

## Iran's Multiple Indicator Demographic and Health Survey - 2010: Study Protocol

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### ABSTRACT

**Background:** There is an international emphasis on providing timely and high quality data to monitor progress of countries toward Millennium Development Goals. Iran's Multiple Indicator Demographic and Health Survey (IrMIDHS) aimed to provide valid information on population and health outcomes to monitor progress in achieving national priorities and health programs and to assist policy makers to design effective strategies for improving health outcomes and equity in access to care.

**Methods:** A cross-sectional multi-stage stratified cluster-random survey is conducted through face-to-face household interviews. The sampling frame is developed using Iran's 2006 population and housing census. Provincial samples ranging are from a minimum of 400 households per province to 6400 households in Tehran province. Cluster size is 10 households. The target sample includes 3096 clusters: 2187 clusters in urban and 909 clusters in rural areas. IrMIDHS instruments include three questionnaires: Household questionnaire, women aged 15-54 questionnaire, children under five questionnaire, supervision and quality assessment checklists and data collection sheets and standard weight and height measurement tools for under-five children. A cascading decentralized training method is used for training data collection and supervision teams. Quality assurance procedures are defined for the five steps of conducting the survey including: Sampling, training data collection and training teams, survey implementation, data entry and analysis. A multi-layer supervision and monitoring procedure is established. All the questionnaires are double entered.

**Conclusions:** IrMIDHS will provide valuable data for policymakers in Iran. Designing and implementation of the study involve contributions from academics as well as program managers and policy makers. The collaborative nature of the study may facilitate better usage of its results.

**Keywords:** National survey, quality assurance, sampling, survey design

### INTRODUCTION

In most countries, the responses of the health systems and

resources allocated to the health needs are not appropriate.<sup>[1]</sup> Health systems responses to the challenges are “often too little, too late or too much in the wrong place”.<sup>[2]</sup> Due to limited availability and low quality of health information, this problem is more challenging in low and middle income countries.<sup>[3]</sup> Inequalities between the rich and the poor in access to services and health outcomes are important policy issues. The inequalities are often formed by factors that are controlled by sectors other than health.<sup>[2]</sup> Hence, it is acknowledged that availability of validated and properly documented information is a fundamental precondition to reduce health inequities.<sup>[4,5]</sup>

Further, there is an international emphasis on providing timely and high-quality data to monitor the progress of countries toward goals emerging from the international agreements: The Millennium Development Goals (MDGs). MDGs are eight development goals aimed at eradicating extreme poverty, reducing child and maternal mortality, combating important disease epidemics and establishing a global partnership for development.<sup>[6]</sup> Furthermore, national development goals may rely on good quality data. In the Islamic Republic of Iran, the 5-year development plans require clear indicators and information to monitor national and provincial progress.

The Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) are internationally accepted household surveys designed to gather the demographic, socio-economic and health information. These surveys would serve as standard tools to monitor progress towards the health-related MDGs.<sup>[7]</sup>

In 2000-2001, the first health and demographic survey of Iran is conducted by the Ministry of Health and Medical Education (MoHME) with the collaboration of the Statistical Center of Iran (SCI).<sup>[8]</sup> During the last decade, results of this survey served as a baseline data in many decision making in health sector.<sup>[9-14]</sup>

The data also helped to promote equity issues in health outcomes around the country.

For example findings of DHS 2000 suggested that socio-economic inequality in infant mortality favors the better-off in Iran as a whole and in most of its provinces and this inequality varies between provinces.<sup>[11]</sup> Given rapid changes in factors influencing health status and the need

for updating health sector policy, the Iranian MoHME commissioned the National Institute of Health Research (NIHR) to conduct a large national household survey under the supervision of the MoHME's Deputy for Health. Furthermore collaborations are sought from international and national partners including the United Nations Population Fund (UNFPA), the United Nations Children's Fund (UNICEF) and the SCI. The study is named as Iran's Multiple Indicator Demographic and Health Survey (IrMIDHS).

NIHR is identified as implementing agency of this survey based its mission and capacity to develop and apply an appropriate infrastructure with regard to population-based surveys. This is also in line with the NIHR mandate to coordinate, support and assess the national efforts to promote evidence based decision making in the health sector.

