

Review Article

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A review of selected nutrition & health surveys in India

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Assessment of the status of health and nutrition of a population is imperative to design and implement sound public health policies and programmes. The various extensive national health and nutrition surveys provide national-level information on different domains of health. These provide vital information and statistics for the country, and the data generated are used to identify the prevalence and risk factors for the diseases and health challenges faced by a country. This review describes the various national health and nutrition surveys conducted in India and also compares the information generated by each of these surveys. These include the National Family Health Survey, District Level Household Survey, Annual Health Survey, National Nutrition Monitoring Bureau Survey, Rapid Survey on Children and Comprehensive National Nutrition Survey.

Key words Annual health survey - DLHS - health - NFHS - NNMB - nutrition - surveys

Significance of health & nutrition surveys

Large surveys are significant means to collect data related to health and aid to observe and check the progress on different indicators related to health measured in these surveys¹. This review was aimed to assess the large-scale national-level community-based health- and nutrition-related surveys conducted in India since 1972 and also to compare the characteristics of these surveys such as survey period, nodal ministries, key themes and indicators covered by each survey.

Although the surveys put forward important and beneficial information on various health- and nutrition-related indicators at sub-national level, this review, in particular, focuses on the maternal

and child health-related indicators. The community-based national-level surveys with large sample size were selected that provided data on various health and nutrition indicators. The major surveys discussed include the National Family Health Surveys (NFHS), District Level Household Survey (DLHS), Annual Health Survey (AHS), National Nutrition Monitoring Bureau (NNMB) Survey, Rapid Survey on Children (RSoc) and Comprehensive National Nutrition Survey (CNNS).

Major surveys

National Family Health Survey (NFHS)

The NFHS is a large-scale survey, and multiple rounds of NFHS have been conducted since 1992

[†]Equally contributed.

in representative sample households throughout India². It is coordinated by the International Institute for Population Sciences (IIPS) as the nodal agency, Mumbai, under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India. Till now, four rounds of this survey have been conducted, NFHS-1 (1992-1993), NFHS-2 (1998-1999), NFHS-3 (2005-2006) and NFHS-4 (2015-2016). The most recent NFHS-4 provides estimates of most of the indicators at the district level for the first time for all the 640 districts³.

District Level Household Survey (DLHS)

The DLHS is a household survey conducted at the district level. Like NFHS, the nodal agency for DLHS also is the IIPS, Mumbai. The survey was focussed on generating quality data on reproductive and child health in India at the district level⁴. Four rounds of the survey have been completed DLHS-1 (1998-1999), DLHS-2 (2002-2004), DLHS-3 (2007-2008) and DLHS-4 (2012-2013).

In DLHS-4, a population-linked facility survey was undertaken for the first time. Under the facility-based survey, the different levels of healthcare comprising the community health centres, district hospitals and sub-divisional hospitals were covered. Furthermore, all sub-health centres and primary health centres were included in this facility assessment under the survey⁵.

Annual Health Survey (AHS)

The AHS is implemented by the Office of the Registrar General of India, Ministry of Home Affairs, Government of India, and sponsored by the MoHFW. The AHS is the largest sample survey in the world⁶. Three rounds of AHS have been completed which provide district- and State-level information. The first survey was commenced in 2010-2011 followed by two successive rounds in 2011-2012 and 2012-2013 covering the same households included during the baseline survey⁷. The DLHS and NFHS, on the contrary, had different cross-sectional sample for each round conducted. The nine empowered action group (EAG) States covered by AHS are the ones not incorporated in the DLHS-4⁷.

Rapid Survey on Children (RSOC)

The RSOC is a country-wide household-cum facility-based survey focussed on maternal and child health. The survey covered 28 States and the Union Territory of Delhi with the purpose to generate more robust data on children and women. The survey

comprehensively evaluates the Integrated Child Development Services programme with regard to its infrastructural facilities, awareness of the beneficiaries about the six services provided and the utilization of the same⁸. The survey was commissioned by the Ministry of Women and Child Development (WCD) with technical and financial assistance from the United Nations Children's Fund (UNICEF), India. Till date, only one round of the survey has been carried out in 2013-2014 and reports for all the States have been released⁸.

Comprehensive National Nutrition Survey (CNNS)

The MoHFW along with UNICEF is conducting a comprehensive survey to assess the nutritional status of more than 115,000 children and adolescents (aged 0-19 yr) in all States of India. The main objective of this survey is to report the micronutrient deficiencies, overnutrition and nutritional risk factors for non-communicable diseases among the above-mentioned age group in India⁹. Reports on preliminary findings of only two States, Maharashtra (2012)¹⁰ and Gujarat (2014)¹¹ have been released.

