DOI: 10.1590/1413-81232021269.28792020

Nationwide population-based household surveys in health: a narrative review

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Abstract *Household surveys are one of the primary methodologies used in population-based studies. This narrative review of the literature aims to gather and describe the leading national and international household surveys of relevance. In Brazil, the historical role played by the Brazilian Institute of Geography and Statistics (IBGE) in conducting the most relevant research in the production of social data stands out. The Medical-Health Care Survey (AMS) and the National Household Sample Survey (PNAD), with the serial publication of Health Supplements, are the country's primary sources of health information. In 2013, in partnership with the Ministry of Health, IBGE launched the National Health Survey (PNS), the most significant household health survey ever conducted in Brazil. The PNS-2019 received a major thematic and sampling expansion and, for the first time, applied the Primary Care Assessment Tool to assess PHC services in all 27 Brazilian states.*

Key words *Household survey, Sampling, PCAT, Brazil*

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Introduction

The production of health information is essential to guide the planning, organization, monitoring, evaluation, and qualification of any health service or policy. Several numerous tools and methods that can be applied to obtain health information are available. The one capable of providing the manager and society with the desired information is the most appropriate choice.

The population survey is a methodology that produces health information inferred from the answers obtained in an interview applied to a significant probabilistic sample of the analyzed population. In general, they are cross-sectional studies, although they can also be longitudinal (or even repeated panels), which are limited to a single area or some regions, and may or may not target a specific demographic segment. Data are systematically collected from a questionnaire administered in the individual's home by a trained interviewer. The questionnaire can be original or even include some statistically validated instrument. It is an essential tool, especially in developing countries, which still have incipient information systems to provide reliable and comprehensive health data[1].

As they can cover various topics or be restricted to a few subjects, surveys are unique compared to many methods, as they approach the individual at home instead of interviewing health units[2]. In the interview, sociodemographic and health characteristics of the population, such as health status, habits, lifestyle, and use and consumption of services, are collected. Eventually, values of physical parameters (weight, height, blood pressure) and laboratory parameters by collecting clinical specimens, such as blood and urine, are studied. Probabilistic surveys also estimate population denominators that are key to calculating indicators of interest for the scope of the studies. Multi-stage cluster sampling is often used ("area sampling") to define the sample in population-based surveys, where the sampling unit is a defined population cluster - as a census tract – that is decomposed into sub-groups each stage until reaching the object of interest of the study[3].

This narrative review will present the primary population health surveys globally and in Brazil, from those with historical relevance to more recent research. Also, the leading Brazilian population surveys, essential in the production of health information in the country, such as some special editions of the National Household Sample Survey (PNAD) and the National Health Survey (PNS), will be detailed and analyzed.

National population-based household surveys around the world

Since the 1990s, in an attempt to encourage the production of information to guide health policy, especially among developing countries, and to standardize indicators between different countries to make them comparable, the World Health Organization (WHO) guided the production of population data, such as morbidity, special needs, use of health services, lifestyle, breastfeeding, birth weight, and others. Besides designating the indicators, the entity recommended carrying out a household survey to collect the data[4].

However, long before that, the U.S. conducted its first national health survey in 1935-1936. Then, the National Health Interview Survey (NHIS) started to be carried out in the mid-1950s, continuing to this day. It collects socioeconomic, demographic, and health data on Americans. Nowadays, several other population surveys with more specific scopes are developed in that country. Also, in the 1970s, the United Kingdom started to apply a national longitudinal survey, the General Health Survey (GHS), which was followed by other similar studies, such as in Canada, which, since the 2000s, has carried out annually the Canadian Community Health Survey (CCHS)[5,6].

As of 2006, the European Union (EU) started to conduct an extensive household survey among its member countries, the so-called European Health Interview Survey (EHIS), which has been applied to individuals over 15 years of age. The survey was optional in its first version (EHIS 1), and 17 European countries participated between 2006 and 2009. With a five-year periodicity, as of its second edition (EHIS 2), the survey became mandatory for all member countries, as decided by the European Parliament. EHIS-2 was applied to all signatories of the bloc, plus Norway and Iceland, from 2013 to 2015, adopting a single questionnaire and sampling and application methodologies to generate harmonic data with high comparability level. The survey was divided into four modules: (1) health status, (2) health services, (3) health determinants, and (4) demographic and socioeconomic variables. Its third version, the EHIS-3, was planned to go into the field in 2019[7].

