

The Development of the National Health Survey in Brazil, 2013

doi: 10.5123/S1679-49742015000200002

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Abstract

This study aims to report on both the preparatory phase of the National Health Survey (PNS) and the experience of implementing it in practice, in order to contribute to the development and improvement of the methodology used in preparing population health surveys in Brazil. PNS preparation began in 2009 and its development included a comprehensive consultation process involving researchers and representatives from Ministry of Health technical areas. From September 2012 to June 2013, the questionnaire was tested and the pilot study was carried out. Field staff were trained following PNS approval by the National Commission for Ethics in Research (CONEP) in July 2013. Fieldwork began in August 2013 and lasted for six months. The first results were published in December 2014 focusing on population lifestyles, self-perceived health and chronic diseases.

Key words: Health Surveys; Methodology; Brazil.

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Introduction

In 2013, the National Health Survey (PNS), a national household-based survey, was conducted in Brazil. It was created by the Ministry of Health in partnership with the Brazilian Institute of Geography and Statistics (IBGE), and is part of the IBGE's Integrated System for Household Surveys (SIPD).¹ PNS aims to describe the health situation and lifestyles of the Brazilian population, the attention given to their health, the access and use of services, preventive actions, continuity of care and the health assistance funding.²

In addition to the traditional method of collecting data with questionnaires, the PNS has also checked physical measures (blood pressure, weight, height and waist circumference) and collected biological material (blood and urine) from the respondents.

Apart from giving important information for the evaluation of the population health and lifestyles,^{3,4} health population surveys also enable us to check the performance indicators of the health system from the user's point of view,⁵ in order to subsidize the formulation, monitoring and evaluation of public health policies.

Population surveys are increasingly being used to clarify epidemiological issues that the health information systems are not capable of answering.⁶ However, these surveys show a series of challenges in their planning and execution, especially when conducted in national level, in the context of an extremely diverse country, like Brazil.^{7,8}

In 2013, the National Health Survey (PNS), a national household-based survey, was conducted in Brazil.

Proper development of methodological aspects, including the design of a sampling plan and questionnaire, the execution of operational questions, such as the way the survey is conducted, as well as the training of interviewers and fieldwork are essential for the population survey to succeed and reach its goals.⁹ On the other hand, ethical aspects become increasingly important when planning population studies,¹⁰ especially when the research involves the collection and storage of biological material.¹¹

This study aims to report on both the preparatory phase of the National Health Survey (PNS) and the

experience of implementing it in practice, in order to contribute to the development and improvement of the methodology used in preparing population health surveys in Brazil. All the stages in the development of the survey were reported, from the description of the sampling plan to the process of formulating the questions, the application of fieldwork, the process of checking physical measures and collection of biological material, the creation of sample storages and the ethical aspects involved in the survey.

PNS Development

PNS planning occurred from 2009 to 2012, period when some methodological questions were discussed: the way the project was conducted; sampling plan; questionnaire formulation; physical measures and measuring tools; and collection of biological material.

In order to fill the gaps of information noticed in the Brazilian National Health System (SUS), the planning of the PNS started with the revision of national and international experiences in health surveys. Among the issues investigated, the focus lied on the researched topics, questionnaires conducted, physical measures and laboratorial exams conducted, total budget and resources spent for each interview.

After that, consultants were contacted, as well as researchers with experience in inquiries and technical representatives from the Ministry of Health. In the interview, they responded to a self-applied questionnaire, containing information about the scope and the main goal of the study, the tools used, the sampling design measures and laboratorial exams to be collected, failures and successes of the application of a population-based survey, availability of data bank and ways of disseminating the results. The counselors and researchers also responded to specific PNS questions, such as the priority themes to be covered and what is the best way to conduct the survey, including all the above mentioned topics. A similar survey was sent to the Ministry's general departments, boards of directors and coordination offices, aiming to define the scope of the research, priority topics that would be researched, gaps found in health information and previous survey experiences, among other issues.

In September 2009, the PNS Planning Meeting was held in Brasília, with the presence of counselors from research institutes and the Ministry's technical

representatives. All the suggestions given at this meeting were considered in the planning of the survey.

In 2009, the Ministry of Health named a Management Committee in charge of creating the guidelines for the National Health Survey,¹² whose objective was to plan and coordinate the survey. The Management Committee was composed of members from the Secretariat of Health Surveillance, the Secretariat of Science, Technology and Strategic Inputs and the Executive Secretariat, in addition to representatives from Oswaldo Cruz Foundation (Fiocruz). This Committee's members were subsequently updated in 2011.¹³

The partnership with IBGE was proposed by the Ministry's managers since the beginning of the project, when the work plans and funding from the National Health Fund to conduct the PNS in 2012 and 2013 were also defined. Thus, the Management Committee started planning the PNS together with IBGE. The option for the partnership with IBGE enabled the establishment of the PNS as a regular survey, inserted in the Institute's schedule and conducted periodically every five years.