National Nutrition Monitoring Bureau (NNMB)

NNMB was established by the Indian Council of Medical Research (ICMR) in collaboration with respective state governments in 1972 in 10 States with ICMR-National Institute of Nutrition, Hyderabad, as the coordinating centre. The mandate of the survey was to collect and generate good-quality data on diet and nutritional status of the communities in the urban, rural and tribal areas. Another main objective was to assess the ongoing national nutrition programmes regularly¹². NNMB has carried out repeat surveys in 1988-1990 and in 1996-1997 in the same villages in all the States that were surveyed during 1975-1979, to assess time trends in diet and nutritional situation. NNMB is the sole organization that gathers information on actual dietary intake of households altogether, along with individual members of the family belonging to different age and physiological groups¹².

Key characteristics & themes of the surveys

Table I provides the key characteristics of selected health and nutrition surveys in India.

The first nutrition-related survey was conducted by NNMB in 1974-1979¹³. This was the baseline survey. Several subsequent rounds have been carried out in one to four year interval in the rural, urban and tribal communities. NNMB being a nutrition focussed

Table I. Key characteristics of selected health and nutrition surveys in India

Name of the survey	Nodal ministry	States and UTs covered	Districts covered
NNMB			
NNMB baseline Survey, 1975-1979 ¹³	ICMR, Ministry of Health and Family Welfare, Government of India ¹⁰	10	-
NNMB, first repeat survey, 1988-1990 ¹⁴		8	-
NNMB Rural Survey, 2000-2001 ¹⁵		9	-
Micronutrient Deficiency Survey, 2003 ¹⁶		8	-
NNMB Rural Survey, 2004-2005 ¹⁷		9	-
Second Repeat Survey, 2008 ¹⁸		9	-
NNMB Rural survey, 2011-2012 ¹⁹		10	-
NNMB Brief Report on Urban Nutrition ²⁰		16	-
NFHS			
NFHS-4, 2015-2016 ³	Ministry of Health and Family Welfare, Government of India ²	29 States and 7 UTs	640
NFHS-3, 2005-2006 ²¹		27 States and 2 UTs	-
NFHS-2, 1998-1999 ²²		26 States	-
NFHS-1, 1992-1993 ²³		24 States and 1 UT	-
DLHS			
DLHS-4, 2012-2013 ⁵	Ministry of Health and Family Welfare, Government of India ⁴	20 States and 6 UTs [^]	-
DLHS-3, 2007-2008 ²⁴		28 States, 6 UTs	601
DLHS-2, 2002-2004 ²⁵		28 States, 5 UTs	593
DLHS-1, 1998-1999 ²⁶		26 States, 7 UTs	504
AHS			
AHS, CAB Survey-2014 ²⁷	Office of Registrar General, India, Ministry of Home Affairs, Government of India ²⁸	9 EAG States	284
AHS 2012-2013 ²⁸		9 EAG States	284
AHS 2011-2012 ²⁹		9 EAG States	284
AHS 2010-2011 ³⁰		9 EAG States	284
RSoC			
RSoC 2013-2014 ⁸	Union Ministry of Women and Child Development with technical and financial assistance from UNICEF, India ³¹	28 States and 1 UT	-

[^]Report out for 21 States. -, data not available on the number of districts covered; NNMB, National Nutrition Monitoring Bureau; NFHS, National Family Health Survey; DLHS, District Level Household Survey; RSoC, Rapid Survey on Children; AHS, Annual Health Survey; AHS CAB, Annual Health Survey Clinical, Anthropometric and Biochemical; EAG, Empowered Action Group; ICMR, Indian Council of Medical Research; UTs, Union Territories; UNICEF, United Nations Children's Fund

survey has not covered the population health-related indicators pertaining to maternal and child health.

In 1992-1993, NFHS-1 was conducted²³. The three subsequent rounds of NFHS were carried in five to nine years intervals. The period of NFHS-2 survey coincides with DLHS-1, both carried out during 1998-1999 and subsequent rounds of both conducted in propinquity with an interval of four-five years for DLHS. Three rounds of AHS survey were conducted at regular intervals (2010-2011, 2011-2012 and 2012-2013)²⁷⁻²⁹ covering the nine empowered action group (EAG) States. The most recent was the RSoC

survey conducted in 2013-2014⁸. The first CNNS was conducted in 2012 in Maharashtra¹⁰.

States & districts covered

The NNMB surveys have been carried out mainly in 10 representative States. The others surveys such as NFHS, DLHS and RSoC have been conducted in more number of States providing national-level data except for AHS that is implemented only in the nine EAG States and complements the DLHS data. CNNS has been carried out in two States till date, *i.e.* Maharashtra and Gujarat. Interim reports have been released and

final reports are awaited. The number of households covered by AHS is much greater than that of DLHS surveys and it provides more robust estimates at the district level.