Some European countries also carry out relevant household surveys. In Portugal, the National Health Survey (INS) is carried out by the

National Institute of Statistics (INE) and covers the entire national territory. Besides collecting sociodemographic data from the individuals interviewed, the questionnaire asks questions about health status, health care, and health determinants[8]. A similar survey has been carried out in Spain, the *Encuesta Nacional de Salud* (ENS), with every five years, it presented its latest results in 2017[9]. Italy is another pioneering country in the development of household health surveys, the *Indagini Multiscopo sulle Famiglie* (IMSF), carried out annually since 1993[10].

The most populous country globally, China carried out its first household health survey involving the 2012-2017 period. The national survey reached 11 of the 23 existing provinces and ten ethnic groups, corresponding to 40% of the minority population in the country. The questionnaire covered socioeconomic and demographic characteristics, lifestyle, and personal and family morbidity. Physiological parameters were also measured through laboratory analyses, anthropometric assessment, physical examination, and additional studies, such as pulmonary function tests and bone mineral density measurements. The blood samples obtained became part of a multiethnic bank for future genetic studies[11].

Another Asian country of similar size, India, also operated a large population study, the National Family Health Survey (NFHS). In its fourth edition, the NFHS (2015-2016) reached all the country's provinces and included socioeconomic, demographic, and housing issues, and health-related issues, such as morbidities, violence, women and children health care, sexual behavior, family planning, lifestyle, nutrition, utilization of health services and insurance coverage. Anthropometric assessment data, blood pressure measurement, and laboratory analysis were also obtained[12].

In Oceania, Australia's national health system has been conducting household surveys for a few decades. The latest version of the National Health Survey (NHS), carried out from 2017 to 2018, brought a variety of data on the composition of the population across the country and information on the health network, health status, chronic morbidities, habits and lifestyles, anthropometric assessment and blood pressure values in the interview[13]. Its neighboring country, New Zealand, has been conducting an ongoing health population survey since 2011, the New Zealand Health Survey (NZHS), which verifies health indicators, habits, lifestyles, and access to the health system, for adults and children across the country. It has also carried out the SoFIE-Primary Care, which used some assessment questions for primary health care from the Primary Care Assessment Tool (PCAT) instrument[14].

Brazilian national population-based household surveys

The Brazilian Institute of Geography and Statistics (IBGE) is the official body of Statistics and Geography in Brazil and the main responsible for conducting national household surveys since the first Demographic Census in 1872. Historically, the National Household Sample Survey (PNAD), created in the 1960s to update population data in inter-census periods, and the Medical-Health Care Survey (AMS), created in the 1970s, are the most extensive Brazilian surveys. Both continue to generate administrative information and show results relevant to health.

The Medical-Health Care Survey (AMS)

The first Brazilian national administrative survey was officially launched in 1975 through an agreement between the IBGE and the Ministry of Health. The Medical-Health Care Survey (AMS) updated administrative data on health establishments. AMS was held annually for an extended period, which ended in 2009[15].

It aimed to characterize the profile of the installed capacity of Brazilian health services, including in its universe all public or private establishments providing health care in the country, outpatient or inpatient care units, and diagnosis, therapy, and control of zoonoses services. Besides listing existing services nationwide, the AMS provides additional information about the types of services provided, facilities, human resources, beds and hospitalizations, and equipment and technologies.

However, in 2002, the Ministry of Health prepared the National Register of Health Establishments (CNES) and gradually stopped supporting the IBGE in preparing the AMS, which is a massive loss for the quasi-census administrative survey periodically recorded unique information. Its last publication, in 2009, innovated by collecting data through an electronic questionnaire directly answered by the informant via the web. The geographic location of each establishment was also registered in this edition, using the global positioning system (GPS), which allowed great precision in the analysis of the spatial distribution of services throughout the Brazilian territory.