A scientific group of academic researchers and another group of managers from the Ministry of Health was established in 2009, with this latter being formed by the Ministry's representatives of several technical areas involved in the PNS. Together with IBGE and the Management Committee, those two groups held periodical meetings from September 2009 to June 2012 for the collective design of the PNS.

During the period of planning, a PNS website¹⁴ was created, which included not only the survey basis and goals, but also the design of its preparatory phase, incorporating all aspects discussed in the planning of the PNS.

In September 2012, the first test for the survey was conducted. In October of the same year, the Instructions Manual for the application of the three questionnaires was created. In March 2013, a pilot-study with the purpose of testing all the procedures involved in the PNS was conducted.

Finally, the survey project was submitted to the National Commission for Ethics in Research (CONEP) in November 2012, being approved in June 2013. Fieldwork began on 12 August 2013 and finished on February 2014. The first results were published on 10 December 2014, which were related to the lifestyle, self-perception of health and chronic diseases.

All the stages of the PNS development and their dates of application are described in Figure 1.

Sampling Plan

The PNS sampling plan was developed from the Master Sample of IBGE's Integrated System for Household Surveys – SIPD.¹ The PNS sample is thus a sub-sample of this IBGE/SIPD's Master Sample, which covers the census sectors of the 2010 Geographic Operational Base – except for census sectors that are too small or considered special.

Stages of development of the National Health Survey - PNS	Date of application
Beginning of planning	August/2009
Revision of national and international experiences in health surveys	August/2009
Consultation with researchers experienced in inquiries and technical representatives from the Ministry of Health	2009 to 2011
PNS planning meeting, for consideration of counselors' suggestions	September/2009
PNS website	April/2010
Hearing of demands and suggestions from health managers via the PNS website	August/2010 to February/2011
Submission of the project to the National Commission for Ethics in Research – CONEP	November/2012
Approval of the project by the CONEP	February/2013
Pre-test for the questionnaire	February/2013
Pilot study	March/2013
Adjustment in the questionnaire and in the Manual of Instructions after pilot study	Abril to June/2013
Training of coordinators and supervisors	July/2013
Training of interviewers	August/2013
Launch of the PNS – beginning of fieldwork	August/2013
End of fieldwork	February/2014
First publishing of the results of the survey related to lifestyles, self-perception of health and chronic diseases	December/2014

Figure 1 - Dates of application of the development stages of the National Health Survey - PNS. Brazil, 2013

The PNS sample was selected by clusters in three stages, with stratification of the primary sampling units. At the first stage, census sectors or set of sectors of the Primary Sampling Units (PSU) were selected. At the second stage, the households were selected. And at the third stage of the sampling, an adult resident (aged 18 or older) for each household was selected to answer to the individual questionnaire, with the same probability for all the other adult residents in that household. Details on the sampling plan are described in a published article.¹⁵

To calculate the necessary size of the PNS sample to estimate the parameters of interest in different levels of geographic disaggregation, the following aspects were considered: desirable level of precision for estimates of proportions with 95% of confidence (95%CI); effect of the sampling plan, given that this is a cluster sampling in multiple stages; number of households selected per PSU; and the proportion of households with people in the age group and/or sex of interest. The PNS sample makes it possible to estimate the main indicators states and state capitals, although some indicators of interest may also be estimated in lower levels of geographic disaggregation: capital and/or the rest of the metropolitan region and/or the rest of the state. In every geographic disaggregation for the release of indicators, the size of the sample must be of at least 900 households.

Based on a prediction for a non-response rate of 20%, the estimated sample size was of around 80,000 households. Losses that were considered: a closed or empty household; residents refusing to receive the interviewer; and failure in the attempt of interviewing the resident after three or more attempts, despite the visits being previously scheduled.

At the end of fieldwork, a total number of 81,167 households were visited, of which 69,994 were occupied, with 64,348 household interviews and 60,202 individual interviews with a selected household resident being conducted. For the laboratorial exams, a sub-sample of 25% of the surveyed census sectors was selected. On behalf of greater logistic in the collection of biological material, the census sectors were selected with probability inversely proportional to the difficulty of collection. For the establishment of collection level of difficulty, according to numerical parameter, all cities with 80,000 or more inhabitants in all States were identified. To each State, the distances between every city with less than 80,000 inhabitants and greatly populated cities

(80,000 or more inhabitants) selected in the sample were calculated through geographic coordinates from the center of the cities. The probability of selection was proportional to the inverse of the distance.