Comparison of nutrition & health-related themes & indicators in the recent national nutrition surveys of India

The key themes and indicators related to nutrition and health from fact sheets of the most recent national nutrition surveys [*i.e.* NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵, RSoC 2013-2014⁸, AHS 2012-2013²⁸ and AHS CAB 2014³³] in India have been summarized in Table II.

Households using iodized salt

While NFHS-4 (2015-2016)³² and RSoC 2013-2014⁸ listed the indicator households using iodized salt and adequately iodized salt under the heading 'Population and household profile' and 'Household characteristics (%)', respectively, DLHS-4 (2012-2013)⁵ provided a separate heading for iodized salt use in households (%). AHS gave this information in its CAB factsheets without any specific heading³³.

Infant & child mortality rates

The indicators infant mortality rate (IMR) and under-five mortality rate (U5MR) have been mentioned under the heading 'Infant and child mortality rates' (per 1000 live births) by NFHS-4 (2015-2016)³². DLHS-4 (2012-2013)⁵ used the heading mortality for listing IMR, neonatal mortality rate and U5MR. RSoC (2013-2014)⁸ and DLHS-4 (2012-2013)⁵ did not capture this information.

Maternity care/antenatal care (ANC)

In NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵, RSoC 2013-2014⁸ and AHS 2012-2013²⁸ the headings 'Maternity care (for last birth in the five years before the survey)', 'Antenatal care (ANC, women who had last live/stillbirth during reference period) (%)', 'Women who had live-birth in 35 months before survey by specific maternal health care (%)' and 'ANC', respectively, have been used for listing indicators related to antenatal check-up in the first trimester, number of ANC visits, consumption of ≥ 100 iron and folic acid (IFA) tablets/syrup during pregnancy and full ANC. RSoC 2013-2014⁸ used three sub-headings pre-natal care, natal care and post-natal check-up (PNC) under this main heading. In addition, DLHS-4 (2012-2013)⁵ and AHS 2012-2013²⁸ used the indicator

for collecting information on receipt of any antenatal check-up by pregnant women. RSoC 2013-2014⁸ has used two separate indicators for collecting information on "Registered pregnancies and mothers receiving mother and child protection (MCP) at the time of pregnancy registration", while NFHS-4 (2015-2016)³² has used only one indicator *i.e.* registered pregnancies for which MCP card received.

Information related to protection against neonatal tetanus has been asked in different ways in all these surveys. In NFHS-4 (2015-2016)³² this information was collected under 'Protection of last birth against neonatal tetanus'. DLHS-4 (2012-2013)⁵ provided this information under 'Pregnant women who had at least one tetanus toxoid (TT) injection', RSoC 2013-2014⁸ under 'Received two or more TT injections' and AHS 2012-2013²⁸ used 'Mothers who received at least one TT injection'. DLHS-4 (2012-2013)⁵ and AHS 2012-2013²⁸ also included information on blood pressure (BP) measurement and blood test for haemoglobin (Hb). RSoC 2013-2014⁸ has included information on institutional delivery and delivery by skilled health provider under the sub-heading natal care.

Delivery care: NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and AHS 2012-2013²⁸ used the headings 'Delivery care (for births in the five years before the survey)', 'Delivery care (women who had live/stillbirth during reference period) (%)' and 'Delivery care', respectively, for collecting information pertaining to institutional births, delivery in public facility and government health institutions and private institutions. In addition, NFHS-4 (2015-2016)³² and DLHS-4 (2012-2013)⁵ mentioned about births attended by skilled health personnel. Only AHS 2012-2013²⁸ mentioned about the indicator 'Safe delivery'. Information on caesarean deliveries was collected only by NFHS-4 (2015-2016)³² and AHS 2012-2013²⁸. The indicator 'Out-of-pocket expenditure per delivery in public health facility (₹ in 000+)' has been mentioned under this heading by DLHS-4 (2012-2013)⁵, whereas NFHS-4 (2015-2016)³² mentioned this indicator under the heading maternity care.

