Epidemiological Report

Noncommunicable Diseases (NCD):
Unconditional probability of premature death from Noncommunicable Diseases
Historic Series 2015 – 2020

Luciane Simões Duarte◉, Mirian Matsura Shirassu◉, Marco Antonio de Moraes◉

Division of Noncommunicable Diseases
Epidemiological Surveillance Center "Prof. Alexandre Vranjac"
Disease Control Coordination
Sao Paulo State Health Department

Correspondence
E-mail: dvdcnt@saude.sp.gov.br
Institution: ESC|DCC/SHD-SP
Address: Av. Dr. Arnaldo, 351 - 6th floor. CEP: 01246-000. Sao Paulo-SP, Brazil

BRIEF HISTORY OF INJURY/DISEASE

About 70% of all deaths in the world are caused by noncommunicable diseases (NCDs).[1] Among them, cardiovascular diseases are the main cause for deaths from NCDs, followed by malignant neoplasms, chronic respiratory diseases and diabetes.[1] More than 80% of premature deaths (adults aged 30 to 69 years) from NCDs occur due to these four groups.[1]

In 2011, the Ministry of Health launched the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil 2011-2022. However, as this document expires, and in response to the new agreement on the Sustainable Development Goals (SDGs), the Strategic Action Plan to Combat Chronic Noncommunicable Diseases, known as the DANT Plan,[2] was prepared for 2021-2030, including accidents and violence, that is, noncommunicable diseases. Thus, the new plan reaffirms and expands the previous proposals and presents itself as a guideline for DANTs.[2]

To achieve the global SDG proposals, the plan establishes five NCD indicators, as well as targets to be achieved by the country by 2030. The indicators and targets are: 1) reduce by 1/3 the standardized rate of premature mortality (30 to 69 years old) from NCDs; 2) reduce by 1/3 the unconditional probability of premature death (30 to 69 years old) from NCDs; 3) reduce premature mortality (30 to 69 years) from breast cancer by 10%; 4) reduce premature mortality (from 30 to 69 years old) from cervical cancer by 20%; and 5) reduce premature mortality (30 to 69 years) from cancer of the digestive system by 10%.[2]

The objectives of this epidemiological bulletin on NCD surveillance are to present the monitoring of the unconditional probability of premature death from NCDs in the state of São Paulo (SSP) and in Brazil, for the period from 2015 to 2020, as well as to analyze the achievement of the target recommended in the SDGs and in the DANT Plan.

RISK FACTORS

Smoking, consumption of alcoholic beverages, unhealthy diet and sedentary lifestyle are the four main risk factors for developing NCDs,[1] which can be modified by behavior change. In this sense, the importance of governmental actions is emphasized, with the adoption of regulatory measures or reduction of commercialization, consumption and exposure of products harmful to health.[2]

METHOD OF EPIDEMIOLOGICAL SURVEILLANCE

The unconditional probability indicator of premature death from NCDs estimates the chance that an individual aged 30 years will die before reaching the age of 70 from any of the four main NCDs: cardiovascular diseases, malignant neoplasms, chronic respiratory diseases and diabetes mellitus. This indicator was measured according to the DANT Plan.[2] Initially, the age-specific mortality rate was calculated for each five-year age group, according to the formula: (rate × 5)/(1 + rate × 2.5). Finally, the probability was reached through the equation: 1 – product (1 – specific rate for the age group).[2] Regarding deaths, the following codes from the International Classification of Diseases version 10 (ICD-10) were considered: I00-I99 (cardiovascular diseases), C00-C97 (malignant neoplasms), J30-J98, except J36 (chronic respiratory diseases), and E10-E14 (diabetes mellitus).[2] The data source referring to the resident population and deaths was Datasus, from the Ministry of Health.[3]

