

The implantation of the Surveillance System for Non-communicable Diseases in Brazil, 2003 to 2015: successes and challenges

A implantação do Sistema de Vigilância de Doenças Crônicas Não Transmissíveis no Brasil, 2003 a 2015: alcances e desafios

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ABSTRACT: *Objective:* To describe the implantation of the Surveillance System for Noncommunicable Diseases (NCDs) in the Unified Health System (*Sistema Único de Saúde*) and the challenges in maintaining it. *Methods:* A literature review was carried out the information contained in federal government directives between 2003 and 2015 was consulted. *Results:* A comprehensive risk and protection factor surveillance system was implemented. It is capable of producing information and providing evidence to monitor changes in the health behavior of the population. Among the advances cited are the organization of epidemiological surveys, such as the Surveillance System for Risk Factors and Protection for NCD (*Sistema de Vigilância de Fatores de Risco e Proteção para DCNT – Vigitel*), the National School Health Survey (*Pesquisa Nacional de Saúde do Escolar – PeNSE*), and the National Health Survey (*Pesquisa Nacional de Saúde*) from 2013, which enabled the most extensive health diagnosis of the Brazilian population. In 2011, the NCD National Plan 2011-2022 established targets for reducing risk factors and NCD mortality. *Conclusion:* The information gathered from the NCD surveillance system can support the implementation of sectoral and intersectoral strategies, which will result in the implementation of the Brazilian Strategic Action Plan for the prevention and control of NCDs, as well as the monitoring and evaluation of their results periodically. Finally, it can be a very important tool to help Brazil achieve the goals proposed by the 2030 Agenda for Sustainable Development and the Global Plan to Tackling NCDs.

Keywords: Surveillance. Chronic diseases. Tobacco. Risk factor. Public policies. Health promotion.

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Conflict of interests: nothing to declare – **Financial support:** none.

RESUMO: *Objetivo:* Descrever a implantação do Sistema de Vigilância de Doenças Crônicas Não Transmissíveis (DCNT) no Sistema Único de Saúde e os desafios colocados para sua sustentabilidade. *Métodos:* Foram feitas revisão de literatura e consultas às informações contidas em portarias do governo federal entre 2003 e 2015. *Resultados:* Foi implantado um sistema de vigilância de fatores de risco (FR) e proteção integrado, capaz de produzir informações e fornecer evidências para monitorar mudanças nos comportamentos de saúde da população. Dentre os avanços, foram citados a organização dos inquéritos epidemiológicos, como o Sistema de Vigilância de Fatores de Risco e Proteção para DCNT (Vigitel), a Pesquisa Nacional de Saúde do Escolar (PeNSE), e a Pesquisa Nacional de Saúde (PNS), em 2013, que possibilitou o mais amplo diagnóstico de saúde da população brasileira. Em 2011, o Plano de Enfrentamento de DCNT 2011 – 2022 estabeleceu metas para redução de FR e mortalidade por DCNT. *Conclusão:* A produção de informações do Sistema de Vigilância de DCNT pode apoiar a implementação de estratégias setoriais e intersetoriais, que resultem no apoio à execução do Plano de Ações Estratégicas para o Enfrentamento das DCNT, bem como monitorar e avaliar os resultados periodicamente. Constitui ferramenta relevante para o alcance das metas e dos Objetivos do Desenvolvimento Sustentável e do Plano Global de Enfrentamento das DCNT.

Palavras-chave: Vigilância. Doenças crônicas. Tabaco. Fator de risco. Políticas públicas. Promoção da saúde.

INTRODUCTION

Non-communicable diseases (NCDs) constitute a major global health problem and have generated a high number of premature deaths, loss of quality of life, disabilities, as well as economic impacts for families and countries' economies¹. The World Health Organization (WHO) estimates that NCDs account for about 70% of all deaths worldwide².

In Brazil, NCDs are also some of the greatest health problems and correspond to about 75% of the causes of death, according to data from the Global Burden of Disease Study 2015³.

NCDs have multifactorial causes and share several risk factors (RF). Accumulated evidence points to the need for comprehensive and sustainable strategies for the prevention and control of NCDs, based on their main modifiable RFs: smoking, physical inactivity, inadequate diet, obesity, dyslipidemia and alcohol consumption^{1,4-6}. For the monitoring of these diseases and their RF, the surveillance of NCDs is essential. It is important for public health, which aims to subsidize the planning, execution and evaluation of prevention and control efforts^{6,7}.