Post-natal care (PNC): This heading has only been used by AHS 2012-2013²⁸ unlike other surveys which have included this information mostly in the heading maternity care/ANC. AHS 2012-2013²⁸ has listed indicators related to mothers receiving PNC within 48 h of delivery, mothers who did not receive any PNC

Table II. Comparison of key themes and indicators pertaining to nutrition and health listed under the national nutrition surveys

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoc 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Key theme	Population and household profile/characteristics (%)				
Indicators:					
Iodized salt	√	√	√		√
Key theme	Infant and child mortality rates				
Indicators:					
IMR	√			√	
Neonatal mortality rate				√	
Under-five mortality rate	√			√	
Key theme	Maternity care/antenatal care (%)				
Indicators:					
Antenatal check-up in the first trimester	√	√	√	√	
At least four antenatal care visits	√		√ (4 or more)		
Received three or more antenatal care		√	√	√	
Received any antenatal check-up/at least one ante-natal check-up		√	√	√	
Full antenatal care	√	√	√	√	
Protection of last birth against neonatal tetanus/at least one TT injection	√	√		√	
Received two or more TT injections			√		
Consumption of iron folic acid tablets/syrup for 100 days or more	√	√	√	√	
Registered pregnancies for which mother and child protection card received	√		√		
Registered pregnancy			√		
Mothers who received ANC from government source				√	
Pregnant women whose BP taken		√		√	
Pregnant women who had blood tested (Hb)		√		√	
Institutional delivery			√		
Delivered by skilled health provider			√		
Availed benefit from national programme for safe motherhood					
JSY	√		√		
JSSK			√		
Both JSY and JSSK			√		
Post-natal care received by doctor/nurse/LHV/ANM/midwife/other health personnel within two days of delivery	√				
Average out-of-pocket expenditure per delivery in public health facility (₹)	√				
Children born at home who were taken to a health facility for check-up within 24 h of birth	√				
Children who received a health check after birth from a doctor/nurse/LHV/ANM/midwife/other health personnel within two days of birth	√				

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoc 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Key theme	Delivery care (%)				
Indicators:					
Institutional births/delivery	√	√		√	
Institutional births in public facility	√				
Home delivery conducted by skilled health personnel (out of total deliveries)	√				
Delivery at government health institutions		√		√	
Delivery at private health institutions		√		√	
Delivery at home		√		√	
Delivery at home conducted by skilled health personnel		√		√	
Births assisted by a skilled health personnel or doctor/ nurse/LHV/ANM/other health personnel	√	√			
Safe delivery				√	
Births delivered by caesarean section	√				
Births in a private health facility delivered by caesarean section	√				
Births in a public health facility delivered by caesarean section					
Caesarean out of total delivery taken place in Government Institutions		√		√	
Caesarean out of total delivery taken place in private institutions		√		√	
Out-of-pocket expenditure per delivery in public health facility (₹)		√			
Key theme	Post-natal care (%)				
Indicators:					
Mothers who received post-natal check-up within 48 h of delivery		√	√	√	
Mothers who did not receive any post-natal check-up				√	
New-borns who were checked up within 24 h of birth			√	√	
Key theme	JSY (%)				
Indicators					
Home delivery		√			
Institutional delivery		√			
Mothers who availed financial assistance for delivery under JSY				√	
Mothers who availed financial assistance for institutional delivery under JSY				√	
Mothers who availed financial assistance for Government Institutional delivery under JSY				√	
Key theme	Child immunization and supplementation (%)				
Indicators:					
Fully immunized/received full vaccination	√	√	√	√	
Received BCG	√	√		√	
Received three doses of polio vaccine	√	√		√	

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoC 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Received polio dose at birth				√	
Received three doses of DPT vaccine	√	√	√	√	
Received measles vaccine	√	√		√	
Received first dose of measles vaccine			√		
Received three doses of Hepatitis B vaccine	√				
Did not receive any vaccination		√	√	√	
Having MCP/immunization card			√		
Received a vitamin A dose in last six months	√				
Received at least one dose of vitamin A supplement in last six months		√		√	
Received IFA tablets/syrup during last three/six months			√	√	
Received most of the vaccinations in public health facility	√				
Received most of the vaccinations in private health facility	√		√		
Whose birth weight was taken				√	
Children with birth weight less than 2.5 kg				√	
Key theme	Childhood diseases and morbidity (%)				
Indicators:					
Prevalence of diarrhoea (reported) in the last two weeks/last 15 days preceding the survey	√	√	√		
For whom advice or treatment was sought		√	√		
Children suffering from diarrhoea				√	
Children with diarrhoea in the last two weeks who received ORS	√	√			
Children with diarrhoea given ORS including HAF			√	√	
ORS and zinc					
Children with diarrhoea in the last two weeks who received zinc	√				
Children with diarrhoea in the last two weeks given zinc along with ORS		√			
Children with diarrhoea in the last two weeks taken to a health facility	√				
Prevalence of symptoms of ARI in the last two weeks preceding the survey	√	√			
Had fever in 15 days before survey			√		
Given anti-malarial drug during fever			√		
Children with fever or symptoms of ARI in the last two weeks preceding the survey taken to a health facility	√				
Children with ARI or fever in the last two weeks and sought advice/treatment		√			
Had symptoms of ARI in 15 days prior to survey			√		
For whom advice or treatment was sought			√		
Children suffering from ARI				√	

