

NATIONAL FAMILY HEALTH SURVEY 2019-20

NFHS-5

DATA QUALITY ASSURANCE AND QUALITY CONTROL MECHANISMS

2019-20



(स्थापना / Established in 1956)
बेहतर भविष्य के लिए क्षमता निर्माण
Capacity Building for a Better Future

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Background of NFHS

The National Family Health Survey (NFHS) in India was initiated in the early 1990s with the first NFHS being conducted in 1992-93. Since then, India has successfully completed four rounds - NFHS-2 in 1998-99, NFHS-3 in 2005-06 and NFHS-4 in 2015-16. All four rounds of the survey were conducted under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India, with the International Institute for Population Sciences (IIPS), Mumbai, as the nodal agency and technical assistance provided by the United States Agency for International Development (USAID) through ICF Macro (now called ICF)¹. USAID has been the primary funder for the NFHS surveys, but in the two most recent surveys (NFHS-3 and NFHS-4), other development partners, such as DFID, the Bill and Melinda Gates Foundation, UNICEF, UNFPA, and the MacArthur Foundation, as well as the Government of India, also supported the surveys in a major way. The main objectives of the NFHS programme have been to strengthen India's demographic and health database by providing information that is both reliable and relied upon; to strengthen the survey research capabilities of Indian institutions to provide, analyse, and disseminate high quality data; and to anticipate and meet the country's needs for data on emerging health and family welfare issues.

The contents of previous rounds of NFHS are generally retained and additional components are added from one round to another. The main objective of each successive round of the NFHS has been to provide essential data on health and family welfare and emerging issues in this area. NFHS data are also useful in setting benchmarks and examining progress in the health sector the country has made over time. Besides providing evidence for the effectiveness of ongoing programmes, the data from NFHS help in identifying the need for new programmes with an area specific focus.

In 2019-20, India will implement the fifth round of the National Family Health Survey (NFHS-5). Like its predecessors, NFHS-5 will be conducted under the stewardship of the Ministry of Health and Family Welfare, coordinated by the International Institute for Population Sciences, Mumbai, and implemented by a group of survey organizations and Population Research Centres, selected following a rigorous selection procedure. Technical assistance for NFHS-5 will be provided by ICF, USA, with financial support from USAID.

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¹ICF International implements the USAID-supported MEASURE DHS Project, and has the experience of providing technical assistance to more than 300 surveys in more than 90 countries.

NFHS being a nationwide large-scale survey is of huge magnitude and requires detailed planning and careful implementation for it to be a success. The survey is a long process that involves many stages including:

1. Project planning and management covering preparation of the project proposal, budget, formation of various committees, etc.
2. Development, pretesting, finalization, and translation of survey instruments including CAPI programs and other documents such as forms manuals, etc.
3. Sample design, selection of Primary Sampling Units (PSUs), household mapping and listing, and sample household selection
4. Recruitment of project staff and selection of Field Agencies (FAs)
5. Procurement and distribution of supplies and equipment
6. Training of personnel for all aspects of the survey
7. Prepare fieldwork implementation protocols and streamline other field arrangements to minimize non-sampling errors
8. Preparation of protocols for planning, monitoring and implementation of the survey. Development of quality check procedures like back checks, field check tables, etc. for all aspects of the survey
9. Development of a tabulation plan for national and state reports, as well as national, state, and district fact sheets
10. Production of data sets and tables
11. Dissemination of survey results
12. Release of publications and data sets for public use through various websites.

Project Planning and Management

For all rounds of NFHS, decisions about policies and procedures are generally reviewed by four project committees, namely a Steering Committee (SC) under the chairmanship of the Secretary of Health and Family Welfare, a Project Management Committee (PMC) under the chairmanship of the Additional Secretary and Mission Director (ASMD), a Financial Management Committee (FMC) under the chairmanship of the Additional Secretary and Financial Advisor, and a Technical Advisory Committee (TAC) under the chairmanship of a person recommended by the Secretary, Department of Health and Family Welfare. These Committees include representatives of MoHFW and other Ministries of the Government of India, such as Statistics and Plan Implementation and Women and Child Development, as well as CSO, NSSO, ICMR, NACO, the Development Partners, IIPS, ICF and individual experts in population, health and gender.

