


# Analysis of the School Health Program eye health action in Brazil from 2014 to 2019: a cross-sectional study

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## Abstract

**Objective:** To describe the School Health Program (PSE) eye health action in Brazil, based on the PSE actions monitoring system. **Methods:** This was a descriptive cross-sectional study using data from the Primary Health Care Information System from 2014 to 2019. **Results:** data on 153,073 PSE eye health action activities and 5,697,109 participants were found. Activities increased by 65.1% in the period from 2014 to 2019. The average number of actions carried out in participating schools was 4.35 (95%CI 4.00;4.70). National average coverage of the action was 8.32% (95%CI 6.31;10.33) in the period. In 2019, 15,325 students were identified as having vision changes. **Conclusion:** We found that PSE eye health interventions have grown over the years in Brazil as a whole, therefore contributing to the prevention of visual impairment and blindness in Brazilian students.

**Keywords:** Eye Health; School Health Services; Primary Health Care; Public Policy; Cross-Sectional Studies.

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## Introduction

According to the World Health Organization, in 2019 at least 2.2 billion people worldwide were living with visual impairment or blindness. Some 1 billion people with impairment could have avoided this health condition if they had received due health care. The causes of visual impairment vary above all according to region, socioeconomic status, sex and age.<sup>1</sup> In Brazil, based on data for 2018, there are estimated to be: 28,000 blind Brazilians aged 0 to 15 years old; 169,000 between 15 and 49 years old; and 663,000 aged over 50, accounting for approximately 1.3% of the population in this age group.<sup>2</sup>

The National Ophthalmology Care Policy (PNAO) represents an important landmark for eye health in the Brazilian National Health System (SUS) and came into force through Ministerial Ordinance No. 957, dated May 15<sup>th</sup> 2008. Standing out among the strategic objectives contained in the PNAO is increased coverage of care for SUS service users with vision changes, as well as the organization of ophthalmology care networks through the creation of comprehensive care services at all levels of health care.<sup>2-4</sup>

*Eye health within the Health School Program consists of activities to promote eye health and prevent blindness and visual impairment, educational and awareness-raising activities for families and communities, eye health assessment activities, and referring students identified as having vision problems to appropriate services.*

At the Primary Health Care level, the PNAO provides for ophthalmology promotion and prevention actions that enable identification and monitoring of families and individuals.<sup>3-4</sup> Within this context, the School Health Program (PSE) emerges as a strategy for implementing these actions in Primary Health Care by promoting eye health interventions in schools.<sup>5-7</sup>

Eye health interventions, similar to this, have been described in Brazil since the 1970s. Over the course of the years, eye health projects and programs in schools have been aimed at providing ophthalmic care to students, supported by educational activities, preferably under the responsibility of multi-professional teams.<sup>8-9</sup>

Ever since it came into being in 2007, the PSE includes eye health interventions on the list of activities agreed for schools joining the program. Eye health within the PSE consists of activities to promote eye health and prevent blindness and visual impairment, educational and awareness-raising activities for families and communities, eye health assessment activities and referring students identified as having vision problems to appropriate services. Standing out especially among these activities is visual acuity testing using the Snellen chart.<sup>5-7,9</sup>

Considering blindness and visual impairment to be a Public Health problem and noting the importance of the history of eye health interventions in schools, especially the PSE intervention, the objective of this study was to describe the PSE eye health action in Brazil, based on the records held on the system used to monitor the program's actions.

## Methods

This is a descriptive cross-sectional study based on the records of the eye health action element of the PSE held on the Primary Health Care Information System (SISAB) in Brazil, from 2014 to 2019.