In order to strengthen surveillance, there is a pressing need to invest in the improvement of coverage and quality of mortality data with the conduct of regular RF surveys⁶. According to Doll⁸, the objectives of prevention and control of noncommunicable diseases are: to reduce their incidence and prevalence; to delay the onset of complications and disabilities; to lessen their severity; and to prolong a good quality of life. The surveillance of NCDs must combine a set of actions that provides information as to the distribution, magnitude and tendency of these diseases. The main sources of data in Brazil are morbidity and mortality information systems and periodic health surveys^{4,9,10}.

Brazil has taken important steps in NCD surveillance in the last decade^{4,6}. The current article describes the implementation of the NCD Surveillance System in the Unified Health System (*Sistema Único de Saúde*—SUS) and the challenges in maintaining it.

METHODOLOGY

To analyze the implementation of NCD surveillance, the period from 2003 to 2015 was chosen. It begins with the creation of the Health Surveillance Secretary (SVS) and the implementation of several actions that will be analyzed in this study.

A literature review and a consultation of the information contained in federal government directives between 2003 and 2015, documents and institutional publications from the Ministry of Health (MH), consultations of the MH website, books and scientific articles were carried out to search for data on the subject of NCD surveillance. Bibliographical research was also carried out through the Virtual Health Library Base (*Biblioteca Virtual em Saúde* – BIREME) with the following descriptors: surveillance of NCDs, health promotion and intersectoriality.

The aim was to organize the results based on the WHO's theoretical framework of how to organize the surveillance of NCDs⁷, using the scope of the guidelines defined by the first Agenda of Priority in NCD from 2005 as an analysis axis. They are characterized by:

1. The implementation of RF surveillance and protection;
2. The management of the Surveillance System, technical support and training of managers, and financing;
3. The influence of health promotion actions, and the prevention and control of NCDs; and
4. The monitoring and evaluation of interventions^{4,9}.

There was no need to submit this study to the research ethics committee, since it was conducted using a secondary database, that is, of public domain, which does not reveal names. It is in accordance with Decree No. 7,724, dated May 16, 2012, and Resolution No. 510, of April 7, 2016.

RESULTS

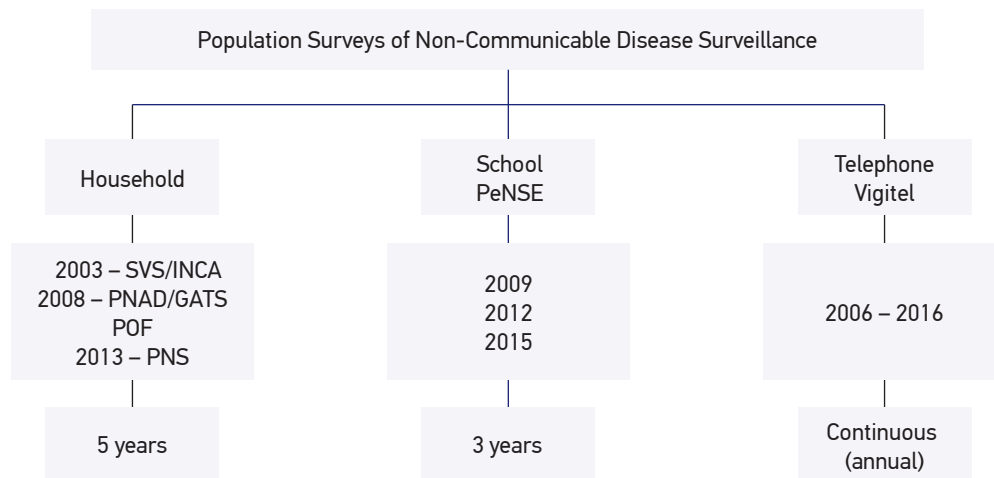
The creation of the National Center for Epidemiology (Cenepi) and the National Health Foundation (FUNASA), which were the first initiatives aimed at dealing with the issue, provided the structure for NCD surveillance. In 2003, the SVS was created within the framework of the MH. It brought together all surveillance actions, including the prevention and control of communicable and non-communicable diseases. The Department of Health Situation Analysis (*Departamento de Análise de Situação de Saúde* – DASIS) and the General Coordination of Surveillance of Noncommunicable Diseases (*Coordenação Geral de Vigilância de Doenças*

e Agravos Não Transmissíveis –CGDANT) were created within it. Ten years later, in 2013, DASIS was transformed into the Department of Surveillance Noncommunicable Diseases and Health Promotion (*Departamento de Vigilância de Doenças e Agravos Não Transmissíveis e Promoção da Saúde* – DANTPS). CGDANT’s mission was to implement the surveillance of Non-communicable Diseases (*Doenças e Agravos Não Transmissíveis* – DANT) within SUS^{4,9}.

