diseases, but excessive use of antibiotics might have adverse effect on health of children [10].
- Adopt effective approaches to regulate the uncontrolled use of antibiotics to prevent the children from resistant to antibiotics
- Low birth weight, malnutrition, and lack of breast-feeding are important risk factors for childhood ARI and pneumonia, therefore, nutritional interventions such as preventing malnutrition and low birth weight, early breastfeeding, vaccination, access to clean water, good nutrition and limited exposure to air pollution should be implemented to reduce deaths from ARI and pneumonia [13]
- Supply trained health workers equipped with adequate medicines and equipment within easy reach of poor and uneducated families to treat childhood ARI and pneumonia effectively

3.2.5. Childhood nutritional status

Summary of findings

- More than one-third (36%) children under five-year age were stunted, one in every ten (10%) children were wasted and slightly more than a quarter (27%) children were underweight in 2016
- Prevalence of stunting was substantially decreased from 57% in 1996 to 96% in 2016 (37% point decline; ARR-1.9%), similarly, prevalence of underweight declined from 42% to 27% (36% decline; ARR-1.8%) during the same period, however prevalence of wasting remained same (around 10%) during 2001 to 2016
- Chronic malnutrition is most prevalent in Karnali province (55%), Lumbini province (39%) and Madhesh (37%) and it is lowest in Gandaki and Bagmati provinces (29%)
- Children of un-educated mother and those living in poorer households suffer more than the educated and wealthier families
- The average ARR of stunting and underweight over 20 year period between 1996 to 2016 were 1.9% and 1.8% respectively, which are much less than the required 4.2% and 5.8% ARR respectively during 2016-2030, therefore, Nepal is less likely to achieve SDG target for reducing childhood stunting, underweight and wasting in Nepal
- Only 66% children age 0-5 months are exclusively breastfeed for an average of 4.3 months

Recommendations

- Exclusive breastfeeding, complementary feeding, micronutrient supplementations, adequate and balanced diet during pregnancy, and treatment of acute malnutrition are the potential nutrition specific interventions that have direct impact on nutrition status of children [10]
- Increase coverage of nutrition-specific interventions listed above across the population through both public and non-government (NGO) sector
- Counsel to mothers effectively to improve child feeding practices and disseminate messages about child feeding practices on cell phone, radio and television to promote good feeding practices
- Through the effective mass media advice mothers to start breastfeeding within an half hour of birth, and to provide only breast milk for the first six months
- Implement appropriate community-based interventions for children with severe acute malnutrition to institutionalize management of acute malnutrition in the community;
- Institutionalize calcium supplementation during pregnancy nationwide to prevent pre-eclampsia, eclampsia and gestational hypertension to prevent fetus deformity
- Implement nutrition-specific interventions together with nutrition-sensitive interventions (such as, food security, family planning, proper water, sanitation and hygiene, women's empowerment) particularly to uneducated, poor and vulnerable children to substantially reduce stunting
- Multi-sectoral collaboration, deployment of trained staff in the community, and effective communication for changing behavior of vulnerable people are key to improving nutritional status of children

4. References

1. Pradhan A., Aryal R.H., Regmi G., Ban B., Govindasami P. (1997). Nepal Family Health Survey, 1996. Kathmandu Nepal, and Calverton, Maryland: Ministry of Health [Nepal], New ERA and Macro International Inc.
2. Ministry of Health, Nepal; New ERA; and ICF. (2017). Nepal Demographic and Health Survey 2016. Kathmandu Nepal: Ministry of Health, Nepal.
3. National Planning Commission (NPC). (2017). Sustainable Development Goals Status and Roadmap: 2016-2030. Singhadurbar, Kathmandu, Nepal.
4. World Health Organization (WHO). (2007). Report of a WHO Technical Consultation on Birth Spacing. Geneva, Switzerland.
5. Department of Health Services (DoHS). (2020). Annual Health Report 2076/77 (2019/2020). DoHS, Teku, Kathmandu, Nepal
6. Ministry of Health, Nepal, New ERA; and Macro International Inc. (2007). Nepal Demographic and Health Survey 2006. Kathmandu, Nepal: Ministry of Health, Nepal

7. Ministry of Health, Nepal, New ERA, and Macro International Inc. (2012). Nepal Demographic and Health Survey 2011. Kathmandu, Nepal: Ministry of Health Nepal.

8. ICF International. (2012). Children's Health and Nutritional Status: Data from the 2011 Ethiopia Demographic and Health Survey. Calverton, Maryland, USA: ICF International.

9. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). (2021). Levels & Trends in Child Mortality: Report 2021, Estimates developed by the United Nations Inter-agency Group for Child Mortality Estimation', United Nations Children's Fund, New York, 2021.

10. National Institute of Population Research and Training (NIPORT) and ICF International. (2016). Bangladesh Demographic and Health Survey 2014: Policy Briefs. Dhaka, Bangladesh and Rockville, Maryland, USA: NIPORT and ICF International.

11. Tekin, M. (2021). Under-five Mortality and Prevention. Bacha, U. eds. Mortality Rates in Middle and Low-Income Countries. https://www.intechopen.com/online-first/79070. DOI: 10.5772/intechopen.100526.

12. United Nations Children's Fund (UNICEF). (2018). UNICEF Immunization Roadmap 2018-2030. UNICEF, New York. https://www.unicef.org/sites/default/files/2019-01/UNICEF_Immunization_Roadmap_2018.pdf.

13. Victoria, C.G., Kirkwood, B.R., Ashworth, A., Black, R. E., Rogers, S., Sazawal, S., Campbell, H., and Gove, S. (1999). Potential interventions for the prevention of childhood pneumonia in developing countries: improving nutrition. Am J Clin Nutr 1999; 70:309–20.