National Household Sample Survey (PNAD)

In Brazil, the first health information from a household survey derived from the National Household Sample Survey (PNAD), which was implemented in 1967 to investigate aspects of the population and the household. The PNAD is planned and executed by the IBGE to this day and gradually expanded its scope until reaching national representation in 2004[16].

The survey's frequency varied widely since it was implemented until it became continuous throughout the national territory in 2012. With the creation of the Integrated System of Household Surveys (SIPD), with the Continuous PNAD (PNAD-C) as one of its pillars, IBGE aimed to coordinate the planning and implementation of several other household surveys carried out by the Institute to expand its scope and streamline the use of resources. The SIPD currently brings together the PNAD-C, the National Health Survey (PNS), and the Household Budget Survey (POF). In this context, it established a "master sample" that serves all SIPD surveys, relying on the 2010 Demographic Census to select the area units that build the subsamples for each study[17].

Each quarter, around 200,000 households are visited, and information is collected on work, including child, voluntary and domestic work, and demographic, educational, and housing features, including housing conditions (occupation, water supply, sewage network, bathroom, garbage disposal, electric lighting) and consumer goods (mobile and landline telephone, automobile, motorcycle, television, microcomputer, and Internet connection)[18].

During these years, the PNAD carried out specific approaches to some thematic areas besides its basic questionnaire. In 1981 and 1986, aspects related to reported morbidity, use of health services, food supplementation, and contraception were investigated. Researchers point out some limitations of the 1981 survey, in which there was no independence in questions about morbidity and demand for the health service, and there was also a prefixed date for questions on the same themes (e.g., "From November 1 to November 14, 1981…"), which impaired the quality of the responses as the interview was applied at different times of recall. Only the last problem was fixed in the 1986 version, relating the reference time to the time of the interview (e.g., "In the last two weeks...")[19].

Funded by the Ministry of Health (MS), the 1998 supplement interrupted a ten-year period without population-based health information in Brazil. It was the first in a five-year series of health supplements at PNAD (1998, 2003, 2008). The questionnaire has undergone several adaptations since 1998 and has been gradually expanded to diversify the health characteristics of the surveyed residents (Table 1).

The PNAD-2003 Health supplement[20] maintained the same structure as the 1998 questionnaire. The main changes were removing the topic on private health expenditures and including questions related to access to preventive health services for women aged 25 and over, such as clinical breast examination, mammography, and preventive examination for cervical cancer. Also, a change occurred in the formulation of the questions concerning the investigation of the prevalence of chronic diseases in the population, which started to require a diagnosis provided by a health professional for a positive answer (e.g., "Has some doctor or health care professional health already said that…you have diabetes?), while in 1998, one's self-perception sufficed (e.g., "…you have diabetes").

In 2008, the PNAD[21] Health Supplement tripled in size in the number of questions, receiving some more questions related to health care for women aged 25 years and over, with the characterization of access to preventive exams based on the inquiry about payment, coverage by a health plan or through the SUS, and one more question about hysterectomy. Moreover, the investigation of risk and health protection factors was included with questions on physical activity, leisure activities, use of TV, computer, and video games, tobacco consumption, traffic accidents, use of seat belts, and victims of some type of violence and its impact on usual activities.

In the 2008 PNAD, households registered in the Family Health Program (PSF), the time of registration, and the frequency of visits by the community health worker or a health professional were investigated. In the country, 47.7% of interviewed households declared to be affiliated with the PSF, with a higher percentage in the Northeast region (64.8%), followed by the North (51.0%), South (50.3%), Midwest (49.1%), and Southeast (35.9%).

From PNAD's special supplement to PNS-2013: a life of its own

From 2013, with the support of the Ministry of Health, the Health Supplement of the PNAD-2008 was unlinked from it and gave rise to the Na-

Chart 1. Health characteristics of residents surveyed simultaneously in the Health Supplements of the PNAD/IBGE of 1998, 2003, and 2008.