NFHS is usually conducted in all the states/union territories of India, and key survey indicators are estimated at the national and state levels. From the fourth round onwards, estimates are also

available at the district level. Interviews are administered to eligible respondents, comprising of household respondents and all eligible women and men.

Development, Pretesting, Finalization, and Translation of Survey Instruments and Manuals

NFHS collects information on a wide variety of indicators that assist policymakers and programme managers to formulate, implement and monitor programmes and strategies to achieve health, family welfare, and other development goals. The nodal agency (IIPS, Mumbai) is responsible for developing and finalizing the questionnaires based on advice received from key stakeholders and the Technical Advisory Committee, and also on the lessons learned from the pretest of all the questionnaires.

As indicated earlier, different types of questionnaires are developed and administered in NFHS surveys (Household Questionnaire, Woman's Questionnaire (age 15-49), Man's Questionnaire (age 15-54) and Biomarker Questionnaire). The draft questionnaires are developed based on a critical review of the contents of the questionnaires used in the most recent round of NFHS and the Demographic and Health Survey questionnaires and modules. Various steps are followed for developing and finalizing the NFHS survey instruments. All questionnaires will be translated into Hindi and all other official Indian languages.

To ensure that all persons involved in the NFHS survey understand the field protocols and the contents of the instruments, particularly the field investigators and supervisors, various manuals are prepared (Interviewer's Manual, Supervisor's Manual, Health Investigator's Manual, Household Mapping and List Manual and other manuals) are prepared. Also, fieldwork related forms, referral letters, information pamphlets, etc. are prepared for distribution during fieldwork.

All survey instruments and field procedures are pretested in the field at a suitable location. Interviewers, supervisors and health investigators who will be part of the pretest exercise are trained to implement the questionnaires and field procedures, including the clinical, anthropometric and biochemical (CAB) component. Feedback from the pretest exercise is used to finalize the questionnaires in English and Hindi. Accordingly, all the manuals are also revised and finalized for use during the main survey fieldwork.

Recruitment of project staff and selection of Field Agencies (FAs)

The vast amount of complex work associated with the NFHS surveys requires the involvement of an extensive network of persons with diverse backgrounds and expertise. The work involves management, coordination, sampling, training, fieldwork, supervision, data processing, production of tables and data sets, data analysis, report writing and dissemination of findings. These activities are handled by IIPS faculty and staff specially recruited for the project by IIPS, and ICF staff/consultants. In each round about 15 Field Agencies are chosen through a rigorous selection process to conduct the NFHS fieldwork in the different states of India. The staff

recruited by IIPS, ICF and the FAs for the survey need to have relevant qualifications and experience as specified in the NFHS proposal.

Training of personnel

Various training of trainers (ToT) workshops are held to provide training to trainers for the different aspects of the survey. The trained FA staff then provide training to the field staff recruited by them to carry out fieldwork in the states assigned to them. The training is guided by the standard survey documents to ensure that the same rigorous procedures are followed throughout the country. At the state level, in-depth training is typically conducted for at least four weeks, and only trainees that pass a test that is graded by IIPS are retained for conducting fieldwork.

Fieldwork implementation and monitoring

Protocols for fieldwork implementation and monitoring are laid down for the smooth execution of the fieldwork. Also, rigorous procedures to check data quality check are conducted throughout the course of the fieldwork. These include back checks of the questionnaires in the field, and the frequent examination of an extensive set of fieldcheck tables to detect systematic errors at the level of the interviewing teams and individual interviewers. Any problems that are detected by the fieldcheck tables can be immediately be relayed back to the Field Agencies to be addressed in a timely fashion.

Procurement and distribution of supplies and equipment

The vast quantity of equipment and supplies required to conduct interviews and various CAB measurements and tests are procured before the launch of the survey by IIPS through a stringent bidding process. All equipment and supplies purchased must meet the clear and detailed minimum requirements specified in the bidding document. IIPS also arranges for timely transportation of the equipment and supplies to different FAs before the start of the fieldwork. IIPS oversees the management, storage, maintenance and transportation of equipment and supplies throughout the fieldwork period, which is a crucial and challenging task and requires constant coordination and monitoring by IIPS with the FAs and field staff.