## OBJECTIVES

IrMIDHS is a national household survey developed to provide valid, internationally comparable information on population and health related issues in Iran. The primary objectives of the IrMIDHS are:

1. To provide rigorous data on health and population at the national and provincial levels for assessing a range of social indicators and their influences on health, especially on children and women situation in Iran;
2. To provide data needed for monitoring progress toward goals established national plans and priorities and the MDGs.
3. To assist policy makers and program managers to design effective strategies to promote health outcomes and equity in access to health care in Iran.

## METHODS

### Design

A cross-sectional multi-stage stratified cluster-random survey through face-to-face household interviews.

### Sample size and sampling

The IrMIDHS sample is constructed to provide estimates of various demographic and health

indicators and to allow for covered the population residing in households in the 31 provinces in Iran. To obtain statistically valid estimates at 95% confidence intervals for the majority of indicators, the sample is calculated based on the indicator of cigarette smoking among women, as a less frequent behavior, using the following formula.<sup>[15]</sup>

$$n_{clu= n_{SRS}} (1 + (M - 1)\rho)$$

Where

- $n_{clu}$  is the required sample size in cluster sampling
- $n_{SRS}$  is required sample size in simple random sampling
- $(1 + (M - 1)\rho)$  is the design effect.

The population size considerably varies across different provinces of Iran.<sup>[16]</sup> First the share of the sample for each province is determined. Hence, the proportion of sample allocated to each province is different. Then sampling is conducted proportional to population size in each district within each province. In addition, the samples are weighted to reflect the population size of rural and urban areas in each district. Then in each district a random sample of “clusters” are selected according to the allocated sample size for rural and urban households in each district. The cluster size is set at 10 households.

The largest sample size is selected from Tehran province (household  $n = 6400$ ). In order to be able to draw meaningful inferences about target indicators in each of province, we increased the minimum sample size for each province to 40 clusters. As a result, a representative probability sample of 30,960 households (3096 clusters) is selected for the IrMIDHS sample [Table 1].

We followed a multi-stage stratified cluster random sampling procedure.<sup>[17]</sup> Rural and urban areas are being considered as two different strata. Random sampling of clusters is conducted at the district level to ensure appropriate distribution of clusters in the country. At the first stage 3096 clusters (2187 and 909 clusters from urban and rural areas respectively) are selected from a national master sample maintained by the Statistics Center of Iran.

The last national population and housing census constituted the sampling frame for the IrMIDHS sample selection. As this frame is 4 years out of date at the time of sampling, household listing is

updated in November 2010 for all of the selected clusters.<sup>[18]</sup> The household listing is conducted before the data collection. The updated household lists for each cluster is sent to the IrMIDHS secretariat, as a source to assess the completeness and accuracy of the data collection later on. It also provided the potential for accurate estimates of non-response rates.

As stated, the clusters in each district are identified at random. Then in each cluster, a systematic sample of 10 households is consecutively selected following a pre-defined procedure. In IrMIDHS all the household members who are permanent residents of the households (more than 6 months) are eligible for inclusion in the household members list (*de jure* approach). Household is defined as a group of persons that live under the same roof and share cooking and eating facilities. IrMIDHS did not allow substitution of non-responses by another household. Hence, all efforts are made to minimize non-response, as we describe below.

The study population includes all people living in Iran, including immigrants and refugees. All women aged 15-54 and mothers or caretaker of all children under five are eligible to be interviewed using the individual women or children under five questionnaires, respectively.

### Organizational structure and project management

The study involves an explicit management structure that involves several layers of responsibilities and activities (including study design and instrument development, project management, financial management, supervision and fieldwork procedures, recruitment and training, data-management computer software development,) as well as external supervision. Figure 1 presents the organizational structure of the study.