It is recommended to reduce the unconditional probability of premature death from NCDs by 30% by 2030, so there is a need to reduce the rate by 2% per year, as 2015 was adopted as the base year.[2] To measure the percentages of this reduction in the period, the difference between the rates of consecutive years is taken, divided by the rate of the initial year of the calculation and multiplied by 100.
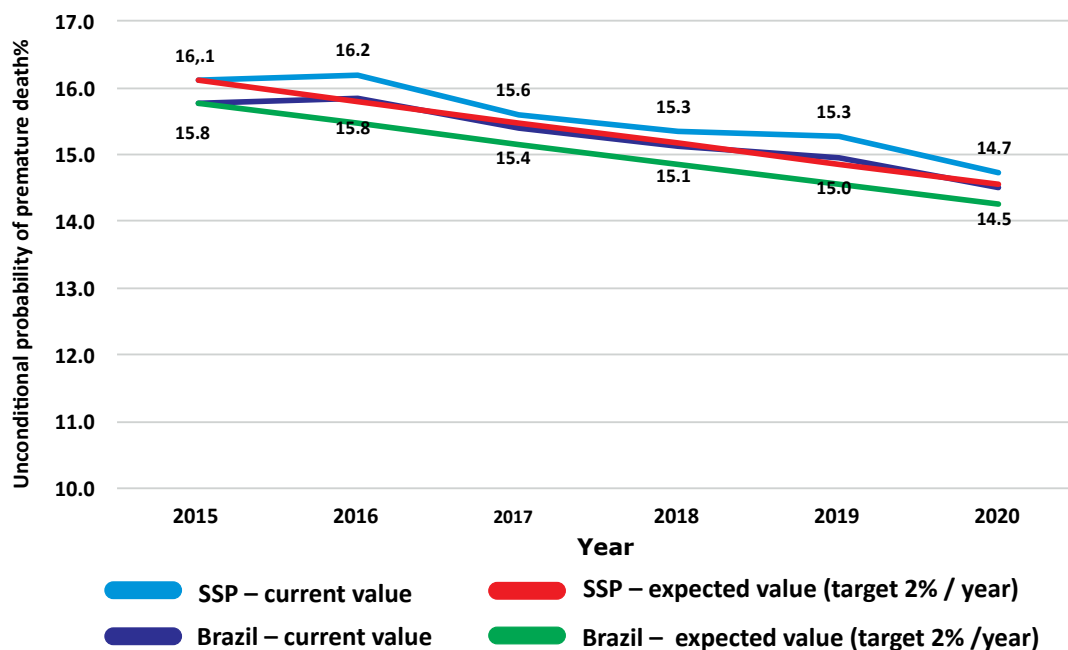
The 30-year lower limit represents the point in the life cycle at which the risk of mortality, from the four selected chronic diseases, begins to increase in most populations. The upper limit of 70 years was chosen for two reasons. The first, to identify an age group in which these deaths from chronic diseases can be considered truly premature in almost all regions of the world; second, the estimation of mortality rates from specific causes becomes increasingly uncertain at older ages due to the increasing proportions of deaths coded as ill-defined causes, increasing levels of comorbidities and the lack of information about age in the sources of mortality and population data.[4]

EPIDEMIOLOGICAL SITUATION

Unconditional probability of premature death for the total population in the SSP and Brazil

In the period from 2015 to 2020, there was a reduction in the estimated probability of dying from NCDs in the SSP and in the country (Graph 1). In 2020, a 30-year-old individual residing in the SSP had a 14.7% chance of dying before reaching the age of 70, while a resident in Brazil had a 14.5% chance. In the case of São Paulo, the percentage change for the period was negative and equal to -8.7% and for the national case it was also negative and equal to -8.2%. Although the goals for the year 2020 were not reached, the values were close to what was established, both for the SSP and for Brazil (Table 1).

Graph 1. Monitoring the unconditional probability of premature death, present value and expected value, in the SSP and in Brazil, 2015 to 2020.*

Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

Table 1. Unconditional probability of premature death, present value and expected value, in the SSP and in Brazil, 2015 to 2020.
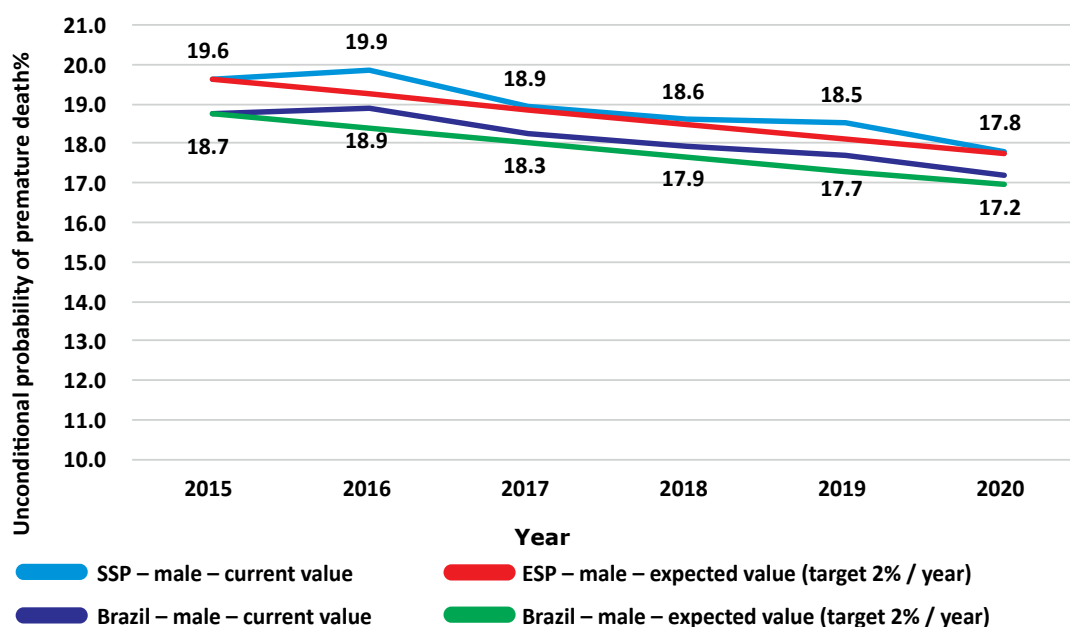
Year	2015	2016	2017	2018	2019	2020
SSP – current value	16.1	16.2	15.6	15.3	15.3	14.7
SSP – expected value (target 2%/year)	16.1	15.8	15.5	15.2	14.9	14.6
Brazil – current value	15.8	15.8	15.4	15.1	15.0	14.5
Brazil – expected value (target 2%/year)	15.8	15.5	15.2	14.9	14.6	14.3

Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

Unconditional probability of premature death for males in the SSP and in Brazil

In the period from 2015 to 2020, there was a reduction in the estimated probability of dying prematurely from NCDs among men in the SSP and in Brazil (Graph 2). In the SSP, the percentage change for the period was negative and equal to -9.2%, reaching the target established for 2020, while for the country the change was also negative and equal to -8.0%. In 2020, a 30-year-old man residing in São Paulo had a 17.8% probability of dying before reaching 70 years of age, while a man residing in the national territory had a 17.2% probability ([Table 2]). It is important to note that men living in São Paulo and Brazil have an unconditional probability of premature death from NCDs greater than that estimated for Latin America, which is around 16.0%.

Graph 2.Monitoring the unconditional probability of premature death for males, current value and expected value, in the SSP and in Brazil, 2015 to 2020*.

Table 2. Unconditional probability of premature death for males, current value and expected value, in the SSP and in Brazil, 2015 to 2020.*

Year	2015	2016	2017	2018	2019	2020
SSP – male – current value	19.6	19.9	18.9	18.6	18.5	17.8
SSP – male – expected value (target 2%/year)	19.6	19.2	18.9	18.5	18.1	17.8
Brazil – male – current value	18.7	18.9	18.3	17.9	17.7	17.2
Brazil –male – expected value (target 2%/year)	18.7	18.4	18.0	17.6	17.3	16.9

Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

Unconditional probability of premature death for females in the SSP and Brazil

There was a reduction in the estimated probability of dying from 2015 to 2020, among São Paulo and Brazilian women (Graph 3). In the SSP, the percentage change for the period was negative and equal to -7.7% and for Brazil, also negative and equal to -7.6%. The annual targets for the indicator have not been reached during the same interval, despite being very close, both for São Paulo and the country. In 2020, a 30-year-old woman residing in Brazil had 12.1% chance of dying before reaching 70 years of age and a woman residing in the SSP had 11.9% chance (Table 3).