Sampling Design

A uniform sample design, which is representative at the national, state/union territory and district level, is adopted in each round of the survey. Each district is stratified into urban and rural areas. Each rural stratum is sub-stratified into smaller substrata which are created taking into account the village population and the percentage of the population belonging to scheduled castes and scheduled tribes (SC/ST). Within each explicit rural sampling stratum, a sample of villages is selected as sample Primary Sampling Units (PSUs); before the PSU selection, PSUs are sorted according to the literacy rate of women age 6+ years. Within each urban sampling stratum, a sample of Census Enumeration Blocks (CEBs) is selected as sample PSUs; before the PSU selection, PSUs are sorted according to the percentage of the SC/ST population. In the second stage of selection, a fixed number of 22 households per cluster is selected with an equal probability systematic selection from a newly created list of households living in the selected

PSUs. The list of households is created as a result of the mapping and household listing operation conducted in each selected PSU before the household selection in the second stage.

Sample Weights

Due to the non-proportional allocation of the sample to the different survey domains and to their urban and rural areas, sampling weights are required for any analysis using the survey data. A design weight is calculated to account for the overall selection probability of each household in the survey. The design weight is adjusted for household non-response and for individual non-response to obtain the sampling weights for households, for women, and for men, respectively. A special weight for domestic violence is calculated that accounts for the random selection of only one woman per household. A special weight is also calculated for the testing of dried blood spots to account for the test nonresponse. Each weight is normalized using two approaches yielding two versions, a national and a state weight. For national weights, the sampling weights are normalized in order to give a total number of weighted cases that equals the total number of unweighted cases at the national level, whereas for the state weights, the sampling weights are normalized in order to give a total number of weighted cases that equals the total number of unweighted cases at the state level. Normalization is done by multiplying the sampling weight by the estimated sampling fraction, calculated on the national level for national weights or on the state-level for state weights.

Non-Sampling Errors

The overall implementation plan for NFHS comprising of hiring of staff, training of personnel, etc. and strategies to monitor and supervise the fieldwork are formalized to ensure survey data quality and minimize non-sampling errors. Also, uniform fieldwork implementation protocols and other field arrangements are streamlined to minimize non-sampling errors. The design effect, standard error, relative standard error, and 95% confidence intervals for key indicators are estimated for each state and all India, as well as in urban and rural areas, and these measure are published in the reports.

The data quality control measures adopted during various stages of the project to ensure high data quality are briefly described below.

Strategies for Mapping & Listing (M&L) to Ensure Data Quality

To ensure high quality data, the mapping and household listing teams follow the protocol given below:

- The quality checks are conducted primarily by the Mapping and Listing Coordinator(s) of each Field Agency.
- The M&L operation is conducted in a phased manner by grouping 5-6 adjoining districts. The districtwise team movement plan is shared with IIPS at least two weeks in advance.
- The educational qualifications and experience of all M&L staff recruited by the FA should be as mentioned in the Request for Proposals (RFP). The minimum qualification for mappers and listers is graduation in any stream. All the educational documents of the M&L trainees are verified by the IIPS Senior Project Officer (SPO)/Project Officer (PO).
- After training, there is the provision of field practice to make mapper and listers well acquainted with the real field situation. SPO/PO/PIs of NFHS-5/Officials from MoHFW will assess the quality of data collected during field practice. If they find the performance of the mapper and lister trainees not to be up to the mark, there additional training is required.
- Continuous supervision of the household listing operation by coordinators of the FA is mandatory to ensure the quality of work.
- To assess the work done by the teams, M&L coordinator(s) of the FA have to do a complete and independent listing operation of 5 completed PSUs (randomly selected by IIPS) per district. After matching the two lists, a detailed report together with the two sets of M&L forms, after the IIPS field SPO/PO signs the documents, should be shared with IIPS highlighting the differences, if any. In the case of any major discrepancy, the whole PSU will have to be relisted. Also, if systematic errors are noticed and it is not possible to make corrections on the listing forms, the listed PSU should be relisted.
- An Excel spreadsheet containing error free listing data must be countersigned by the M & L coordinator of the FA and the IIPS SPO/ PO before being sent to the NFHS-5 office.
- To ensure the quality of data, the selection of households from the listing forms is undertaken centrally at IIPS for each PSU and provided to the FA along with the necessary household details, which eliminates the chance of substitution, duplication or omission.