Internally, a total of about 240 data collection teams, 78 field supervisors, 46 provincial technical managers and 35 central supervisors are involved in the data collection phase of the study. Further a small secretariat at the NIHR steers the whole process and 20 observers from the SCI (as the external supervisory structure) visit all provinces to ensure consistency and quality of data collection. Each data collection field team consists of two interviewers (preferably female), one field

**Table 1:** Number of clusters and supervisors by province

Province	Urban clusters	Rural clusters	Total clusters	Teams	Field supervisors	Central supervisors
Ardebil	29	19	48	4	2	1
Bushehr	28	12	40	3	1	1
Chahar-Mahal and Bakhtiari	21	19	40	3	1	1
East Azerbaijan	109	50	159	12	4	1
Fars	114	65	179	15	4	2
Ghazvin	36	16	52	4	1	1
Gilan	64	49	113	9	3	1
Golestan	33	33	66	5	2	1
Hamedan	44	30	74	6	2	1
Hormozgan	26	27	53	4	2	1
Ilam	25	15	40	3	1	1
Isfahan	175	36	211	16	5	1
Kerman	64	41	105	8	3	1
Kermanshah	54	22	76	6	2	1
Khorasan Razavi	169	74	243	20	4	1
Khuzestan	107	44	151	11	3	2
Kohkilooye and Boyer-Ahmad	20	20	40	3	1	1
Kordestan	35	21	56	4	2	1
Lorestan	40	26	66	5	2	1
Markazi	44	18	62	5	2	1
Mazandaran	73	62	135	11	3	1
North Khorasan	20	20	40	3	1	1
Qom	42	3	45	3	1	1
Semnan	31	11	42	4	2	1
Sistan and Baluchestan	38	41	79	7	3	2
South Khorasan	21	19	40	3	1	1
Tehran	591	49	640	43	14	2
West Azerbaijan	73	40	113	9	3	1
Yazd	37	11	48	4	2	1
Zanjan	24	16	40	3	1	1
Total	2187	909	3096			

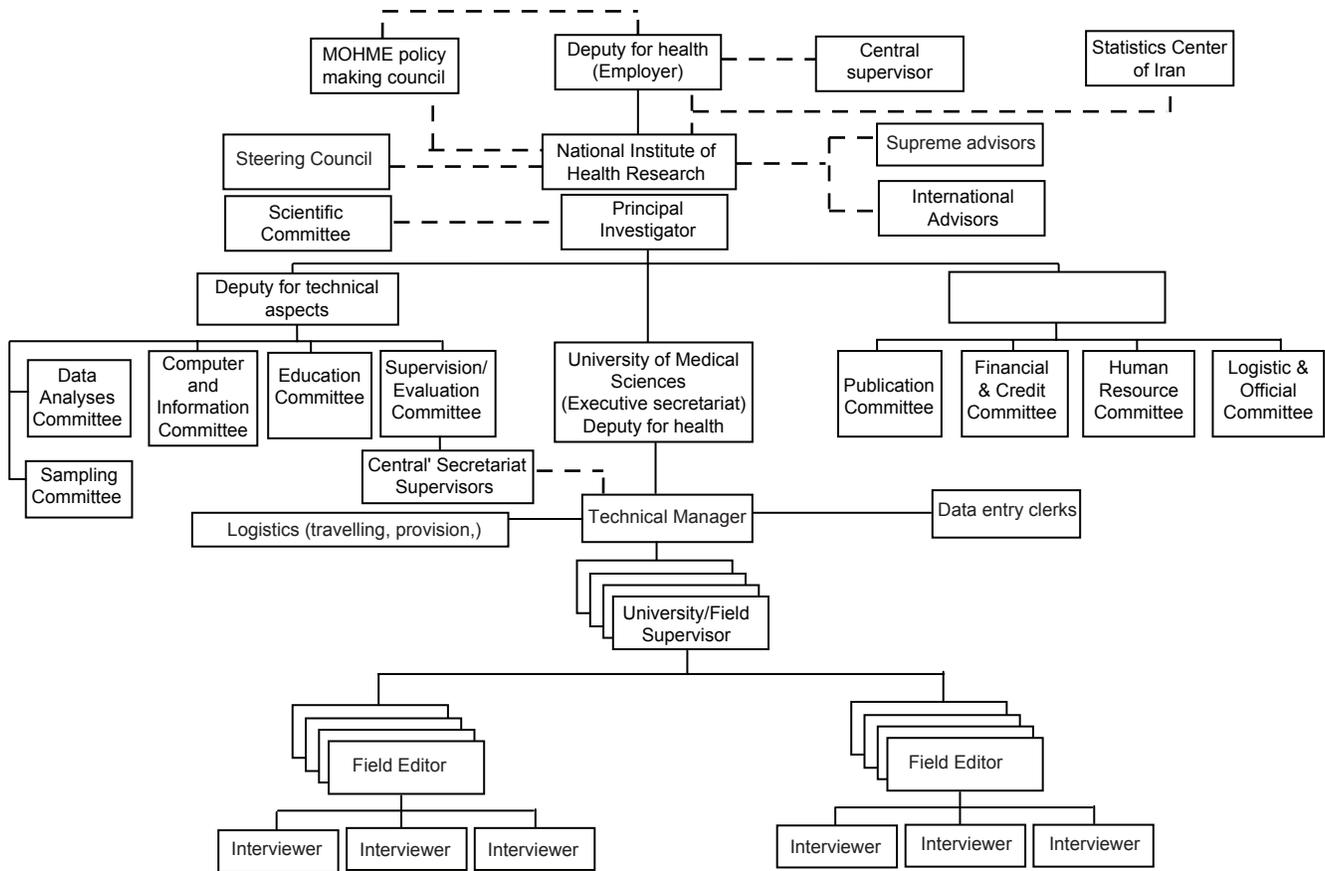
editor (preferably male) and one driver. Each field supervisor is responsible, on average, for three data collection teams.