PNAD-1998	PNAD-2003	PNAD-2008
N° of modules: 7 N° of questions: 84	**N° of modules: 7 N° of questions: 85**	**N° of modules: 13 N° of questions: 242**
Morbidity		
Self-assessment of health status based on a five-degree scale (from "very poor" to "very good") and the impact on usual activities; perceived or diagnosed the presence of any of the listed chronic diseases (spine or back disease, arthritis or rheumatism, cancer, diabetes, bronchitis or asthma, hypertension or high blood pressure, heart disease, chronic kidney disease, depression, tuberculosis, tendonitis or tenosynovitis, and cirrhosis), selected based on three criteria (high prevalence, possibility of intervention, and reliability observed in other studies).	Most of the questionnaire was kept; the most notable change is in questions about the presence of the chronic problems listed; while in the 1998 version, the question was open ("... do you have hypertension?"), in 2003, the existence of the diagnosis began to be questioned based on the claim of a "doctor or health professional", dispensing with people's perception.	There were no changes from the previous questionnaire.
Health plan coverage		
Frequent hiring of health plans (medical and dental); private, business, or public institution; scale evaluation of the plan; socioeconomic and demographic characteristics of people covered by plans; profile of holders, dependents, and extended members; services covered by the plans; expenses incurred with the monthly fees of the plans.	The previous questionnaire is maintained, with the addition of only one question about the type of accommodation (private room or apartment, collective, or infirmary) offered by the plan.	The previous questionnaire is mainly maintained. Only one question about the uninterrupted time to which the respondent is entitled to the plan, and another about the number of health plans the respondent is entitled to, were added.

it continues

tional Health Survey (PNS), which soon became part of the SPID, together with other household surveys by IBGE. Thus, since its first version, the PNS has used the PNAD's "master sample" to define its primary sampling units (PSU), ensuring greater reach and statistical and geographic representation throughout the national territory.

PNS-2013 had 31 modules and 751 questions. It visited 81,167 households, conducting 64,348 interviews with all residents of the same household and 60,202 interviews with residents selected from the 12th module. It was also a pioneer at the Institute by introducing the collection of clinical specimens from respondents, such as blood and urine samples, and submitting them to laboratory analysis. A total of 25% of the census sectors surveyed were indicated for the collection of biological material[22,23].

Since its inception, the PNS has adopted an approach similar to the leading national and international health surveys. This allows, for example, comparing its data with those of the Health Supplements series of the PNAD and the Surveillance of Risk and Protection Factors for Chronic Diseases Survey by Telephone Survey (VIGITEL) of the SVS/Ministry of Health. Also, it started to include topics relevant to public health and of interest to the Ministry of Health[24].

The PNS-2013[25] questionnaire was divided into three parts: (1) home module: with questions for the characterization of the household, including the presence of domestic animals, and on home visits by a Family Health Strategy (ESF) team and an endemic worker; (2) module on the characteristics of all household residents, to analyze the general aspects of individuals, such as

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Access to health services		
Check the habit of using the same health care provider and characterize it (formal, such as pharmacy, hospital, post, clinic, and health professional; or informal, such as spiritist center and healer); frequency of medical and dental appointments	There were no changes from the previous questionnaire.	Questions about continuous-use medications are added; availability of free dispensing or out-of-pocket purchase; other questions were added regarding the service source (plan, private, or the SUS) to the questions about attending the dentist.
Use of health services		
Capture the demand for health-related care, the reason and frequency; service provider type; service consummation or not; public or private service; drug prescription and dispensing in the service; collection and source of payment for the service; the level of satisfaction with the service received; reasons for not looking.	There were no significant changes from the previous questionnaire.	Questions about prescription and access to medications were expanded; questions about the level of user satisfaction with the service were discarded.
Hospitalizaton		
In the 12-month reference period, capture people who were hospitalized and characterize the frequency, duration, reason, care type received; whether public or private service and paying source; service evaluation	There were no changes from the previous questionnaire.	There were no changes from the previous questionnaire.
Physical mobility > 14 years		
To measure the difficulty level with which one performs daily activities based on a progressive scale, identifying their stage of physical limitation. (IBGE, 1998)	There were no changes from the previous questionnaire.	The module has been expanded to include questions about physical activity
Health expenditure	**Access to women prevention services > 25 YEARS**	
Estimate the total expenses with health goods and services: health plan monthly fees, medical and other professional visits, hospitalizations, home nursing, tests, dental treatment, eyeglasses, and orthopedic items. This module was deleted in subsequent editions.	Time since the last clinical breast exam, mammography, and preventive exam for cervical cancer	Questions were added about the source of payment for services (out-of-pocket, health insurance, and the SUS) and about performing a hysterectomy.