Creating the Questionnaire

The revision of national and international experiences in health surveys, conducted in the phase of planning the survey, was considered during the creation of the questionnaire. In addition, technical representatives from the Ministry of Health and researchers with experience in population-based surveys were consulted during a two-year period (2009-2011). Similarly, meetings were held with the Ministry's technical representatives for a better understanding of the Ministry's demands. Finally, the PNS website was made available for a six-month period (from August 2010 to February 2011), in which it received suggestions and demands from researchers and managers.

The logic to build the questionnaire met the objectives of enabling the comparison between data to be collected and data from the National Household Sample Survey (PNAD) Health Supplement¹⁶ and from the Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel),¹⁷ in order to allow the establishment of spatial and temporal trends for established indicators. In addition to the inclusion of topics considered relevant in the inquiry process, the questionnaire aimed to, among other purposes, attend the demands of the Ministry's technical areas, as well as those showed in other health surveys (both national and international) of interest and relevance to the PNS, besides, naturally, attending to the Ministry of Health's priorities.

The PNS questionnaire was sub-divided into three parts: household; related to all the household residents; and individual. The household questionnaire and the questionnaire related to all the household residents were answered by one of the household residents who could inform about the socioeconomic situation and health of all of its residents. The individual questionnaire was answered by a resident aged 18 or more selected with the same probability for all the other adult residents in the household. The topics covered in each part of the questionnaire are described in Figure 2.

The questionnaire was submitted to revision in three stages. At the first stage, in October 2012, each

module was sent to evaluation of the Ministry of Health's technical areas responsible for the topic covered. At the second stage, in February 2013, the pre-test, in which the questionnaire was applied to individuals of different socioeconomic aspects and health conditions, was conducted. At the third stage of this revision, in March 2013, a pilot study was promoted for tests in procedures involved in the PNS, including the approach to the household, understanding of the questions proposed, investigation of possible inconsistencies or 'skips' in the questionnaire (changing the order of questions or intentionally skipping a question) and the calibration of the physical measures. A random sample was selected from 46 census sectors and 644 households, distributed in 6 states: Acre, Espírito Santo, Goiás, Mato Grosso do Sul, Rio de Janeiro and Sergipe. 31 people were trained, among whom there were interviewers and fieldwork supervisors. Based on the findings, the procedures and the questionnaire itself were revised and adjusted for a more accurate application of the survey.

Before the beginning of the fieldwork, a manual was created to help understand the questionnaire. This manual was composed of a list with the basic concepts

necessary for understanding the survey, specific health terms and the explanation of each of the questions in the questionnaire. The questionnaire and the interviews manual are available for reading at the PNS website.¹⁴

Fieldwork

The fieldwork was organized, coordinated and conducted by IBGE. The teams responsible for this work were formed by data collection agents (interviewers), supervisors and coordinators from the Institute. The Ministry of Health contributed with the production of qualification material and field personnel training. The training of supervisors and coordinators had the assistance of researchers from Fiocruz and the Ministry of Health, especially for the understanding of issues specific to health area, and was held at IBGE's headquarters in Rio de Janeiro, State of Rio de Janeiro, in July 2013.

IBGE's coordinators and supervisors acted as multipliers in smaller training sections for the interviewers, which were held at IBGE's headquarters in all the States. All the interviewers, supervisors and coordinators of the PNS were trained to understand the entire survey process, including the physical measures and the

Subdivision of the questionnaire	Topic
Household	Household data (including the presence of pets)
	Household visits of teams of Family Health and endemics agents
All the household residents	General aspects of the residents (education level, work and income)
	Aspects of education in people aged 5 or more
	Jobs of the household residents
	Household incomes
	Disabled people
	Health plan coverage
	Use of health services
	Health of individuals aged 60 or more and coverage of mammography among women aged 50 or more
	Children aged less than 2
	Other work aspects and social support
Individual	Self-perception of health state
	Accidents and violence
	Lifestyles
	Chronic diseases
	Women's health (women aged 18 or more)
	Prenatal care
	Dental care
	Medical assistance

Figure 2 - Topics covered in the questionnaire of the National Health Survey - PNS. Brazil, 2013

laboratorial tests involved. Interviews were conducted with the assistance of handheld computers – PDA (personal digital assistance) –, programmed to automatically perform the ‘skips’ in the questionnaire. PDAs also counted with a critical component of the answered variables: for instance, when a value considered unlikely was inserted for a given question, the computer emitted a warning of possible typewriting error.