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoC 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Children suffering from ARI who sought treatment				√	
Key theme	Breastfeeding (%)				
Indicators:					
Children breastfed within one hour of birth				√	
Children (aged 6-35 months) exclusively breastfed for at least six months				√	
Key theme	Nutritional status of children below five years (%)				
Indicators:					
Children who are wasted (weight for height- below 2 SD)		√	√		√
Children who are severely wasted (weight for height- below 3 SD)		√	√		√
Children who are stunted (height for age- below 2 SD)		√	√		√
Children who are severely stunted (height for age - below 3 SD)		√	√		√
Children who are underweight (weight for age - below 2SD)		√	√		√
Children who are severely underweight (weight for age -below 3SD)		√	√		√
Children who are undernourished (BMI for age below -2SD)					√
Children who are undernourished (BMI for age below -3SD)					√
Children who are over-nourished (BMI for age above 2SD)					√
Children who are over-nourished (BMI for age above 3SD)					√
Key theme	Infant and young child feeding practices (%)				
Indicators:					
Children under age three years breastfed within one hour of birth	√	√			
Children aged 0-23 months breastfed immediately/ within an hour of birth			√		
Children under age six months exclusively breastfed	√	√	√		
Children age 6-8 months receiving solid or semi-solid food and breast milk	√				
Children age 6-9 months receiving solid/semi-solid food and breast milk		√			
Children aged 6-8 months who were fed complementary foods			√		
Breastfeeding children age 6-23 months receiving an adequate diet	√				
Non-breastfeeding children age 6-23 months receiving an adequate diet	√				
Total children age 6-23 months receiving an adequate diet	√				

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoc 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Children age 12-23 months receiving breastfeeding along with complementary feeding		√			
Breastfed children (6-23 months) fed a minimum number of times			√		
Breastfed children (6-23 months) had a minimum dietary diversity			√		
Children under five years who are stunted (height-for-age)	√				
Children under five years who are wasted (weight-for-height)	√				
Children under five years who are severely wasted (weight-for-height)	√				
Children under five years who are underweight (weight-for-age)	√				
Key theme	Micronutrient and deworming (%)				
Indicators:					
Percentage of children aged 6-59 months received in six months before survey vitamin A dose			√		
Percentage of children aged 6-59 months received in six months before survey IFA supplement			√		
Percentage of children aged 6-59 months received in six months before survey deworming medication			√		
Key theme	Birth weight (%) (age below 36 months)				
Indicators:					
Children weighed at birth		√			
Children weighed with 24 h of birth			√		
Children with low birth weight (out of those who weighed below 2.5 kg)		√	√		
Key theme	Nutritional status of adolescent girls (10-19 yr) and children 5-18 yr (%)				
Indicators:					
Girls aged 15-18 whose BMI was less than 18.5 (low weight)			√		
Girls aged 15-18 whose BMI was more than 25 (overweight)			√		
Children 5-18 yr who are undernourished (BMI for age below -2SD)					√
Children 5-18 yr who are undernourished (BMI for age below -3SD)					√
Children 5-18 yr who are undernourished (BMI for age above 2SD)					√
Children 5-18 yr who are undernourished (BMI for age above 3SD)					√
Key theme	Nutritional status of adults (age 15-49 yr)/males and females and person 18 yr and above (%)				
Indicators:					
Women (15-49 yr) whose BMI is below normal (BMI <18.5 kg/m ²)	√				

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoc 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Men (15-49 yr) whose BMI is below normal (BMI <18.5 kg/m ²)	√				
Women (15-49 yr) who are overweight or obese (BMI ≥25.0 kg/m ²)	√				
Men (15-49 yr) who are overweight or obese (BMI ≥25.0 kg/m ²)	√				
BMI ≥25.0 kg/m ² for age 18-59 yr					√
BMI ≥25.0 kg/m ² for age ≥60 yr					√
BMI ≥30.0 kg/m ² for age 18-59 yr					√
BMI ≥30.0 kg/m ² for age ≥60 yr					√
BMI <18.5 kg/m ² for age 18-59 yr					√
BMI <18.5 kg/m ² for age ≥60 yr					√
Key theme	Anaemia among children and adults				
Indicators:					
Children age 6-59 months who are anaemic (<11.0 g/dl)	√				
Children (6-59 months) having anaemia		√			√
Children (6-59 months) having severe anaemia		√			√
Children (6-14 yr) having anaemia - male		√			
Children (6-14 yr) having severe anaemia - male		√			
Children (6-14 yr) having anaemia - female		√			
Children (6-14 yr) having severe anaemia - female		√			
Anaemia in the age group 10-17 yr					√
Severe anaemia in the age group 10-17 yr					√
Children (10-19 yr) having anaemia- male		√			
Children (10-19 yr) having severe anaemia - male		√			
Children (10-19 yr) having anaemia - female		√			
Children (10-19 yr) having severe anaemia - female		√			
Adolescents (15-19 yr) having anaemia		√			
Adolescents (15-19 yr) having severe anaemia		√			
Non-pregnant women age 15-49 yr who are anaemic (<12.0 g/dl)	√				
Pregnant women age 15-49 yr who are anaemic (<11.0 g/dl)	√				
Pregnant women (15-49 age) having anaemia		√			
Pregnant women (15-49 age) having severe anaemia		√			
Women (15-49 age) having anaemia		√			
Women (15-49 age) having severe anaemia		√			
All women age 15-49 yr who are anaemic	√				
Mean age 15-49 yr who are anaemic (<13.0 g/dl)	√				
Anaemia in the age group 18-59 yr (%)					√
Severe anaemia in the age group 18-59 yr					√
Persons (20 yr and above) having anaemia		√			
Persons (20 yr and above) having severe anaemia		√			