Note: The PNAD-2008 incorporated new modules that were not present in the 1998 and 2003 editions: home emergency care, violence, traffic accidents, sedentary lifestyle, tobacco use for the general population, and particular research on tobacco use for people aged 15 or more.

Source: Authors' elaboration

information on education, work, income, education of minors, people with special needs, health plan coverage, use of health services, health status of people over 60, mammography coverage; and (3) module with a selected resident, which included additional questions about work characteristics and social support, perceived health status, accidents and violence, lifestyle, chron-

ic diseases, women's health, prenatal care, oral health, and medical care. The first two modules could be answered by any resident capable of providing these data, and the third by the randomly selected adult aged 18 or over.

Anthropometric data of the selected residents were collected, such as weight, height, and waist circumference, and blood pressure was measured. Interviewers were previously trained to perform these tasks. Part of the individuals was also submitted to blood and urine collection in the indicated laboratory, whose samples analyzed glycated hemoglobin, total cholesterol, LDL, HDL, blood count, hemoglobin S and others, creatinine and serology for dengue, and urinary dosages of sodium, potassium, and creatinine. These samples were stored and became part of a collection of the Brazilian population[26].

Primary Health Care in the PNS-2013

In Brazil, the PNS-2013 was the first survey with a probabilistic sampling of national, regional, and local coverage to verify the reach of PHC services through the Family Health teams (eSF), measuring the percentage of registered households. In total, it was estimated that, in 2013, 34.8 million households were linked to an eSF, making up 53.4% of the total number of Brazilian households. The proportion was higher in the Northeast (64.7%) and lower in the Southeast (46.0%). The share of households registered in urban areas (50.6%) was lower than in rural areas (70.9%); the same relationship was maintained when asked whether they received monthly visits from any member of the eSF team (62.7% among rural households vs. 43.6% in urban areas). This same index was lower in the Southeast (41.6%) and higher in the Midwest (58.3%)[27].

National Health Survey 2019: expanding the scope

Between August 2019 and March 2020, IBGE took the second PNS edition to the field. The scope significantly increased. Several changes were made to the questionnaire, which was expanded, and the sample size, which reached around 100,000 households throughout the country. However, clinical and laboratory parameters measurements were not performed due to logistical difficulties observed in the PNS-2013.

The first part of the questionnaire[28] aimed to characterize the household. Module A ("household information") brought questions about housing characteristics, water supply, sewage, garbage collection, electricity, domestic pets, and consumer goods. The questions in the following modules were oriented to all residents of the household. Module B ("home visits by the Family Health Team and endemic workers") asked about the registration of residents in a family health unit and the visit of members of the eSF, community health workers, and endemic workers.

Module C ("General Characteristics of Residents") aimed to collect demographic and socioeconomic data for all inhabitants. Module D ("Characteristics of Residents' Education") presented a series of questions about the residents' literacy, schooling level, and school attendance. Then, module E ("characteristics of work of people 14 years of age or older"), applied to all individuals from this age group, aimed to characterize work remuneration, removal from work, contract type, and income. This version of the questionnaire started to include other forms of work, such as household chores and the care of other household residents, such as children, older adults, and the sick or people with special needs. Complementing the characterization of people, module F ("income from other sources") investigated whether the family had other sources of income, such as retirement, alimony, and social benefits (BPC-LOAS, Bolsa Família).

Expanded compared to the PNS-2013 questionnaire, module G ("people with disabilities") checked whether any of the inhabitants had any special needs, what type of disability, the degree of limitation, and whether they were accompanied in any rehabilitation service. Module I ("health plan coverage") aimed to determine whether any resident had a particular or private medical/dental health plan, the services offered, the dependents, and the responsible for the payment.