In 2004, the first DANT Surveillance Workshop at the Brazilian Epidemiology Conference (*Congresso de Epidemiologia da Associação Brasileira de Saúde Coletiva* – ABRASCO)¹¹ demonstrates this initial effort. It was then followed by regional DANT surveillance forums, held in 2004, which established consensus and defined monitoring indicators¹¹. In September of 2005, the First National Seminar on DANT and Health Promotion was held, with the participation of state and municipal managers. At this seminar, the National Agenda for NCD was agreed upon. It is detailed below^{4,6,9}.

IMPLANTATION OF THE SURVEILLANCE OF RISK FACTORS AND PROTECTION

Initially, questionnaires were used to obtain a “minimum set” of self-reported information about RF for NCD. Future research should also use anthropometric measures followed by physical measurements and the collection of laboratory tests⁷. These steps allowed for the construction of NCD surveillance, which incorporated information from the Health Information Systems (*Sistemas de Informação em Saúde* –SIS) and implemented population surveys (household, telephone and school) in the following years (Figure 1).



NCDs: Non-communicable diseases; SVS: Health Surveillance Secretary; INCA: National Cancer Institute; PNAD: National Household Sample Survey; GATS: Global Tobacco Adult Survey; HBS: Household Budget Survey; PNS: National Health Survey; PeNSE: National School Health Survey; Vigitel: Risk Factor Surveillance and Protection System for Noncommunicable Diseases.

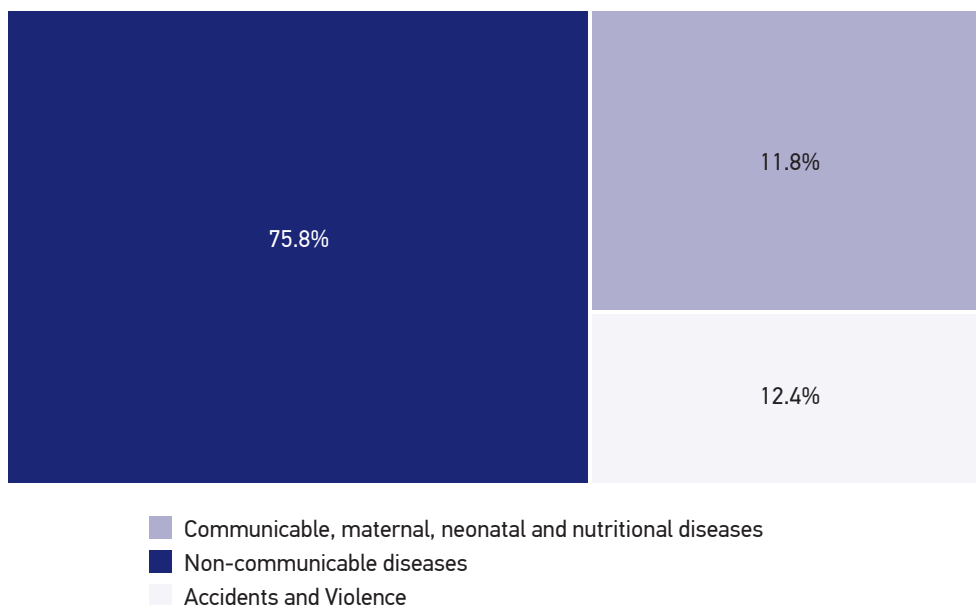
Figure 1. A diagram of population surveys regarding risk factor and protection surveillance of noncommunicable diseases, Brazil, 2003 to 2016.