### Questionnaires

IrMIDHS questionnaires mainly come from the MICS questionnaires. However, to reflect issues relevant to Iranian context, several modules from the DHS questionnaires are also incorporated into the IrMIDHS surveys. Priority indicators for policy making in Iran are also considered for adding to the survey. Therefore, some modules are incorporated into IrMIDHS questionnaires based on previous national surveys such as 2001 DHS,<sup>[5]</sup> Anthropometric Nutrition Indicator Survey,<sup>[19,20]</sup>

Health Care Utilization survey,<sup>[21]</sup> and the National Health Account survey.<sup>[22]</sup> We also benefitted from consultations with a broad range of technical experts.

In order to develop the tailored questionnaires, a questionnaire design committee is organized. MICS4<sup>[23]</sup> and DHS Phase 6<sup>[24]</sup> questionnaires and manuals are translated from English to Farsi. Periodic meetings of the questionnaire committee resulted in a first draft of the questionnaires. IrMIDHS questionnaires underwent extensive pre-testing and face validity and fluency assessments prior to the pilot. The content validity of the questionnaires is evaluated through face-to-face interviews with relevant experts in each field and



**Figure 1:** Organizational structure of Iran Multiple Indicators Demographic and Health Survey

discussions in the groups. We also sought feedbacks from relevant departments within the MoHME and the international partners. The assessments also include informal tests of the questionnaires on twenty families and then trial completions of a hundred questionnaires.

IrMIDHS instruments include three questionnaires in five formats: household questionnaires (with and without malaria indicators, 107 questions), women aged 15-54 questionnaire (145 questions) and children under five questionnaires (with and without malaria indicators, 88 questions) [Table 2]. Household questionnaires with malaria components are developed to use in three provinces where malaria cases are still observed.

Height and weight of all of children under 5 years are also measured, using two standard tools: A wooden height measurement tool and a pediatric weight measurement scale.

To avoid a response bias and ethical issues in poor urban and rural areas, respondents are not offered any financial incentives to participate.

Copies of the Persian version of the IrMIDHS instruments are available on the study's website at the <http://nihr.tums.ac.ir>.

### Pilot surveys

A training workshop is provided for the pilot study teams, the same as the main training. The results are discussed to identify any particular implementation problems. The intention of the pilot testing is to identify feasibility issues and enabled better planning for the main survey.

All aspects of the data collection procedure are then tested during a pilot study in October 2010. Six teams from three provinces of Tehran (urban areas of Eslam-Shahr, low socio-economic status, high population density), Yazd (urban and rural Taft, average socio-economic status, low population density, central Iran) and Golestan (urban areas of Gorgan, high socioeconomic status, high population density, north Iran) are trained and conducted the data collections. In total, 300 households are selected in the pilot study.