Strategies for Field Staff to Ensure Data Quality

To ensure high data quality, the field staff follow the protocol given below:

- Phasing the field operations into two parts, where all the states/groups of States/UTs are divided in two phases having a balanced distribution of the work load in each phase. This ensures effective management of survey implementation and stringent monitoring of the fieldwork.
- The largest states are divided into 2-3 parts and the survey is implemented in a cluster of 5-6 adjoining districts at a time to ensure effective implementation and close monitoring of the survey.
- Intensified centralized hands-on training of the trainer's (ToT) of 3 weeks' duration for the four core team members of each FA (i.e., the State Coordinator, the Demographer/Social Scientist, the IT Coordinator and the CAB Coordinator) is organized by IIPS. Further, to ensure the quality of the training, one ToT is organized for each phase and the number of participants in each ToT is limited.
- NFHS stringently follows ethical protocols at every level of data collection and processing inclusive of informed consent, the potential risks and benefits, voluntary participation, ensuring privacy and confidentiality of data.
- NFHS ensures the educational qualifications of each field investigator, which should be consistent with the criteria specified in the RFP. All the documents relating to their educational qualifications are verified by the IIPS SPO/PO before initiation of the state level training.
- The core team members of the FAs trained by IIPS in the centrally organised ToT are responsible for state level training. Training of field staff organised at the state level is for four weeks' duration with adequate emphasis on classroom teaching and field practice. All the state level training courses are closely monitored by the PIs, SPOs/POs and, where possible, an ICF Representative and Officials from MoHFW.
- Each state level training is limited to field staff required for conducting the NFHS survey for each of the 10 districts. FAs are required to conduct additional training courses if they are assigned a state having more than 10 districts.
- The field investigators and supervisor level trainees must pass a test conducted by the IIPS SPO/PO at the end of the each training at the state level before they are deployed for the actual fieldwork. To compensate for those who drop out of the training or do not make the grade, about 10-15% more trainees than are necessary for the fieldwork attend the training course.
- NFHS adheres to the protocol of maintaining gender sensitive team composition with a mix of an adequate number of male and female investigators who belong to the native state and have proficiency in the local language(s).
- Data collection through the CAPI program eliminates errors by automatically following skip patterns, filters, identification of those who are eligible for questions.
- Multi-layer monitoring of fieldwork is adopted to strengthen the data quality, including spot checks, back checks, review of field check tables and continuous supportive supervision. Results obtained on a daily basis using inbuilt CAPI programs are used to

provide continuous feedback and to adopt corrective measures on an individual and team basis for various aspects of survey implementation.

- District and state level Coordinators of the FA are required to revisit a minimum of 10% of PSUs from each district that are randomly selected by the IIPS SPO/PO.
- IIPS SPOs/POs are required to spot check and back check surveyed households in a minimum of 10% of PSUs randomly selected by the IIPS Central Office.
- The feedback obtained from the above checks is shared with investigators at field level de-briefing sessions by Core Team members of the FA, IIPS SPOs/POs, and PIs, especially at the initial stages of data collection.
- To ensure a high level of response rates, NFHS has a provision of a four-day stay in the field. Investigators must make at least 3 visits at different points of time and different days during the stay if an eligible respondent is not available in previous visits.
- A districtwise allotment of selected households in each of the selected PSUs for different clusters of 5-6 adjoining districts is made by the NFHS central office. This strategy is effective in the remote monitoring of field team movement plans from the central office.
- NFHS has developed a protocol of accessing real time data on a daily basis using the SyncCloud data streaming system. Continuous evaluation of data through field check tables and regular feedback to field teams avoids errors and improves the quality of the data.
- In addition to all the above measures to ensure data quality, NFHS has a provision to organise review meetings with the head of the FAs to maintain a high standard of data quality.