In order to characterize the health status and use of health services by the household's residents, the historic module J ("access and use of health services"), present since the PNAD-1998 supplement, included aspects of limitations the usual activities for health reasons, the description of this reason, limitations caused by chronic problems, type of establishment sought for health care, number of medical appointments in 12 months, the consummation of care when sought and which provider. There were also questions about drug prescription, ways to access them, use of the Popular Pharmacy Program, hospitalizations, emergency home care, and integrative and complementary practices.

Module K ("health of individuals aged 60 years and over") collected information about the individual's autonomy when performing activities with varying degrees of difficulty, the existence of a caregiver, medication use, common morbidities of the age group, and immunization. Module L ("children under two years of age") addressed several issues about the child's health, including information on nutrition, breastfeeding, neonatal screening tests, and registration of vaccination card data.

The following modules were included in the second part of the questionnaire and had to be answered by only one randomly selected resident of the household, aged 15 years or more. Module M ("Job characteristics and social support") went deeper into work-related issues, addressing, for example, on-site environmental exposures. Family and social relationships were also explored in this module. Finally, the individual's self-perceived health status from an expanded perspective was questioned in module N ("perception of health status"), which also asked about specific issues, such as chest pain and other frequent manifestations in some types of mental health disorders.

Module O ("accidents") addressed driving cars and motorcycles, adopting safety measures, and traffic accidents and their consequences. Finally, some of the individual's lifestyle habits were addressed in module P ("lifestyles"), such as diet composition, physical activity, alcohol, and tobacco consumption, commuting means, level of physical effort at work, and use of electronic devices.

Some health conditions were identified in module Q ("chronic diseases"). The questions, in short, dealt with common health issues. In this section, the individual was asked, for example, about whether a doctor had already given a diagnosis of hypertension and diabetes, medication use for this purpose, tests, measures to control them, among other aspects related to these problems. Other morbidities were also included, such as cholesterol alterations, cardiovascular diseases, asthma, osteoarthritis, low back pain and back problems, and mental health disorders such as depression, anxiety disorder, and panic syndrome.

Module R ("women's health aged 15 and over") was intended to investigate access to cervical and breast cancer screening. It also encompassed issues related to menstruation, menopause, reproductive planning, and contraceptive use. Still aimed only at women, module S ("prenatal care") addressed the reproductive history, addressing issues related to routine prenatal care and childbirth.

Geared to oral health, module U brought aspects related to oral hygiene care, dental appointments, and the use of dental prostheses. Module Z ("paternity and partner prenatal care") was applied to men aged 15 or over and was dedicated to collecting information about children and prenatal care, for example.

In the PNS-2019, the questions about violence were expanded and gathered in module V ("violence"), with their privacy assured. The respondents could fill out the form, in which they were asked about different situations of violence, including the perpetrator, the place of occurrence, and its possible consequences.

Module T ("communicable diseases") asked about common symptoms in communicable infectious diseases, such as tuberculosis, Chagas disease, leprosy, and sexually transmitted infections.

Questions from module Y ("sexual activity") were also included in the PNS-2019 questionnaire, aimed at residents aged 18 or over. They explored the age of sexual initiation, habits related to sexual behavior, such as condom use, and the individuals' sexual orientation.

The AA module ("relationships and working conditions") was also created, which contained questions about conflicting situations at work, unwillingness, unhealthy conditions, coercion, degrading conditions, and ensuing health problems. The inclusion of this module followed the recommendations of the International Labor Organization (ILO).

In summary, PNS-2019 included a total of 26 modules and 803 questions and kept practically the same number of questions as PNS-2013 (Chart 2).

The inclusion of the Primary Care Services Assessment Module in the PNS-2019 from the Primary Care Assessment Tool (PCAT)

The PNS-2019 dedicated, for the first time, a fundamental part of its questionnaire to the production of data on PHC services from the perspective of the adult user. The theme is contained in Module H ("Medical Care", replacing the homonymous module in the PNS-2013) and was applied in the individual part of the interview to subjects aged 18 or over. Also, questions from the short version of the Primary Care Assessment Tool (PCAT), one of the main instruments used in the assessment of PHC, were incorporated.