Health Information Systems

Among the SIS, the Hospital Information System of SUS (SIH-SUS) stands out in the monitoring of morbidity and mortality of NCDs. It contains data on diagnoses of those admitted to the hospital, expenses, trends, and other systems such as: the Authorization of High Complexity Procedures (*Autorização de Procedimentos de Alta Complexidade* APAC), which provides information on highly complex procedures; the Basic Attention Information System (*Sistema de Informação de Atenção Básica* – SIAB), which contains data on basic care procedures; the Population Base Cancer Registries (*Registros de Câncer de Base Populacional* – RCBP) and the Hospital Registry of Cancer (*Registros Hospitalares de Câncer* – RHC), which provide estimates regarding the incidence of cancer, survival and mortality; and the Mortality Information System (*Sistema de Informações sobre Mortalidade*–SIM), which collects information on the causes of death and their trends^{9,10,12}. SIM data from 2015, which was corrected for underreporting and garbage codes and used the methodology of the Global Burden of Disease study, showed a proportional mortality rate for NCDs in Brazil of 75.8%, followed by deaths due to external causes (12.4%) and deaths due to transmissible, maternal, neonatal and nutritional diseases (11.8%) (Figure 2)

Risk Factor Surveys

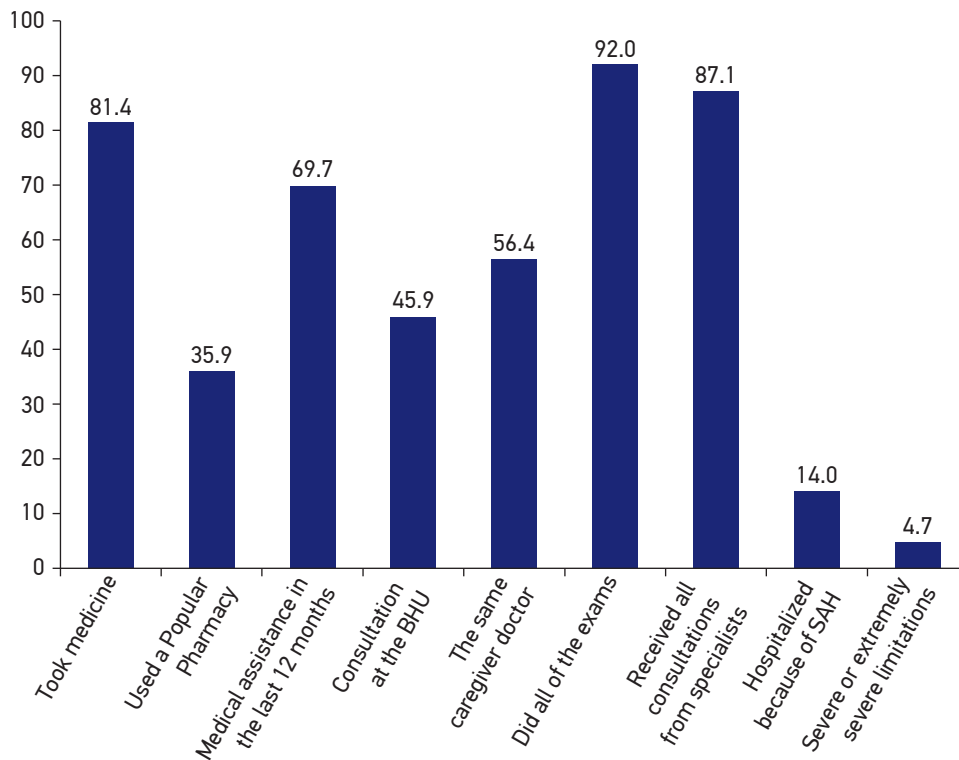
1. Household surveys: they were planned to be carried out every five years. The first, in 2003, covered 16 capital cities¹³. From 2002 - 2003 and from 2008 - 2009, the Brazilian



Source: Global Burden of Disease Study, 2015 (<http://vizhub.healthdata.org/gbd-compare/>).

Figure 2. Proportional mortality according to large groups, Brazil, 2015.

Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*—IBGE) carried out the Family Budget Survey, with added on questions regarding the acquisition and consumption of food and including a nutritional evaluation¹⁴. In 2008, the National Household Sample Survey (*Pesquisa Nacional de Amostra por Domicílios*—PNAD) included modules related to NCDs, physical activity and the Global Tobacco Adult Survey (GATS), which incorporated data on tobacco and provided international comparisons^{15,16}. Finally in 2013, the IBGE, in partnership with the MS, carried out the country's largest home-based survey in about 64 thousand households. Most health topics were included, such as NCDs, RE, elderly, women, children, use of services, health inequalities, and physical and laboratory measurements^{17,18}. Among the results, the prevalence of some NCDs reached up to 45% of the population¹⁸⁻²¹. Hypertension was reported in 21.4% of people, with a 95% confidence interval (95% CI) 20.8 - 22.0. Of these, 45.9% reported having received their most recent medical care at a UBS, 81.4% reported taking medications for hypertension; 92.0% reported having completed all of the complementary tests requested (Figure 3). These data point to the importance of SUS in providing care to NCDs and in reducing inequities²⁰⁻²².