Strategies for the Team Supervisor to Ensure Data Quality

To ensure high quality data the team supervisor follows the protocol given below:

- NFHS provides training at all levels of the survey team involved in the survey, from interviewers to trainers, as well as to the central team overseeing the process. This will ensure that all involved persons are clear with regard to their role in ensuring good quality of data.
- The team supervisor plays an important by reviewing various aspects of data collection, focusing on those undertakings that are proving complex and difficult or guidelines that are not being adhered to sufficiently by interviewers.
- The main role of the supervisor is to provide feedback to the interviewers on an individual basis and to report progress and protocol adherence to the state office of the FA. He/She is also responsible for managing the supply and inventory required in the field. The supervisor is the core link between field teams and the state core team. A well trained supervisor is very helpful in collecting quality data in surveys like NFHS.
- NFHS has assigned a distinct role to supervisors in terms of planning fieldwork at the local level, checking all materials, and reporting procedures.
- NFHS evaluates the supervisors before their appointment by considering their education, experience and performance in the test conducted by IIPS.
- Each survey team has a supervisor who oversees and coordinates the work of the interviewers, as well as provides on-site training and support.
- Supervisors plan the daily work at the beginning of the work day such as allotment of selected households to each interviewer, synchronization of the data and reviewing the data quality jointly with the IIPS SPO/PO at the end of the day.
- Supervisors help to build rapport with the head of the community, PRI members and other stakeholders in the community. These relationships help minimize nonresponse and obtain reliable information from the selected respondents.
- NFHS adheres to the protocol of the centralized selection of households after completion of M&L of households and receiving verified excel spreadsheets. At the field level, the supervisors ensure the implementation of survey in the selected households and eligible respondents.
- The completed interviews are checked by the supervisor before synchronization of data to the central office.
- Pursuant to the NFHS protocol, 10% of the surveyed households are to be back checked by supervisors.

Strategies for CAB Team to Ensure Data Quality

To ensure high quality data, the CAB team follows the protocol given below:

- Training of Trainers for the CAB health investigators in NFHS is imparted by international experts having experience in CAB training across different DHS surveys.
- The protocols used for collection of CAB data have been developed as per international standards which allows comparability with other DHS surveys.
- NFHS uses standard, self-calibrating equipment having the latest technologies to ensure minimum instrument errors. The equipment used in the survey are also standardized periodically to ensure the accuracy and consistency of the measurements.
- NFHS ascertains the qualifications and experience of the health investigators for good quality CAB data. Health investigators must meet the prescribed qualifications, such as having a degree in Medical Lab Technology/B. Pharm/BUMS/BHMS/BAMS or a Diploma in Nursing (ANM/GNM) or in Medical Lab Technology (DMLT), and they should understand the investigation procedures well. All the educational documents of HIs will be verified by the IIPS SPO/PO prior to training.
- An in-depth dedicated CAB training for three weeks is given to the health investigators with adequate practice sessions in-house and in the community. The trained health investigators are integrated with the core survey team before comprehensive field practice and feedback. Before participating in the main fieldwork, health investigators must qualify with a minimum of 80% marks in a written exam conducted by IIPS at the end of the training.
- Standardization of trainers as well as health investigators is performed at different trainings and only those trainers/investigators who perform as per the required standards are allowed to be part of survey.
- The CAB investigations during fieldwork are closely monitored to ensure that health investigators obtain informed consent from respondents and follow the sample collection and biomarker measurement protocols correctly and professionally. Health coordinators of the FA, IIPS POs/SPOs, IIPS PIs, and, where possible, ICF representatives and officials from MoHFW conduct spot-checks to monitor and supervise the CAB investigations to provide timely feedback and ensure that corrective measures are taken when they are warranted. NFHS continuously strives to raise the bar of quality of CAB data by assessing the performance of each health investigator and organising debriefing sessions to bolster the technical competencies of health investigators.
- The CAB investigations are also monitored regularly with the help of field check tables generated at the FA headquarters and IIPS. The feedback from associated laboratories is also sought to ensure proper collection and transport of DBS samples. NFHS has an e-tracking system to monitor the transportation of DBS from the field to designated lab within stipulated time. The lab also provides feedback on the quality of the dried blood spots to make improvements, if necessary.
- NFHS follows strict protocols of storage, maintenance, distribution and handling of CAB equipment and consumables to ensure minimal instrumental errors.