**Table 2:** The general characteristics of the questionnaires

Modules		
Household questionnaire 107 questions	Children under five questionnaire 88 questions	Women 15-54 questionnaire 145 questions
Household listing	Birth registration	Woman's background
Insurance and employment	Early childhood development	Access to mass media and information technology
Education	Nutrition and breastfeeding	Marriage
Water and sanitation	Unhealthy snacks consumption	Fertility and child mortality
Household mortality	Care of illness	Contraception
Accident and disability	Malaria (in three provinces)	Unmet need
Disaster preparedness	Immunization	Desire for last birth
Child labour	Anthropometry	Maternal and newborn health
Child discipline		Health system responsiveness for child delivery services
Malaria/treated net (in three provinces)		Illness symptoms
Household socioeconomic characteristics		Human immunodeficiency virus/acquired immune deficiency syndrome
		Tobacco
		Life satisfaction
		Chronic disease

### Training

Due to the large sample size and the number of teams involved in data collection and supervision, a decentralized training approach is followed in the study. In October 2010, the NIHR, via provincial Deputies of Health, recruited staff of the provincial teams consisted of technical managers, field supervisors and trainers of interviewers from 44 medical universities. These people are recruited based on specific criteria and are experienced researchers (including academics) or fieldwork managers.

A cascade training workshop for these teams is organized by the NIHR in October 2010 to build the training capacity at the provincial level, as a follow-up to the national workshop.

Training procedures are including interviewing techniques, the contents of the questionnaires, role playing of interviews and sampling procedures. The trainings will be finished with a written test of all the participants. These are conducted during October and November 2010. A booster session will be predicted if it could be accommodated at some point during the data-collection period.

Field editors and supervisors receive an additional training on how to edit the questionnaires, supervise the teams in the field and the use of the computer software.

### Survey implementation

The household questionnaire is administered to any knowledgeable adult member of the household who could provide information of household members. This questionnaire is also used to identify the women and children eligible for individual questionnaires. The children under five questionnaire is administered to the mother or caretaker living in the household who is able to provide detailed information on the health and well-being of children under 5 years. The individual women questionnaire is used to collect data from all women aged 15-54 years [Table 2].

The activities of the field supervisors are described in detail in the data collection and fieldwork manual. At the end of the day interviewers brief their supervisors about their interviews and results.

Supervisors must examine the completed interviews to make sure that the interviewers selection of the respondents in the household has been done correctly and that the questionnaire is both complete and accurately coded.

We provide supervisory sheets to ensure the quality of the implementation process. For example, we had control sheets to check 10% of the respondents randomly again by the field supervisors. This check could be done by phone

or in person and is structured to ensure that the initial interview has been conducted properly. The recheck interview covers the basic information.

We have biweekly reports produced by technical managers of the survey. Their report is sent in a previously designed sheet in Excel format to the central office of the survey via E-mail. This report aimed to monitor interviewing process, response and refusal rates.

Field supervisors and field editors for the IrMIDHS have an important position. They are the primary links between the provincial supervisors and the interviewers. As such, they are responsible for ensuring both the quality and progress of fieldwork; so, the most responsible and mature field staff should be appointed to the positions of field supervisor and field editor.

The specific responsibilities of the supervisor are to organize and direct the fieldwork and to conduct periodic spot check re-interviews.

The specific duties of the field editor are to monitor interviewer performance with the aim of improving and maintaining the quality of the data collected. Close supervision of interviewers and timely editing of completed interviews are essential to ensure that accurate and complete data are collected. Throughout the fieldwork, field editors will be responsible for observing interviews and carrying out field editing. It is necessary to observe the interviewers more frequently at the beginning of the survey; because the interviewers may make errors due to lack of experience or lack of familiarity with the questionnaire; these can be corrected with additional training as the survey progresses.

One of the most important duties of the supervisor and editor is to try to minimize non-response. Making public announcements in local TVs, radio or local media channels, sending pamphlets to the participants, asking assistance from local health workers etc., are among the public relations techniques that might be used to maximize response.