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoC 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Anaemia in the age group 60 yr and above					√
Severe anaemia in the age group 60 yr and above					√
Key theme	Blood sugar level among adults (age 15-49 yr)/blood sugar level (age 18 yr and above) (%)				
Indicators:					
Blood sugar level in women - high (>140 mg/dl)	√				
Blood sugar level in women - very high (>160 mg/dl)	√				
Blood sugar level in men - high (>140 mg/dl)	√				
Blood sugar level in men - very high (>160 mg/dl)	√				
Blood sugar level >140 mg/dl (high)		√			
Blood sugar level >160 mg/dl (very high)		√			
Blood sugar level ≥110 mg/dl (%) (for men and women)					√
Blood sugar level ≥130 mg/dl (%) (for men and women)					√
Blood sugar level ≥150 mg/dl (%) (for men and women)					√
Key theme	Hypertension among adults (women and men) (age 15-49 yr)/hypertension (18 yr and above)				
Indicators:					
Slightly above normal (systolic 140-159 mm Hg and/or diastolic 90-99 mmHg)	√				
Above normal range (systolic >140 mmHg and diastolic >90 mmHg)		√			
Systolic ≥140 mmHg and diastolic ≥90 mmHg					√
Systolic ≥140 mmHg and diastolic <90 mmHg					√
Systolic <140 mmHg and diastolic ≥90 mmHg					√
Moderately high (systolic 160-179 mmHg and/or diastolic 100-109 mmHg)	√				
Systolic ≥160 mmHg and diastolic ≥100 mmHg (%)					√
Systolic ≥160 mmHg and diastolic <100 mmHg					√
Systolic <160 mmHg and diastolic ≥100 mmHg					√
Moderately high (systolic >160 mmHg and diastolic >100 mmHg)		√			
Very high (systolic ≥180 mmHg and/or diastolic ≥110 mmHg)	√				
Systolic ≥180 mmHg and diastolic ≥110 mmHg					√
Systolic ≥180 mmHg and diastolic <110 mmHg					√
Systolic <180 mmHg and diastolic ≥110 mmHg					√
Very high (systolic >180 mmHg and diastolic >110 mmHg)		√			

Contd...

Surveys	NFHS-4 (2015-2016) ³²	DLHS-4 (2012-2013) ⁵	RSoC 2013-2014 ⁸	AHS 2012-2013 ²⁸	AHS CAB 2014 ³³
Others			In addition, RSoC has also covered indicators on awareness and use of ICDS services		
<p>[^]DLHS-4 reference period is from 1-1-2008 to survey date. NFHS-4, National Family Health Survey-4 (2015-2016); DLHS-4, District Level Household Survey-4 (2012-2013); RSoC 2013-2014, Rapid Survey on Children 2013-2014; AHS 2012-2013, Annual Health Survey 2012-2013; AHS CAB 2014, Annual Health Survey Clinical Anthropometric and Biochemical 2014; ppm, parts per million; JSY, <i>Janani Suraksha Yojana</i>; JSSK, <i>Janani Shishu Suraksha Karyakrama</i>; TT, tetanus toxoid; BP, blood pressure; IFA, iron and folic acid; ORS, oral rehydration salts; HAF, home available fluids; ARI, acute respiratory infection; BMI, body mass index; ICDS, Integrated Child Development Services; IMR, infant mortality rate; Hb, haemoglobin; ANC, antenatal care; LHV, lady health visitor; ANM, auxiliary nurse midwife; SD, standard deviation; DPT, diphtheria, pertussis and tetanus; BCG, Bacillus Calmette Guerin; MCP, Mother and Child Protection card</p>					

and new-borns who were checked up within 24 h of birth.