- To minimise recording errors, all the entries of CAB investigations in the biomarker questionnaires are done jointly by the health investigators and the field investigators and are verified/ edited by the team supervisor.

Strategies Incorporated in CAPI to Ensure Data Quality

Since 2015-16, NFHS has adopted CAPI technology to conduct interviews, which helps in strengthening the data quality and saves time. CAPI software provides results in real time, which are easily exportable to Excel, CSV, SPSS, and STATA file formats. The CAPI data entry and editing program is designed with adequate checks and they follow strategies to ensure high data quality:

- Extensive training is provided to the IT coordinator of each FA, including software and hardware troubleshooting. In addition, NFHS provides remote technical support to all field teams and FA from the central office.
- The CAPI program used in NFHS has an inbuilt feature to select the appropriate language for the interviews from multiple regional languages.
- Control and management of fieldwork across the country is arranged from the central office by allotment of work to each of more than 500 teams working and accessing their progress on a real-time basis.
- An inbuilt algorithm in the CAPI program automatically handles skip patterns, filters, and eligibility for questionnaires and sections.
- The provision of synchronizing data from interviewer's CAPI to supervisor's CAPI provides an opportunity for back check of information to improve data quality.
- An inbuilt mechanism partially saves incomplete questionnaires to provide opportunities to complete the interview in multiple sessions and minimize respondent's fatigue.
- Use of SyncCloud Technology improves the data synchronization from the supervisor's CAPI instrument to the Central Office, which gives access to real-time data from any device or computer.
- The CAPI programs help in generating field check tables on key indicators on a daily basis which are reviewed by the Quality Assurance Team in the central office to allow individual level feedback to be communicated back to the teams working across different parts of the country.
- NFHS assigns a unique code to each investigator within a state, which helps in tracking the progress and performance of the investigator after individual level feedback is provided.

Strategies to Assess Non-Sampling Errors: Evidence from NFHS-4

For the first time in the NFHS series, when coverage was increased from the state to the district level, there was an increase in sample size more than fivefold. The National Statistical Commission advised IIPS to estimate the magnitude of non-sampling errors in NFHS-4 on an experimental basis in two states of India, namely Kerala and Jharkhand. For estimating the non-sampling errors, NFHS-4 selected two independent subsamples each from Kerala and Jharkhand. The estimates obtained from the two independent subsamples in each state were compared and found to be well within an acceptable limit. A brief description of the process and results is presented below:

Methodology: In order to estimate the possible extent of non-sampling errors in Kerala and Jharkhand, two independent subsamples were selected in both the states. Independent teams comprising of one supervisor, three female investigators, one male investigator, and two health investigators were assigned the job of conducting fieldwork in each of the two subsamples in each state. For example, in Kerala, Team A conducted the fieldwork in first subsample and Team B conducted the fieldwork in second subsample. The members of Team A and Team B were selected in such a way that the composition of the teams in terms of age, years of schooling, and years of fieldwork experience of the members were similar. It was also ensured that the two independent subsamples included PSUs from each district of the two states. For the main fieldwork, the districts from each state were grouped into sets of contiguous districts (usually 4-5 districts). For proper monitoring of the fieldwork, the main survey fieldwork started in first set of districts. After completion of the fieldwork in first set of districts, the teams moved to the second set of districts. While five sets of districts were formed in Jharkhand, only four sets were formed in Kerala. Thirty field teams were trained in Jharkhand and 18 were trained in Kerala.

Findings: The comparison of estimates from the two independent subsamples in Jharkhand suggests that the differences in only 11 out of 72 indicators across the two independent subsamples are statistically significant. In Kerala, the estimates from two independent subsamples were statistically different for only 7 indicators out of a total of 72 indicators. The results in each state show that there is no difference in the estimates across the two subsamples for a large majority of indicators, as would be expected from a survey with a low level of nonsampling errors.