The SISAB system dates from 2013, following publication of Ministerial Ordinance No. 1412, dated July 10<sup>th</sup> 2013. It is the information system recognized by the Ministry for the purposes of funding and committing to Primary Health Care programs.<sup>10</sup> In 2013, the PSE underwent a redefinition of its rules and criteria for joining it, and adopted the SISAB as the system for monitoring and evaluating PSE actions.<sup>11</sup>

PSE monitoring and evaluation take place annually, in line with the two-year program joining cycles. Joining the program means signing a Commitment document in which municipal Health and Education service managers provide an agreed set of schools and students to be covered by the planned PSE actions. It should be noted that in 2016 the Federal management of the PSE did not provide a period for joining the program. Because of this fact this study analyzed the two-year cycles conducted since 2013: 2014/2015, 2017/2018 and 2019/2020.<sup>5,11-13</sup>

The analysis period comprising 2014-2019 is justified both by the availability of PSE data on the SISAB system since the program came into being, and also because the period coincides with the PSE joining cycle dates. Another reason for selecting the period is that it was only in 2013 that 100% of the Brazilian municipalities became eligible to join the PSE.<sup>11</sup>

It should be highlighted that one of the responsibilities of the professionals involved in carrying out PSE actions, which include eye health actions, is to record them on health information systems currently in use.<sup>5,7</sup> We retrieved the eye health action data from SISAB reports. SISAB is the information system used by the Ministry of Health and its access is restricted to health workers registered on it as users.<sup>10,14</sup>

The data available in the reports come from the records held on e-SUS AB strategy applications (software), this being a data collection tool coordinated nationally by the Health Ministry's: 'Simplified Data Collection' or 'Citizen's Electronic Medical Records', via the e-SUS AB JOINT ACTIVITY FORM.<sup>10,15</sup> The data recorded on these systems are generated based on the intersectoral work of the professionals who carry out the PSE actions. The records are transferred to the federal SISAB database, where they undergo a validation process, before being made available in the form of reports.<sup>16</sup>

It should be emphasized that despite data being transmitted to SISAB monthly, transmission of older information is also allowed. Consequently, the reports are subject to alteration.<sup>14</sup> The filling in of the e-SUS AB Joint Activity Form by health workers who have access to the system, with regard to eye health, involves a description of the date the activity was conducted, total number of participants, identification of the health establishment and the health professionals involved, the INEP number of the schools where the activities take place (numeric school identification number), which is essential for identifying the schools that have joined the PSE.<sup>15</sup>

Filling in the form also involves information on the type of activity, which may or may not require identification of the service user according to their National Health Card number, indication of the target audience and, finally, the theme or practice the record relates to – in this case, the 'HEALTH PRACTICES' block and selecting 'Eye health' on the joint activity form.<sup>15</sup>

When the data were collected in April 2020, the school level of granularity was used. The schools were identified by their INEP number on the records held on the joint activity forms for the years 2014-2019. In other words, the data included states, municipalities and schools that both joined and did not join the PSE in that period.

The data retrieved from SISAB brought together information about the number of activities and the total number of participants, filtered by selecting 'Eye

health' on the Form. Retrieval of data on students with signs of vision changes was requested from SISAB federal management, in the same way as the above data retrieval, and corresponded to students identified by their National Health Card number and by selecting the option 'ASSESSMENT CHANGED' (back of the Form).<sup>15</sup>

With regard to the analyses, the frequencies described the numbers of these records on the Joint Activity Form, for schools that both joined and did not join the PSE, and the number of eye health action activities and participants, by geographical unit. Percentage eye health action coverage was calculated according to the ratio used for PSE monitoring: the number of schools conducting actions over the total number of schools that joined the PSE.<sup>17</sup>

Microsoft Excel® and the Statistical Package for the Social Sciences (SPSS®) were used for data treatment. With regard to the statistical procedures, a statistical description was made of the eye health actions by calculating absolute and relative frequencies and average number; a 95% confidence interval (95%CI) was used for the average number.

Access to the databases was possible thanks to Ministry of Health institutional consent. Standing out among the factors that helped to minimize biases was the principal investigator's prior knowledge and his practical participation in the process of monitoring and evaluating the PSE as a member of the Ministry's PSE management team.

The project study was approved by the Human Research Ethics Committee of Fiocruz in Brasília: Opinion No. 3.858.465, issued on February 27<sup>th</sup> 2020, and Certificate of Submission for Ethical Appraisal No. 28560320.0.0000.8027.