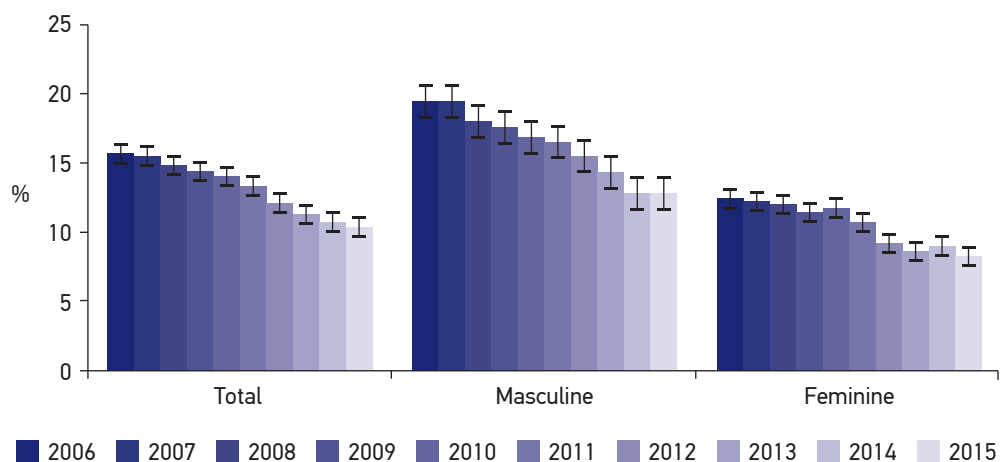
BHU: basic health unit; SAH: systemic arterial hypertension.

Figure 3. Population with arterial hypertension aged 18 years or older, according to assistant care markers, National Health Survey, Brazil, 2013.

2. Telephone Surveys: the Surveillance System of Risk Factors and Protection for NCDs (Vigitel) was started in 2006 with an annual sample of about 54 thousand telephone lines. Adults were interviewed in the 26 Brazilian capitals and in the Federal District. Vigitel completed a decade of collections, and it is the most well maintained survey among all public health research in the country. It uses the rake method to post-stratify information²³. Vigitel allows for the monitoring of temporal trends and it accompanies policies that are priorities, such as tobacco control, reduction of alcohol abuse, promotion of physical activity, among others (Figure 4).
3. School-based surveys: they were planned to be held every three years, beginning in 2009 with the National School Health Survey (*Pesquisa Nacional de Saúde do Escolar—PeNSE*), which collected information from ninth-grade Brazilian high school students. Three editions were held in 2009, 2012 and 2015²⁴⁻²⁶. In 2015, adolescents aged 13 to 17 years old and from the sixth grade of middle school to the third year of high school were included. The sample was expanded in succession²⁴.

MANAGEMENT OF THE SURVEILLANCE SYSTEM, TECHNICAL SUPPORT, MANAGER TRAINING, AND FINANCING

In these 12 years of NCD surveillance, there were numerous training processes, seminars, debates, technical visits, and the like, which aimed to broaden the understanding on the topic of surveillance and health promotion. They included SUS professionals and managers from different states and municipalities²⁷. Distance education (*ensino a distância—EAD*) was developed, with an emphasis on the partnership with the Federal University of Rio Grande do Sul



Significant reduction in the period in all strata $p < 0.001$. Showed 33.8% for the total, 34.4% for males, and 33.1% for females.