### **Data management and entry**

After the interviews are administered, the completed questionnaires are checked by the field supervisor. Obvious mistakes and omissions are corrected, if necessary through contacting the household, before the data entry.

Specialized data-entry software based on the CSPro software (Census and Survey Processing System; developed by the U.S. Census Bureau and ICF Macro. provided to the team by the UNICEF) is prepared for the data entry. The CSPro software is customized to IrMIDHS questionnaires. The customized data collection software is heavily tested, using actual data from three provinces, to ensure it is free of bugs and errors. The software provided the opportunity for dual data entry.

Data entry process is conducted at the province level. The staff responsible for data entry at the provincial levels attends a 2-day workshop in Tehran. Second data entry is performed for the purpose of identifying typing errors and accidentally skipped questions. The data entry program identifies double data entry when the second entry is completed. The data entry program is accessible only to the responsible team members and to no one else to ensure confidentiality of data. We record the number of questionnaires entered/day/person. Discrepancies identified in the second round of data entry, are corrected through checking the questionnaires. Any invalid codes such as out of range codes recorded in the questionnaires are corrected by field supervisors.

The data files are uploaded on the study server on a daily basis through a secure web-based data management system. This system allows for the download and immediate access and storage of the data from all provincial teams in a central computer.

### **Other quality assurance procedures**

We have noted the quality assurance procedures relevant to each section of the study design previously. The quality assurance procedures generally follow the standard recommendations for such procedures.<sup>[25,26]</sup> Here the overall structure of the quality assurance procedures is introduced. A quality assurance system is set up by the IrMIDHS' secretariat. The objectives of this system are to minimize random and systematic errors in different stages of data collection. Furthermore as the study involved several teams at the province level, as a secondary objective we also sought to improve data-collection capabilities for future national studies.

To achieve these objectives, the quality assurance cover five steps of the survey conduct: (a) Sampling, (b) training, (c) data collection procedures (i.e., survey implementation) and (d) data entry, as explained above.

Training is an essential element of quality assurance. Training is considered as an ongoing process that should be conducted before and during the data-collection process.

During the data collection three members of the scientific committee are responsible for response to field teams' questions and are assigned separate cell phone numbers. Each member is responsible for questions relevant to one of the questionnaires: Household, women and children questionnaires. Also a web site is developed to provide access to a wide range of facilities such as new events and frequently asked questions about the questionnaires and survey implementation.

The results of the quality assurance processes are also reported to the study secretariat using written reports in pre-specified quality assurance forms. These forms are intended for different levels of supervision of the study process. Also the external supervisors from the SCI provide detailed feedback to the provincial teams, as well as the study secretariat.

To ensure both quality and progress of the fieldwork, the steering committee of IrMIDHS set an additional layer of supervision as including 35 "central supervisors" who are experienced researchers and attended specific training courses. Their roles are to supervise each province team consisting of field supervisors, field editors and interviewers at least for 2 weeks.

We will also check the finding of certain key variables with national census to ensure that the sample is an accurate representation of the population.

### Analytic plan

The analytic plan is developed based on the general recommendations specified by the MICS4 survey. The indicators defined in that survey, are analyzed as such. For other indicators based on other surveys (e.g. DHS6, or previous surveys conducted by the MoHME), the indicators are defined as in their original sources as much as possible. For certain modules or items that are included in this study for the first time (e.g., junk food consumption, or delivery via cesarean section), we define the indicators as appropriate. If an item had been customized, the indicator definition is adjusted accordingly. However we try to keep such changes to a minimum.

All indicator definitions and analytical structure are objectively presented in the report.

Except for few indicators, all indicators will be reported at provincial levels. Mortality indicators, accidents and disability rates, low birth weight rate and young age marriage rates will be presented at a national level only, due to the small numbers of events at provincial level. All analyses are presented as national indicators, gender based indicators and urban/rural indicators. IrMIDHS analysis will begin with data checks and quality assessments. The data will be checked for structural and range errors and edited for internal consistency and accuracy and completeness of data entry.

### Ethical considerations

Different stages of the IrMIDHS are approved at the Ethics Committee of the Tehran University of Medical Sciences, the information office of the MoHME, the review of board of the SCI and the Policy Council and the Board of Deputies of the MoHME.