Janani Suraksha Yojana (JSY) benefits: DLHS-4 (2012-2013)⁵ and AHS 2012-2013²⁸ have listed indicators related to JSY under a separate heading, whereas NFHS-4 (2015-2016)³² and RSoC 2013-2014⁸ have collected this information under the heading maternity care/ANC. The indicators used in DLHS-4 (2012-2013)⁵ intended to collect information on percentage of women who used JSY benefits for home and institutional delivery. AHS 2012-2013²⁸ provided information related to mothers availing financial assistance for delivery, institutional delivery and government institutional delivery under JSY.

Immunization & supplementation

NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵, RSoC 2013-2014⁸ and AHS 2012-2013²⁸ have all collected this information under headings 'Child immunizations and vitamin A supplementation', 'Child immunization (%) (children aged 12-23 months)', 'Immunization (percentage of children aged 12-23 months)' and 'Immunization, vitamin A and iron supplementation, and birth weight', respectively. RSoC 2013-2014⁸ is the only survey which has listed 'Having Mother and Child Protection (MCP) card /immunization card' under this heading. NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and AHS 2012-2013²⁸ have also included indicators on receipt of BCG vaccine and three doses of polio (AHS has asked about polio dose at birth also). NFHS-4 (2015-2016)³² has also listed the percentage of children who received three doses

of hepatitis B vaccine, and AHS 2012-2013²⁸ has listed the percentage of children who received no immunization. All three surveys provided information about vitamin A supplementation, but the age groups covered by all three differ. The indicators use the age group 9-59 months [NFHS-4 (2015-2016)³²], 9-35 months [DLHS-4 (2012-2013)⁵] and 6-35 months (AHS 2012-2013²⁸) to find out receipt of vitamin A dose in the last six months. NFHS-4 (2015-2016)³² has also provided information about children age 12-23 months who received most of the vaccinations in public and private health facility. AHS has included indicators pertaining to children (aged 6-35 months) receiving IFA tablets/syrup during the last three months, children whose birth weight was taken and those who weighed <2.5 kg.

Childhood diseases/morbidity

Diarrhoea

The headings used to collect information on diarrhoea by NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵, RSoC 2013-2014⁸ and AHS 2012-2013²⁸ were 'Treatment of childhood diseases (children under age five years)', 'Treatment of childhood diseases (based on last two surviving children born during the reference period) (%)', 'Morbidity-percentage of children aged 0-59 months (%)' and 'Childhood diseases', respectively. Information related to the prevalence of diarrhoea in the last two weeks and about children with diarrhoea in the last two weeks who received oral rehydration salts (ORS) was collected by all these surveys.

Acute respiratory infection (ARI)

NFHS-4 (2015-2016)³² and DLHS-4 (2012-2013)⁵ have listed indicators which give information about prevalence of symptoms of ARI³² and prevalence of ARI⁵ in the last two weeks preceding the survey and children with fever or symptoms of ARI in the last two weeks preceding the survey taken to a health facility³² and children with ARI or fever in last two weeks who sought advice/treatment⁵. AHS 2012-2013²⁸ mentioned about children suffering from ARI and those suffering with ARI who sought treatment.

Nutritional status of children

The height and weight of children of the following age groups have been measured: less than five years [NFHS-4 (2015-2016)³²], more than or equal to one month [DLHS-4 (2012-2013)]⁵ and AHS [2012-2013]²⁸; 5-59 months (AHS CAB 2014³³) and 0-4 yr (RSoC 2013-2014⁸). All three cover wasting, stunting and underweight below -2 standard deviation (-2SD) and -3SD, respectively. In addition, AHS CAB³³ provided information on body mass index (BMI) for age: undernourished (below -2SD and -3SD, respectively) and overnourished (above -2SD and -3SD, respectively).

Infant feeding practices

The DLHS-4 (2012-2013)⁵ and RSoC 2013-2014⁸ provided information on infant feeding practices under 'Child feeding practices (based on last-born child in the reference period) (%)' and 'Infant and young child feeding practices (%)'. As mentioned above, NFHS-4 (2015-2016)²⁷ used one heading to give details about infant feeding practices and their nutritional status. NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and RSoC 2013-2014⁸ used different age groups when asking information about breastfeeding immediately/within an hour of birth: children under three years^{5,32} and children aged 0-23 months⁸. Information on exclusive breastfeeding in children under age six months³² and children aged 0-5 months^{5,8} has been collected by all three surveys. Details asked about complementary feeding include children age 6-8 months³² and 6-9 months⁵ receiving solid or semi-solid food and breast milk and children aged 6-8 months who were fed complementary foods⁸. NFHS-4 (2015-2016)³² has also listed breastfed, non-breastfed and total children age 6-23 months receiving an adequate diet. DLHS-4 (2012-2013)⁵ has used the indicator children aged 12-23 months receiving breastfeeding along with complementary feeding

(includes infant food, tinned powdered or fresh animal milk, fruit juice, tea/coffee or other liquid). RSoC 2013-2014⁸ has included information on breastfed children (6-23 months) who are fed a minimum number of times and have a minimum dietary diversity (and included their specifications in the footnotes in the State Report). NFHS-4 (2015-2016)³² has also listed indicators related to stunting, wasting, severe wasting and underweight in children less than five years.