The interviewers were properly trained for the interviews approach and insertion of answers in the PDA, as well as the collection of all physical measures – weight, height, waist circumference and blood pressure – with the proper equipment.

At the first approach to the selected household, contact was established with the responsible person or with any of the other residents, to whom the interviewer explained the reasons for the study, its goals and procedures, as well as the respondent’s role in the survey. At the occasion, a list was made with all the adult residents in the household, identifying (i) the respondent responsible for answering the household questionnaire and the questionnaire about data from all the household residents, apart from selecting (ii) the adult resident to answer the individual interview with the PDA’s random selection program. Individual interviews were scheduled to the dates and time that best suited the respondent. If necessary, two or more visits to each household were scheduled.

All individuals with high blood pressure or with altered results in blood exams were taken to a reference service in the local SUS system, chosen based on an inquiry in the National Registration of Health Institutions (CNES), according to the level of assistance given and to the proximity to the household.

Physical Measures

The adult resident selected for the individual interview had his/her weight, height, waist circumference and blood pressure measured with the use of, respectively, a portable electronic balance, a portable height scale, a measuring tape and a digital pressure device. In the household visit, the interviewer carried along, in addition to the PDA, all the necessary equipment for the physical measures.

The procedures and training of field teams for taking anthropometric measures and blood pressure were done in partnership with the Laboratory for Nutritional Evaluation of Populations (LANPOP), part of

the Public Health School in the University of São Paulo. The criteria for this measurement were also defined in order to prevent biologically inaccurate measures. A program for critical work was created specifically for the PDA, recommending the repetition of the measures when necessary.

The same procedures for the 2008-2009 Family Budget Survey (POF), conducted by the Ministry of Health in partnership with IBGE,¹⁸ were employed in the anthropometric measures taken by the PNS. In relation to the specific measurement of blood pressure, the use of an automatic device for blood pressure followed the same procedures used in the Longitudinal Study of the Adult’s Health (ELSA Project - Brazil),¹⁹ where the systolic and diastolic pressures are calculated based on algorithms from the point of maximum oscillation correspondent to the average blood pressure.

Collection of Biological Material

The collection of biological material took samples of blood and urine. Seven ml of blood were collected at any time of the day, and submitted to the following exams: glycated hemoglobin; total cholesterol; LDL cholesterol (direct method); HDL cholesterol (direct method); complete blood count; hemoglobin S and other hemoglobinopathies; creatinine; and dengue fever serology. Urine collection was occasional, with the collected material being used to measure sodium, potassium and creatinine doses.

Collection and analysis of the biological material were done by a consortium of private laboratories, established based on the partnership between the Ministry of Health and Sírío Libanês Hospital, as part of the Project for Support to the Institutional Development of the National Health Survey (Proadi-SUS). The private laboratories chosen were among those that fit the Ministry of Health’s criteria for quality control and to the standards of collection, transport and processing of the biological material. The laboratories were responsible for hiring regional supervisors, responsible for the standardization of the training of collectors and supervision of all stages in this process, which are: scheduling, previous preparation of the selected individual; collection of biological material; conduction of exams; and presentation of results. For the quality control, the laboratories had a routine of calibration of the exams’ results.

With the conclusion of the individual interview, IBGE passed the selected resident's contact information (name, address, telephone number, etc.) to the hired laboratory, in confidentiality, through mechanisms of data transmission.

The hired laboratory was responsible for scheduling the laboratory exams, guiding and watching the preparation that preceded the exams conduction through printed matter, telephone calls, or even a previous home visit when necessary. The laboratory was also responsible for delivering the collector to the household, collecting the blood and the urine and transporting the collected material, publishing the exams results on the internet (encrypted) or through a personal letter (in case the respondent does not have access to electronic network service), in addition to passing the exams results to IBGE. Until the moment of elaborating this article, this stage of the fieldwork, related to the collection of biological material, had not been concluded.

Creation of Sample Storages

The blood samples collected in the PNS are stored with the purpose of creating a national sample storage of a probabilistic sample of the Brazilian population. After the conclusion of analyses for the PNS, the samples will be stored in Evandro Chagas Institute (IEC), an organ of the Secretariat of Health Surveillance (SVS), part of the Ministry of Health (MS), and based in the State of Pará.

During the storage process, the researched individual's identification data are eliminated and replaced by a code, which will enable the association of blood samples only to demographic (sex; age; ethnicity/skin color) and geographic data (city of residence).