Chart 2. Comparing the National Health Survey Modules (PNS-2019) with the PNS-2013 and PNAD Health Supplements (1998, 2003, 2008).

		N° of questions				
Modules in the PNS-2019		**PNS-2019**	**PNS-2013**	**PNAD-2008**	**PNAD-2003**	**PNAD-1998**
A	Household information	22	24	0	0	0
B	Home visits by Family Health Teams and Endemic Workers	4	4	0	0	0
C	General characteristics of residents	16	12	0	0	0
D	Educational characteristics of residents	18	15	0	0	0
E	Work characteristics of people 14 years of age or older	32	27	0	0	0
F	Income from other sources	9	10	0	0	0
G	People with disabilities	51	23	15	7	7
I	Health plan coverage	9	12	27	24	24
J	Use of health services (*)	56	59	65	51	53
K	Health of individuals aged 60 years and over	37	60	0	0	0
L	Children under two years of age	24	20	0	0	0
M	Characteristics of work and social support	21	20	0	0	0
N	Perceived health status	16	22	0	0	0
O	Accidents	22	48	8	0	0
P	Lifestyles (**)	90	85	108	0	0
Q	Chronic diseases	141	136	0	0	0
R	Women's Health (women 15 years of age or older) (***)	35	49	16	3	0
S	Prenatal care	63	64	0	0	0
U	Oral health	13	19	0	0	0
Z	Partner paternity and prenatal care (men aged 15 or over)	14	0	3	0	0
V	Violence (people aged 18 and over)	21	0	0	0	0
T	Communicable Diseases	6	0	0	0	0
Y	Sexual activity (18 years and over)	8	0	0	0	0
AA	Work relationships and conditions (18 years and over)	43	0	0	0	0
H	Medical care (18 years and over)	30	30	0	0	0
W	Anthropometry (15 years and over)	2	12	0	0	0
	Total:	803	751	242	85	84

Note: The modules highlighted in gray are those that, as of PNS-2013, had only one resident of each household selected to respond to the module, unlike the other modules in which all residents of the same household respond.
(*) In the 1998, 2003, and 2008 PNAD, this module contained the parts on "morbidity", "access to health services", "hospitalization", and "home emergency care".
(**) In the PNAD-2008, the modules on sedentary lifestyle, tobacco use – general questions, and particular research on tobacco use for people aged 15 and over were grouped here.
(***) In the PNAD 2003 and 2008, the scope was smaller, and the module was called "Access to preventive health services for women aged 25 and over".

Source: Authors' elaboration.

The PCAT uses a structured closed-ended question questionnaire to collect data. The most recent manual of the instrument published by the Ministry of Health[29] informs the existence of numerous versions, depending on the target audience, classically adults and children, and adaptations for specific situations, such as the version for health professionals (doctors, nurses, and dentists).

The PCAT is organized from the individual assessment of each of the attributes of primary care, all covered in the questionnaires. Respondents must answer each question with a Likert-type scale in four points: "certainly, yes", "probably, yes", "probably not", "certainly not". They may also abstain, with the answer "doesn't know/doesn't remember". Each answer is assigned a value from 1 to 4 to compose a score through a sim-

ple arithmetic mean. Based on the essential PHC attributes and derivatives defined by Starfield (2002)[30] to formulate its questions, the primary objective of the PCAT is to estimate the level of extension and orientation of service for the PHC, that is, its ability to *provide comprehensive care to its ascribed community from a biopsychosocial viewpoint*[31].

The instrument has been translated into many languages and validated in many countries. In Brazil, its validation and first applications occurred in 2006[32]. A recent review identified 42 publications using the PCAT between 2000 and mid-2016[33]. Of these, the most extensive study considering the number of participants was carried out in Rio de Janeiro, in 2014, with 6,675 respondents.[34] With the PNS-2019, the country became the first to apply the instrument on a national scale with a probabilistic and representative sample of capitals, states (UF), and five main regions of the country[35]. This means that it is possible to calculate confidence intervals for the estimates generated by the instrument's scores, thus ensuring a baseline for future PHC assessment studies in all UFs in the country.