## Results

Between 2014 and 2019, 48,821 records of eye health actions in Brazilian schools were identified on the Joint Activity Form on the SISAB system, whether the schools belonged to municipalities that joined the PSE or not.

Table 1 shows the characteristics of participation in the PSE in the period 2014-2019. The number of municipalities that joined the program, the number of agreed schools and students and the number of primary health care teams can be seen. In 2019, 5,289 municipalities joined the PSE, corresponding to 91,659 schools and 22,425,160 students.

There was a considerable increase (69.2%) in the number of records on the forms between 2014 (6,769) and 2019 (11,453). There were also over 3,000 records in 2016, despite there not having been a program joining cycle that year (Figure 1). It is noteworthy that 79.1% (38,597) of the records corresponded to actions in participating schools, i.e. in the five years in which there were PSE joining cycles, between 2014 and 2019.

When analyzing the eye health actions conducted only in participating schools, activities totaled 153,073, with 5,697,109 student participants, in the period analyzed (Table 2). Between 2014 (24,525) and 2019 (40,487), these activities increased by 65.1%.

Of the municipalities that joined the PSE in the 2014/2015 cycle (4,787), 898 recorded eye health actions in the first year of the cycle and 1,079 in 2015, corresponding to 18.8% and 22.5% of the total municipalities that joined in that cycle. In 2017, 1,380 (27.4%) municipalities recorded actions; and in 2018, 1,785 did so, i.e. 35.4% of the total municipalities that joined in the 2017/2018 cycle (5,040). In 2019, 2,018 municipalities recorded actions, i.e. 38.2% of the total 5,289 municipalities that joined the 2019/2020 cycle.

Among the municipalities that recorded PSE actions in the period, the average number of eye health actions conducted per participating school was 4.35 (95%CI 4.00;4.70), with 4.80 (95%CI 4.57;5.03) in 2014, 4.24 (95%CI 4.05;4.44) in 2015, 4.02 (95%CI 3.87;4.18) in 2017, 4.37 (95%CI 4.20;4.53) in 2018 and 4.32 (95%CI 4.17;4.47) in 2019.

When analyzing percentage coverage of the eye health action in participating schools, grouped together by Federative Unit, in general coverage was found to increase progressively in the period analyzed (Table 3). National average coverage was 8.32% (95%CI 6.31;10.33) for the 2014-2019 five-year period.

When analyzing percentage coverage of the actions in the Federative Units in the 2014/2015 cycle (Table 3), the Federal District and the states of Rondônia and Roraima had the lowest percentiles, while the states of Amapá and Tocantins had the highest percentage coverage rates in Brazil for the same cycle.

In the 2017/2018 cycle, in the first year (2017), Roraima, Federal District and Rondônia had coverage below 1%, and the state of Roraima remained on this level in the following year. The highest percentiles were identified in the states of Amapá, 27.1%, and Ceará, 14.9%, in 2017;

coverage in Ceará continued to grow in 2018, when it achieved 18.6%, the highest percentage among the Federative Units that year.

In 2019, the first year of the 2019/2020 cycle, the Federal District continued to be the Federative Unit with the lowest percentage coverage of eye health actions in schools (1.7%). Also in 2019, the state of Rio Grande do Sul (18.7%) overtook the percentage coverage achieved by the state of Ceará (18.3%).

The number of students targeted with PSE eye health actions who had vision change grew in the period, despite a slight fall in 2017, as found in the analyses of the other years: in the 2014/2015 cycle there were 12,524 (2014) and 12,896 (2015); in the 2017/2018 cycle there were 9,063 (2017) and 12,358 (2018); and in 2019 there were 15,325 students reporting vision changes.