After the conclusion of analyses ordered by the PNS, the laboratory hired for the conduction of laboratorial exams will be responsible for the transport of the biological material for storage in Evandro Chagas Institute. IEC will be responsible for both guarding the material and supervising the laboratorial procedures applied in the use of the stored biological material.

Ethical Aspects

The project for the National Health Survey was approved by the National Commission for Ethics in Research (CONEP) on 8 July 2013, under decree n. 10853812.7.0000.0008, and followed the National Health

Council (CNS) resolution n. 466, of 12 December 2012, assuring the subjects' voluntariness, anonymity and possibility of withdrawal at any moment in the study, through the signing of the Term for Free and Clarified Consent, specific for every case.

The consents informed for the research were given in two stages. At the first, the consent informed for the household interview was obtained by the household respondent before the beginning of data collection, in the following manner: the interviewer read the Term for Free and Clarified Consent to the individual, who signed it in case he/she agreed in taking part in the research.

In the second stage, the informed consent was requested to the selected adult resident (aged 18 or more) in the household for the individual interview. In this case, consent was requested for each one of the procedures, separately: conduction of the interview; measurement of anthropometric measures and blood pressure; blood and urine collection, for those who were part of the sample selected for laboratory exams. Before the individual interview, the interviewer explained, in a clear and objective way, the voluntary aspect of his/her participation and the possibility of (i) refusing to answer any question or (ii) interrupting the interview at any moment or (iii) not taking part of the measures and laboratory exams, even with his/her previous consent.

All the Terms for Free and Clarified Consent are available at the PNS website.¹⁴

For the laboratory exams, the interviewer explained that the blood collection would be made by a laboratory technician, qualified by the Ministry of Health, not implying any significant risk in any of the tests. In case of acceptance, the respondent would be asked permission for his/her identification data and address in order to inform to the hired laboratory, so they could schedule the collection of his/her blood and urine. The respondent was informed that if altered results were found related to his/her blood pressure or laboratory exams, he/she would be notified and taken to a SUS reference service. After blood collection, the respondent was asked to consent to the storage of his/her blood sample in national sample storage, being explained that his/her identification data would be eliminated and replaced by a code, ensuring confidentiality.

During the conduction of the survey, the coordination team remained available to the respondents to clarify and answer any doubts via telephone calls, e-mail or by the PNS website.

Final Considerations

The PNS development process involved professionals of several areas and institutions, so that all the topics of interest were covered in the survey. Given the diversity of these topics, a final version of the questionnaire that would not be too long and, at the same time would attend the goals of the survey, was difficult to achieve.

The PNS provides continuity to the Health Supplement of the National Household Sample Survey - PNAD, conducted in 1998, 2003 and 2008. The PNAD questionnaire was answered by a single respondent representing all the household residents. Given the need for a broader survey on the health of the population, the PNS is presented nowadays as an independent survey from the PNAD. Apart from maintaining all the PNAD's sociodemographic data and work aspects – given that it is part of the SIPD/IBGE –, the PNS enabled the development of specific health issues, including the questionnaire about morbidity and lifestyles, answered individually by a randomly selected resident among the other adults in the household.

Another big advance of the PNS was the inclusion of anthropometric measures, checking blood pressure and collection of biological material (blood and urine) from the individual selected in the household, because it will enable the investigation of (i) the access to diagnosis of blood hypertension and diabetes, (ii) assistance to the individual diagnosed with blood hypertension, diabetes and depression, including access to laboratory exams and consultation with specialists,

restrictions, after-effects and hospitalization, (iii) the percentage of obesity in adults, (iv) the lipid profile of the Brazilian adult population and (v) the amount of sodium in the urine.

An important gain resultant from the process of development of the PNS was the fact that the field work could count with the expertise of IBGE professionals, experienced in the conduction of national surveys, which gave the national context a productive dialogue between researchers from Health areas and the IBGE, which is the main national institution dedicated to the production, analysis, research and dissemination of statistical information.

Up to the elaboration of this article, this stage of the fieldwork, related to the collection of biological material, had not been concluded. For this reason, more details about the possible successes and/or problems faced at this stage of the PNS could not be considered by the work here presented. The expectation is that the process of development and the field experiences achieved by the 2013 National Health Survey might serve as subside to the development and improvement of new population-based health surveys in the country.

Authors' Contributions

All the authors participated in the conception, final approval of the manuscript, and are responsible for all the other aspects of the article, ensuring its accuracy and integrity.

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Received on 24/02/2015
Approved on 20/04/2015