Graph 3. Monitoring of Unconditional Probability of Premature Death for Females, Current Value and Expected Value, in the SSP and Brazil, 2015 to 2020.*
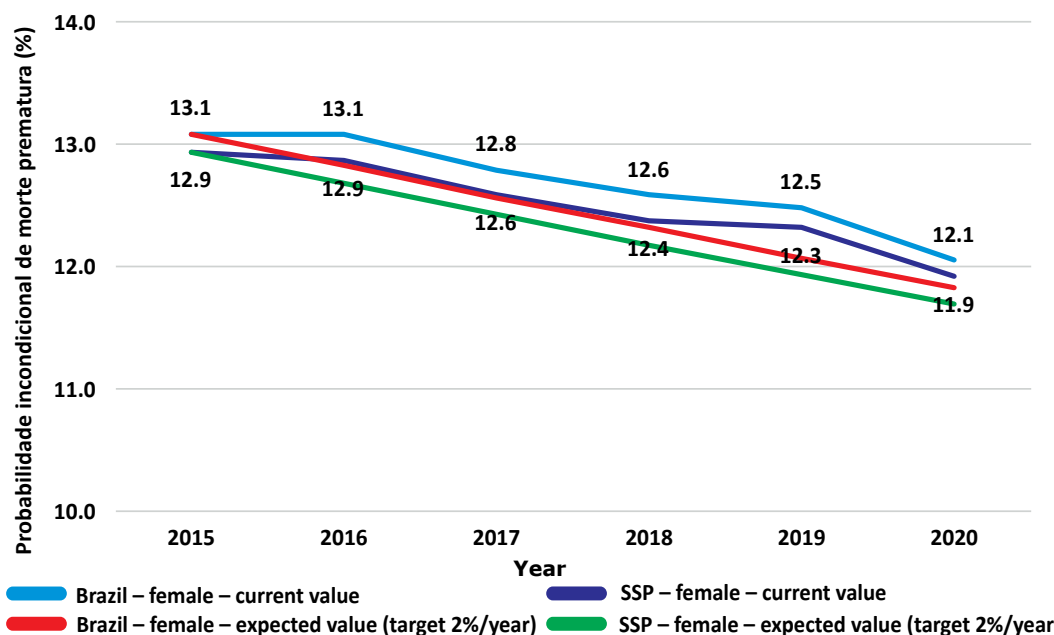
Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

Table 3. Unconditional probability of premature death for females, current value and expected value, in the SSP, 2015 to 2020.*

| Year	2015	2016	2017	2018	2019	2020
SSP – female – current value	12.9	12.9	12.6	12.4	12.3	11.9
SSP – female – expected value (target 2%/year)	12.9	12.7	12.4	12.2	11.9	11.7
Brazil – female – current value	13.1	13.1	12.8	12.6	12.5	12.1
Brazil – female – expected value (target 2%/year)	13.1	12.8	12.6	12.3	12.1	11.8

Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022. Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered.

Unconditional probability of premature death for female and male in the SSP

There was a reduction in the estimated probability of dying from 2015 to 2020 in both sexes (Graph 4). Among men, the percentage change for the period was negative and equal to -9.2%; among women, also negative and equal to -7.7%. Men residing in the SSP had a higher estimated probability of dying prematurely from NCDs than women. Thus, in the year 2020, men and women aged 30 years had a 17.8% and 11.9% chance of dying before reaching 70 years of age, respectively (Table 4).

Graph 4. Monitoring the unconditional probability of premature death for females and males in the SSP, 2015 to 2020*.
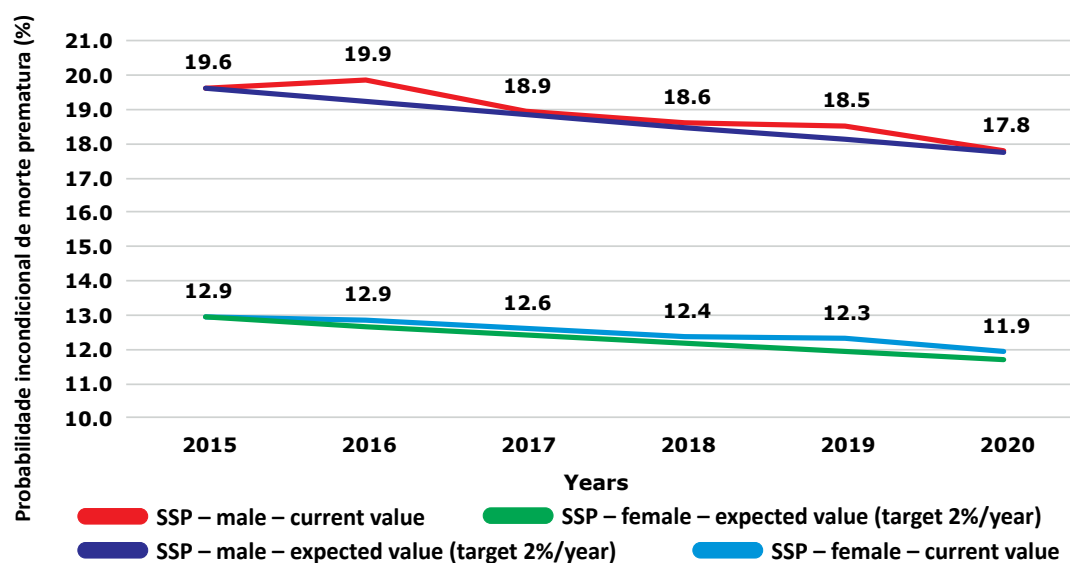
Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