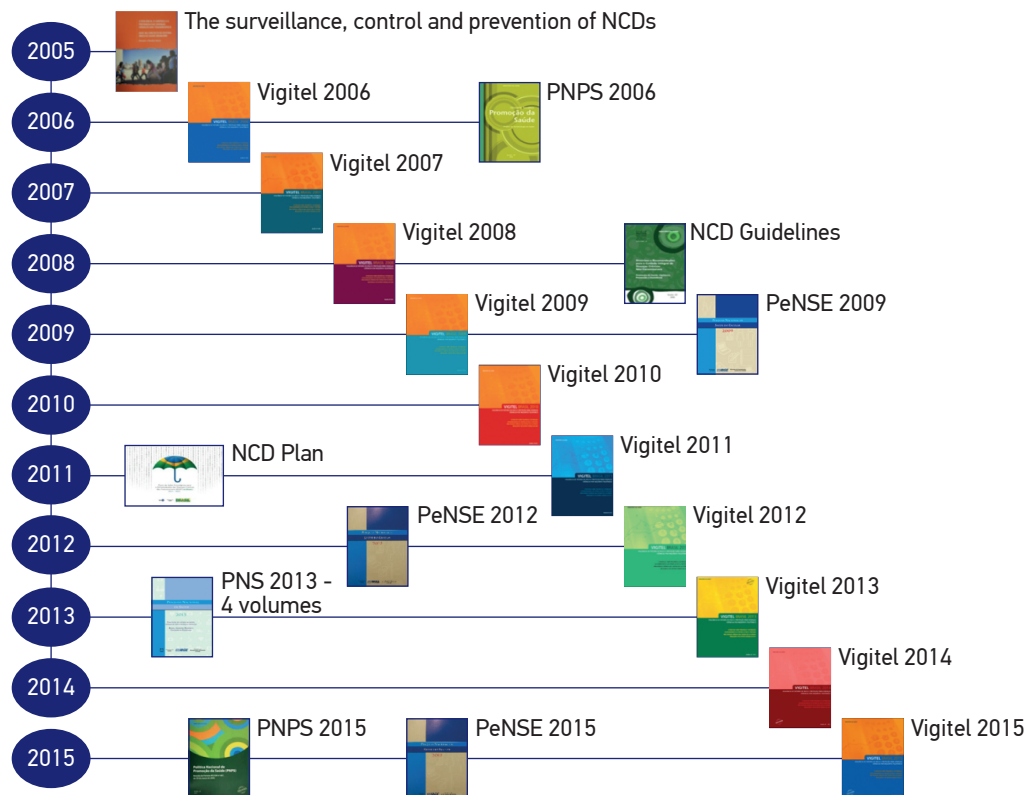
Figure 4. Temporal smoking trend, in all of the Brazilian capital cities, Vigitel 2006 to 2015.

(UFRGS) and the State University of Rio de Janeiro (UERJ), which resulted in four editions of EAD on NCD surveillance between 2010 and 2013. It had about 1,200 people enrolled²⁷.

Several books, reports and educational materials were published for the training of health professionals and managers, as well for advertising, as the technical information contained in the reports was disseminated to the national press and to the entire population through press releases, interviews and publications on sites²⁸. Some of the publications on NCDs can be observed in Figure 5.

Among the publications there are:

- in 2005, NCD Surveillance, which launched the conceptual base for the area; it was released at the same time as the WHO publication, NCD, a Vital Investment^{4,5};
- in 2007, the Carmen Network Assessment Guide, which highlights the importance of the evaluation of NCDs²⁹;
- in 2008, Comprehensive NCD Guidelines launched the concept of the comprehensive NCD care line, which contains health promotion, prevention, surveillance and comprehensive care³⁰;



NCDs: chronic non-communicable diseases; Vigitel: Risk Factor Surveillance and Protection System for Noncommunicable Diseases; PNPS: National Health Promotion Policy; PeNSE: National School Health Survey; PNS: National Health Survey.

Figure 5. Non-Communicable Diseases disease surveillance publications, 2005 to 2015.

- in 2011, the NCD Tackling Plan, which culminated in commitments and priority agendas^{31,32};
- other relevant publications include Vigitel's annual reports^{23,33}; and
- PeNSE²⁴ reports and the National Health Survey (PNS)²¹.

Another fundamental element is the partnership with educational and research institutions, which supported the structuring of NCD surveillance, through participating in scientific committees and seminars, supporting distance education courses, performing data analysis, preparing the NCD Tackling Plan, among others³¹.

Financing was another important instrument for institutionalizing and creating policies. Between 2006 and 2010, approximately R\$171 million was transferred to state secretaries in addition to 1,500 municipal health secretaries from all regions of the country²⁷. With these resources, public managers structured the coordination of NCD surveillance and population-based cancer registries, and developed health promotion projects, advertising and funding. In 2011, funds were used to finance the implementation of the Action Plan Strategies for Tackling Non-Communicable Diseases in the federal units and the capital cities. After 2012, financial resources for these actions were included in the financial ceiling of health surveillance³⁴.