## Discussion

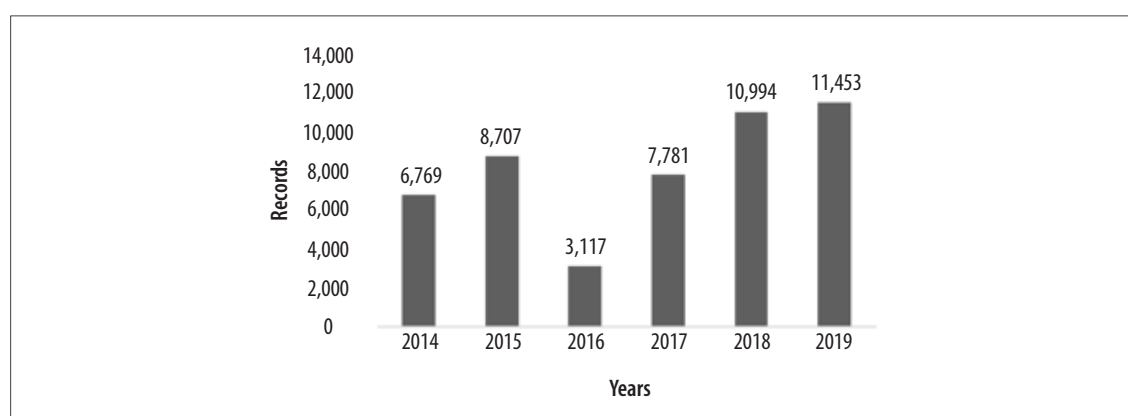
Eye health actions are conducted in schools that are included in agreements to join the PSE and also in schools that are not; however, the number of records is higher in schools participating in the program, indicating that joining the program promotes eye health actions. Both the number of activities and the number of student participants, including those identified as having vision changes, showed a rising trend in the period, despite the reduction in 2017. Action coverage made progress, even though the average number of actions per school reduced in relation to the first years of the period analyzed. This is one of the first articles to be published which explores the potential of monitoring joint activities via the SISAB system, beyond just eye health actions in Brazil.

The study's limitations relate to the quality of the recording of the actions on the joint activity forms of the e-SUS AB strategy. This implies difficulties for achieving a precise view of local reality, in addition to the recognized scarcity of studies using similar methods – including for other PSE themes –, thus restricting interpretation of the data and the inferences presented, apart from limiting the emergence of new reflections and actions. Despite these difficulties, the data and information provided will certainly contribute to knowledge of the state of the art of eye health promotion activities in the school environment, especially those of the PSE.

**Table 1 – Characteristics of participation in the School Health Program, according to program joining cycles, Brazil, 2014-2019**

Variables	School Health Program joining cycles		
	2014/2015	2017/2018	2019/2020
Municipalities taking part	4,787	5,040	5,289
Agreed number of schools	79,167	85,700	91,659
Agreed number of students	18,313,214	20,521,416	22,425,160
Agreed number of Primary Health Care teams	32,317	36,990	57,001

Note: There was no School Health Program joining cycle in 2016.



**Figure 1 – Number of records on Joint Activity Forms informing eye health actions in Brazilian schools, in municipalities that both joined and did not join the School Health Program, Brazil, 2014-2019**

**Table 2 – Absolute number of activities and participants in eye health actions in schools that joined the School Health Program, Brazil, 2014-2019**

Year	Eye health action activities	Eye health action participants
2014	24,525	951,080
2015	28,224	952,028
2017	24,011	915,608
2018	35,826	1,353,675
2019	40,487	1,524,718
<b>Total</b>	<b>153,073</b>	<b>5,697,109</b>

Note: There was no School Health Program joining cycle in 2016.

**Table 3 – Absolute number of schools conducting actions and percentage eye health action coverage in schools that joined the School Health Program, by Federative Unit, Brazil, 2014-2019**