The "PCATool-Brasil for adults" is the reduced version of the instrument incorporated into the H module of the PNS-2019. It was proposed and validated by Oliveira et al.[36] as an alternative capable of streamlining the collection process and using the results, adapting to the already extensive questionnaire of PNS-2019[37].

As stated, even in its abridged version, the PCAT questionnaire is divided among the PHC attributes. All questions related to the last doctor who attended the respondent in a PHC unit. The evaluation of "access - first contact" is made by asking about the identification of this doctor as the first reference when there is a new health problem, about accessibility and agenda. "Longitudinality" is divided into four questions and "care coordination" into six, addressing referral to secondary care and information systems. In the "comprehensiveness" section, questions are asked about the PHC unit's services. Two more sections on "family counseling" and "community counseling" are included.

Final considerations

Population surveys have been developed worldwide, in different contexts and models, holding a relevant position in the production of health information. Over time, limitations were pointed out, and observations were made on the method. For example, data collection on morbidities from the respondent's self-report ("referred morbidity") is based on the subject's perception, a controversial issue for many researchers, who emphasize the need to develop and validate instruments that allow this measure to be more reliable[38]. The increasing "non-response rate" in household surveys has rushed a discussion about possible harm to the quality of the results. The indifference of individuals could be related to the higher number of surveys and a more significant concern with data confidentiality. On the other hand, adherence seems much higher in developing countries[39].

It is essential to ensure the periodicity of surveys to follow up on results on an evolutionary basis. Some countries, such as New Zealand[40], have developed continuing household health surveys, thus providing information in much shorter periods. On the other hand, carrying out household surveys requires high financial investments. In order to maximize the use of these resources, some authors discourage the carrying out of surveys with restricted spectrums, such as those specific to a single disease, carried out in some developing countries. They argue that small addition of funds could broaden their approach and provide more information about the population's health[41].

The several household surveys should seek to harmonize their designs to ensure data comparability. The dissemination of microdata from these surveys, their linkage and anonymization with other databases, and the development of cross-sector interviews are also encouraged[42,43]. IBGE's incorporation of the PCAT in the PNS-2019 questionnaire advances in this direction, producing relevant data on PHC services that can be compared with the results of dozens of studies that use the same tool in Brazil and globally. This measure recognizes the usefulness and importance of the PCAT in assessing this level of care.

The production of comparable information seems even more relevant in the contemporary context of obtaining data in large volume, speed, and variety (Big Data). Currently, browsing data on social networks, personal user information, wearable device records, for example, have been used as data sources. In health, there is also information from medical records in electronic databases. Despite several concerns regarding the use of this information, especially the discussion on privacy, Big Data has been presented as a prom-

ising tool for obtaining health information in the future[44-46].

In response to the demand for real-time information within the COVID-19 pandemic, in 2020, the IBGE managed, in less than three months, to plan and develop the instrument, train interviewers remotely, apply the questionnaire, criticize the database, tabulate, and disseminate, in mid-June 2020, "PNAD COVID-19", a particular version of the survey dedicated to collecting information during the pandemic period. The interviews were carried out by telephone, reaching around 193,000 households per month across the country. Its questionnaire covered sociodemographic, work, and income characteristics, investigated the presence of flu-like syndrome symptoms and, among these, those most associated with COVID-19, and collected information on symptomatic people's search for health facilities, with or without hospitalization.[47] IBGE innovated and, for the first time in its almost 90-year history, it carried out household-based data collection with telephone support and real-time transmission of collected data. This will be a great learning experience and a legacy for the Institute's future population-based research in times of health crisis.

Collaborations

VSTM Silva structured the review paper. LFP critically reviewed and validated the final version.

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Article submitted 01/08/2020
Approved on 10/09/2020
Final version submitted 12/09/2020

Chief editors: Maria Cecília de Souza Minayo, Romeu Gomes, Antônio Augusto Moura da Silva.