Micronutrient & deworming

RSoC 2013-2014⁸ has used a separate heading to list percentage of children aged 6-59 months who received in six months before the survey: vitamin A dose, IFA supplement and deworming medication.

Birth weight

DLHS-4 (2012-2013)⁵ and RSoC 2013-2014⁸ have used the headings 'Birth weight (%) (age below 36 months)' and 'Birth weight (percentage of children aged 0-35 months)' to give details about: percentage of children weighed at birth⁵ and within 24 h of birth⁸ and percentage of children with low birth weight (out of those who weighed below 2.5 kg).

Nutritional status of children above five years & adolescents

RSoC 2013-2014⁸ provided information if the BMI of adolescent girls (15-18 yr) was below or above 18.5 kg/m² (although measurement of height and weight was done for adolescent girls 10-18 yr), whereas AHS CAB³³ gave details for BMI for age for all children aged 5-18 yr (whether BMI below -2SD or -3SD or above +2SD or +3SD).

Nutritional status of adults

NFHS-4 (2015-2016)³² has covered the age group 15-49 yr, and AHS CAB 2014³³ has covered the age group 18 yr and above. NFHS-4 (2015-2016)³² provided information about women and men whose BMI was below normal (BMI <18.5 kg/m²) or those who were overweight or obese (BMI ≥25.0 kg/m²). AHS CAB 2014³³ gave information for age groups 18-59 yr and age 60 and above whose BMI was <18.5, ≥25 and ≥30.

Anaemia among children & adults

NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and AHS CAB 2014³³ have used the headings 'Anaemia among children and adults', 'Anaemia status by Hb level (%) (based on CAB tests)' and 'Anaemia status by Hb level' respectively. NFHS-4 (2015-2016)³²

has given information about anaemic children aged 6-59 months (<11.0 g/dl Hb), non-pregnant women aged 15-49 yr (<12.0 g/dl Hb), pregnant women aged 15-49 yr (<11.0 g/dl Hb) and all women and men (<13.0 g/dl) aged 15-49 yr. DLHS-4 (2012-2013)⁵ listed children (6-59 months), children aged 6-14 yr (both males and females), children aged 10-19 yr (both males and females), adolescents (15-19 yr), pregnant women (15-49 yr), women aged 15-49 yr and persons (20 yr and above) having anaemia and severe anaemia. AHS CAB 2014³³ has given information about age groups 6-59 months, 5-9, 10-17, 18-59, 60 yr and above having anaemia and severe anaemia.

Blood sugar level in adults

NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and AHS CAB 2014³³ provided information under the headings 'Blood sugar level among adults (age 15-49 yr)', 'Blood sugar level (age 18 yr and above) (%) (based on CAB tests)' and 'Blood sugar level (18 yr and above)'. NFHS-4 (2015-2016)³² and DLHS-4 (2012-2013)⁵ used different age groups: 15-49 yr³² (NFHS) and 18 yr and above⁵ but the same cut-offs (high: >140 mg/dl and very high: >160 mg/dl) for blood sugar. AHS CAB 2014³³ used the cut-off ≥ 110 , ≥ 130 and ≥ 150 mg/dl to calculate blood sugar for people 18 yr and above.

Hypertension in adults

The headings used by NFHS-4 (2015-2016)³², DLHS-4 (2012-2013)⁵ and AHS CAB 2014³³ were 'Hypertension among adults (women and men) (age 15-49 yr)', 'Hypertension (%) (based on CAB tests)' and 'Hypertension (18 yr and above)', respectively, with different cut-offs (Table II).

The Biomarker Schedule in NFHS included measurements such as height, weight and estimation of Hb levels of children; whereas for adults [women (15-49 yr), men (15-54 yr)], measurements included height, weight, BP, estimation of Hb and random blood glucose levels³².

Way forward

These national surveys are a great reservoir of information and some of these surveys generate information on the same indicators. As a great deal of resources are involved in conducting these surveys, designing and implementing one comprehensive survey that provides information on all the important and relevant indicators and generate large data can be considered with timely provision of the findings so that

it can be used to improve the health and nutritional status of the population.

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