THE CREATION OF ACTIONS TO PROMOTE HEALTH, PREVENTION AND CONTROL OF NON-COMMUNICABLE DISEASES

Two key actions stand out:

1. Action Plan Strategies for Tackling NCD in Brazil. In September of 2011, the United Nations (UN) convened a high-level meeting on the subject of NCDs, urging countries to make commitments to address these diseases³⁵. The meeting was attended by representatives of governments from countries around the world, and resulted in commitments that materialized later in the Global NCD Plan, which set targets for the reduction of NCDs and their RF³⁶. President Dilma Rousseff presented the Action Plan Strategies for Tackling Non-Communicable Diseases in Brazil at the High Level UN Meeting^{31,32,37}.

The plan encompassed the four main groups of NCDs (cardiovascular, cancer, chronic respiratory and diabetes) and their modifiable RF (smoking, alcohol, physical inactivity and inadequate diet) on three strategic axes:

1. surveillance, information, evaluation and monitoring;
2. health promotion; and
3. comprehensive care, as well as goals and commitments assumed by Brazil^{31,32}.

The actions from the NCD Plan carried out between 2011 and 2015 have been described in previous publications, with important advances being highlighted. The studies

- emphasize surveillance and monitoring of objectives; actions for health promotion and prevention of NCDs, such as confronting RFs, and the strengthening of health care systems to include a NCD approach³⁸⁻⁴⁰.
2. The approval of the National Health Promotion Policy (*Política Nacional de Promoção da Saúde* – PNPS) in 2006 and its broad and participatory review in 2014, which prioritized actions to tackling NCDs while encouraging healthy eating, physical activity, and the prevention of tobacco use and alcohol^{27,41}.

The monitoring and evaluation of interventions

The implemented surveillance system allows for the monitoring of the reach of the implemented policies, which include tobacco control, through research and trend analysis. Figure 4 shows the temporal trend of Vigitel in Brazilian capital cities and points out that tobacco prevalence declined in a statistically significant way from 15.0% in 2006 to 10.8% in 2015, thus proving the success of the tobacco control policies in the country^{23,42}. Likewise, Vigitel's monitoring of alcohol consumption pointed to the reduction of this practice⁴³, as well as an increase in the levels of physical activity in Brazilian capital cities⁴⁴.

The evaluations of physical activity practice programs conducted in municipalities were also carried out by means of the Useful Physical Activity Assessment Guide (*Projeto Guia Útil de Avaliação em Atividade Física*—GUIA). This partnership involved the SVS, the Pan American Health Organization (PAHO), the United States Center for Disease Control and Prevention (CDC), several national universities, and Saint Louis University in the United States⁴⁵⁻⁴⁸. These evaluations showed that community-based physical activity projects are efficient strategies for increasing physical activity levels in the population⁴⁵⁻⁴⁸.

DISCUSSION

Among the advances observed in the implementation of the surveillance of NCD risk factors, the epidemiological surveys and the 2011-2022 NCD Tackling Plan are cited. In the latter, the PNS is highlighted, because it enabled the most diagnoses in the Brazilian population.

NCD surveillance differs in relation to transmissible disease surveillance in terms of methods and objectives⁶. Transmissible disease surveillance needs to identify each individual case for the adoption of appropriate control measures. Therefore, it focuses on compulsory and immediate reporting of suspected cases, followed by an investigation aimed at disrupting the chain of transmission. NCD surveillance does not focus on individualized cases, but rather uses multi-causal chains of determination. Furthermore, health prevention and promotion measures are performed throughout the entire population^{6,49}.

NCD surveillance in Brazil implemented these ideas, and a powerful disease and RF monitoring system was created through secondary data from information systems and surveys, as well as actions to protect population health, such as the regulation of tobacco-free environments⁴².

Vigitel has been a continuous monitoring tool for health promotion and prevention interventions. One example is tobacco control, whose actions are based on the best global evidence available for the reduction of smoking^{2,40,42}. Law No. 12,546 regarding smoke-free environments from December of 2011, banned smoking in communal areas, increased cigarette taxation to 85%, set a minimum price for the sale of cigarettes, as well as increased the space for warnings on cigarette packaging^{40,42}. Data from Vigitel show a continued decline in smoking, and indicate that the goal from the NCD Plan of reducing the prevalence of smoking by 30% will be superseded^{36,39}. Brazil has been considered an example in the fight against tobacco by several global organizations, such as the WHO, the Bloomberg Foundation and PAHO, and it has received awards for the measures it implemented²⁷. To prevent the harmful use of alcohol, alcohol prohibition and driving laws have been applied, which have shown a reduction in the practice⁴³.