Careful attention is devoted to the confidentiality of the household data. Pamphlets will be distributed to the sampled households at least 1 day before the data collection. The pamphlet includes explanatory statements providing information about the study and contact numbers of the study secretariat at the NIHR. It clearly states that the participants are free to refuse to respond or withdraw from the study at any stage. At the time of data collection, at the beginning of the interview with each household, a verbal consent will be obtained from all eligible persons and the outcome of it will be stated on the questionnaires.

The protection of privacy and the confidentiality of interviewee information is assured by classification and storing the completed questionnaires in a separate room and saving the data in the web based information system anonymously. These data will be accessible only to specified members of the research team.

## DISCUSSION

We have described the methods and implementation issues of the IrMIDHS study. To the best of our knowledge, this paper is the first published paper that describes the protocol of

DHS and MICS as actually conducted in low-or middle-income country.

IrMIDHS will provide valuable data for use by policymakers of the health and social sectors in Iran. The large sample size of this survey will allow creating adequate representation of the country population. We believe that there are several elements to the design and implementation of this protocol that are original and offer methodological advantages. First, the associated data collection tools are developed through extensive collaboration with academics, policy makers and program designers, implementing partners and international agencies technical officers.

Second, With respect to the complexity of the design and the wide range of people involved in the study, we have added an additional layer of supervision as “central supervisors” to the study. This is additional to the SCI representatives that acted as external auditors of the study. These mechanisms will provide ample opportunity for the monitoring of all aspects of survey conduct, including updating the sampling frame, selection of the households, interviewing, data entry and analysis. Distribution of informational pamphlet and wide publicity of the study will help increasing responses rate to the optimal levels.

However, conducting a national survey is not free from significant challenges, particularly field related problems. The IrMIDHS has a very large sample size. For IrMIDHS, 30,960 households are selected as sample of the survey. The main reason for this relatively large sample size is the policy makers demand for estimating the key indicators at the provincial level. This is due to the Iran’s administrative structure and different socio-economic characteristics in the provinces.

The Islamic Republic of Iran is a middle-income country with a national health information system which is based on facility based data. Hence, data on diseases, death and several risk factors are collected based on routine data from the facilities.<sup>[27]</sup> One of the objectives of IrMIDHS is to evaluate the completeness of the data that are collected based on routine systems (e.g. birth and death). Moreover, due to the demand of policy makers for certain indicators we included further modules in the survey which are not included in the international versions for the MICS or DHS survey: e.g., Health insurance coverage,

disaster preparedness and accident and disability occurrence.

While we have attempted to design a comprehensive and high quality survey, our study have some limitations. First, in this study more information will be collected based on self-report than previous surveys. We deliberately dropped the requirement of visual inspection of sanitary facilities at the household (e.g. checking the toilet or existence of soap). Previous studies and routine data in Iran strongly suggested that these are not any more major concerns of the health systems and the absolute majority of the households had access to basic sanitary facilities. We are concerned the visits may reduce the response rate and hence negatively affect the study. So although all the interviews are to be conducted at the household, they do not involve inspections of the households (apart from checking the birth registration and identification cards, vaccination cards and child health card).

Although, various quality assurance measures have been done to avoid the non-sampling errors such as asking control questions, for some variables recall bias might be a challenge.

Second, due to the logistic and cost issues, a specific men questionnaire is not included in the study. Hence, information on men’s demographic and health situation will not be collected. Third, we used and translated international the questionnaires of DHS6 and MICS4; however, it is not possible to validate those modules of the questionnaire that may be affected by the Iranian cultural context such as child discipline, child development and life satisfaction modules. Such assessments should be conducted before future national surveys.

## CONCLUSIONS

Designing and implementing a high quality household survey can produce information and evidence for decision making to develop planning and evaluation programs. Furthermore conducting such surveys can increase the capacity for health system research. We believe that IrMIDHS will improve the project management knowledge in Iran health sector to design and implement of national surveys. To achieve this goal, a qualitative study is developed to assess the project management process and quality assurance strategies. This

will also enable sharing of the experiences for future studies, additional to the direct benefits of providing much needed national indicators for the policy makers.

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