Table 4. Unconditional probability of premature death for female and male in the SSP, 2015 to 2020.

Year	2015	2016	2017	2018	2019	2020
SSP – male – current value	19.6	19.9	18.9	18.6	18.5	17.8
SSP – male – expected value (target 2%/year)	19.6	19.2	18.9	18.5	18.1	17.8
Brazil – male – current value	18.7	18.9	18.3	17.9	17.7	17.2
Brazil –male – expected value (target 2%/year)	18.7	18.4	18.0	17.6	17.3	16.9

Source: Deaths: Datasus – Vital Statistics – Mortality. Resident population: Datasus – Demographic and socioeconomic – Resident population. Deaths classified with codes C00-C97, E10-E14, I00-I99, J30-J98 (except J36) of the ICD-10 were considered. Note: Standard population: Brazil Census 2010.[5] Goal according to the Strategic Action Plan to Combat Noncommunicable Diseases in Brazil, 2021-2030. *Data extracted on April 6, 2022.

CONCLUSIONS

There was a reduction in the unconditional probabilities of premature death both in the SSP and in Brazil, but the recommended targets were not reached, with the exception of men in 2020. Regarding sex, in the SSP, men aged 30 years were more likely to die before reaching 70 years of age than women.

The higher probability of premature death from NCDs among men, both in the SSP and in Brazil, in relation to the Latin American average, may indicate the need for investments in care and prevention of serious events in this population.

The reduction in probabilities does not necessarily represent an improvement in the panorama of NCDs, since 2020 was an atypical year due to the covid-19 pandemic, which impacted the health care of the population, especially those with NCD. Thus, it is recommended to analyze subsequent years to investigate whether there was, in fact, a reduction in rates.

REFERENCES

1. World Health Organization. Noncommunicable diseases – Fact Sheets [internet]. Genebra: WHO; 2021 [acesso em 7 jun 2022]. Disponível em: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

2. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Análise em Saúde e Vigilância de Doenças Não Transmissíveis. Plano de Ações Estratégicas para o Enfrentamento das Doenças Crônicas e Agravos Não Transmissíveis no Brasil 2021-2030 [internet]. Brasília: Ministério da Saúde, 2021 [acesso em 27 dez 2022]. Disponível em: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/publicacoes-svs/doencas-cronicas-nao-transmissiveis-dcnt/09-plano-de-dant-2022_2030.pdf/#:~:text=O%20Plano%20de%20Enfrentamento%20das,sa%C3%BAde%20voltados%20%C3%A0s%20doen%C3%A7as%20cr%C3%B4nicas.

3. Ministério da Saúde (BR). DATASUS. Informações de Saúde - Tabnet [internet]. Brasília: Ministério da Saúde, 2022 [acesso em 6 abril 2022]. Disponível em: https://datasus.saude.gov.br/informacoes-de-saude-tabnet/

4. Organização Pan-Americana da Saúde. Compendium of Indicators for Monitoring Regional and Global Noncommunicable Disease Response in the Americas [internet]. Washington; 2015 [acesso em 26 dez 2021]. Disponível em: https://www.paho.org/hq/dmdocuments/2015/NCD-Compendium-of-indicators-2015.pdf

5. Instituto Brasileiro de Geografia e Estatística [IBGE]. Censo 2010: população do Brasil é de 190.732.694 pessoas. Agência IBGE. 2011. Disponível em: <https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/13937-asi-censo-2010-populacao-do-brasil-e-de-190732694-pessoas>. Acesso em: 21 jun. 2022.

Open access

How to cite