Another important element of the NCD surveillance system was its articulation with national and international universities in order to carry out evaluations of health promotion interventions. The main initiative was the evaluation of the Health Academy Program, launched in 2011, which aimed at stimulating corporal practices and physical activity as a central feature of its actions, as well as stimulating healthy eating, violence prevention and other practices²⁷. Program evaluations in Pernambuco and Belo Horizonte demonstrated their importance in improving the practice of physical activity of the their populations^{47,48}.

Another initiative of the surveillance system was the monitoring done by the National Agency for Sanitary Surveillance (*Agência Nacional de Vigilância Sanitária*—ANVISA) with regard to the contents of food labeling and the sodium content of processed and ultraprocessed foods, according to the Brazilian Association of Food Industries (*Associação Brasileira das Indústrias de Alimentos*—ABIA) in 2011, in accordance with the recommendations of the Healthy Eating Guide published by the MS in 2014^{50,51}. It is also worth noting the contribution of the PeNSE, which guides and monitors school interventions and incentivizes intersectorial actions^{27,50}.

The surveillance system made it possible to monitor the plan's goals until 2015 and put the country in global prominence. In a WHO publication in 2015, Brazil was recognized, alongside Costa Rica, as one of the most promising countries in the monitoring of NCDs, because it was able to report the completion of 14 goals and commitments⁵².

Another contribution of the surveillance system is the monitoring of comprehensive care, particularly the screening programs for breast and cervical cancer⁴⁰. The PNS also makes it possible to monitor pharmaceutical care programs and the Popular Pharmacy, which refers to access to medicines for hypertension, diabetes and asthma (antihypertensives, insulins, hypoglycemic agents, among others)⁴⁰. The PNS pointed out that attention to

NCDs in the SUS reduced existing inequities, especially with regard to access to basic care and medication^{19,20,21}.

The NCD surveillance system presents challenges and limitations, such as advancing the training of technicians at the state and municipal levels to analyze SIS databases, which would strengthen surveillance in the states. The biggest challenge is the continuity and sustainability of the system and the agenda of surveillance, prevention, health promotion and comprehensive care of NCDs. There are numerous commitments made with regard to monitoring the goals of the Global NCD Plan³⁶ and the Agenda for Sustainable Development in 2030⁵³, which must be maintained. Other topics to be included are the future incorporation of information regarding health plans in the SIS, as well as the revision of the PNS' laboratory collection. Experiences from other countries in laboratory collection, such as in the United States with the National Health and Nutrition Examination Survey (NHANES)⁵⁵ and in Chile may contribute to the improvement of the Brazilian model.

CONCLUSION

The consolidation of NCD surveillance made it possible to organize actions aimed at the monitoring of RF, morbidity and mortality of NCDs; actions and programs for the prevention of NCDs, health promotion, and comprehensive care for people with NCDs. Investments were also made in expanding access to health services, medicines and diagnostic support. Also worth mentioning are the investments made into human resources training, the development of public policies and, finally, the creation of the Strategic Action Plan Strategies for Tackling NCD, Brazil 2011-2022, which is considered a milestone. There are still challenges in maintaining these actions in the face of health spending cuts that were approved for the next 20 years, with Constitutional Amendment 95. It will be up to organized civil society and educational and research institutions to demand the continuation of actions that are so essential to the Brazilian population.

ACKNOWLEDGEMENTS

The authors would like to thank the staff of the Department of Surveillance of Noncommunicable Diseases and Health Promotion, those that were contracted by PAHO and other partners that have helped to build this collective work over the years. We thank the leaders of SVS and MS over the years for the political choice of structuring NCD surveillance. We are grateful for the partnership with the teaching and research institutions, with technicians from the areas of NCD from the State Secretaries of Health and Municipal Secretaries of Health, who contributed to the construction of the NCD Surveillance. Deborah Carvalho Malta would like to thank the National Council for Scientific and Technological Development (CNPq) for the research productivity grant.

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Received on: 01/19/2017

Final version presented on: 03/20/2017

Accepted on: 04/05/2017