Federative Unit	2014		2015		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%
Acre	6	1,6	21	5,5	6	1,4	22	5,2	36	8,4
Alagoas	210	9,8	97	4,5	139	6,4	314	14,5	247	11,5
Amapá	24	15,4	60	38,5	62	27,1	26	11,4	42	15,2
Amazonas	72	5,5	181	13,7	136	7,1	282	14,8	292	14,3
Bahia	737	7,2	751	7,4	716	6,4	1.023	9,1	1.088	9,4
Ceará	379	8,2	585	12,7	680	14,9	851	18,6	852	18,3
Distrito Federal	–	–	–	–	1	0,4	7	2,7	5	1,7
Espírito Santo	43	4,9	81	9,3	85	7,4	56	4,9	83	5,9
Goiás	132	5,9	248	11,0	197	7,8	248	9,9	262	9,9
Maranhão	559	7,9	852	12,0	446	6,0	593	7,9	446	6,0
Mato Grosso	130	9,3	151	10,8	98	7,7	134	10,5	209	13,6
Mato Grosso do Sul	44	6,1	60	8,3	25	4,0	69	11,0	101	13,6
Minas Gerais	492	6,4	623	8,1	901	10,8	1.123	13,4	1.322	14,4
Pará	96	2,7	160	4,5	153	3,2	292	6,2	321	6,4
Paraíba	255	6,4	277	7,0	184	4,8	301	7,8	314	8,5
Paraná	333	7,9	423	10,1	213	5,5	183	4,7	340	7,6
Pernambuco	236	5,6	213	5,1	208	4,3	410	8,4	394	8,4
Piauí	181	4,6	131	3,4	133	3,7	267	7,4	276	7,7
Rio de Janeiro	101	3,3	158	5,1	138	3,7	212	5,7	214	5,4
Rio Grande do Norte	163	6,5	194	7,7	252	10,8	254	10,9	297	12,3
Rio Grande do Sul	144	5,3	276	10,2	467	13,6	501	14,6	838	18,7
Rondônia	3	0,8	12	3,1	5	0,8	32	5,2	90	12,8
Roraima	3	1,2	8	3,2	1	0,4	2	0,8	14	3,5
Santa Catarina	216	8,0	256	9,4	207	6,5	194	6,1	345	9,6
São Paulo	313	4,9	481	7,5	314	4,8	464	7,1	644	8,3
Sergipe	137	10,0	197	14,4	102	7,2	190	13,4	167	11,6
Tocantins	100	10,0	153	15,4	99	9,0	155	14,1	130	11,4
<b>Brasil</b>	<b>5.109</b>	<b>6,5</b>	<b>6.649</b>	<b>8,4</b>	<b>5.968</b>	<b>7,0</b>	<b>8.205</b>	<b>9,6</b>	<b>9.369</b>	<b>10,2</b>

Note: There was no School Health Program joining cycle in 2016.

Schools have a huge potential for programs intended to promote eye health and prevent blindness. There are clear benefits of eye health interventions for eyesight and learning student's, in addition to their powerful motivation among parents and teachers, in the sense of their supporting blindness prevention activities among their children and students.<sup>18</sup> Solidification of these activities in school routines can mean a solution for meeting students' needs for this form of care, being cost-effective in preventing blindness, especially among children living in remote places.<sup>19-20</sup>

The publication produced by the International Agency for the Prevention of Blindness, a guide for implementing eye health programs in schools, sees the adoption of monitoring and evaluation systems as the last step in the implementation of these programs, which include (i) prevalence and incidence rates that consider variables such as 'age', 'sex', 'ethnic group' and 'socioeconomic profile' (categorized in strata) and (ii) variables regarding eye health services, capable of enabling evaluation of the effectiveness and impact of the interventions conducted.<sup>21</sup>

Taking the results of this study as a basis, it can be seen that the SISAB system is able to bring together part of this information and thus assert itself as a tool for such a monitoring and evaluation system, in the context of the PSE. Consequently, the system can inform the definition of eye health action indicators and targets. The analysis found that eye health interventions in schools have increased in Brazil over the years, both regionally and nationally, despite the falls in 2017. The latter may have been caused by the lack of a joining cycle in 2016, given that because of this there was no formal commitment or incentives established, as would have happened when municipalities joined the program, by means of the commitment agreements signed and incentive resource transfers being based on the performance of the PSE actions.<sup>5,13</sup>

The study also made evident that growth in the PSE eye health action was small, this being reflected in the number of municipalities that recorded actions on the system: only 38.2% of the Brazilian municipalities committed to this action of the program in the last year of the period analyzed. It is a very different percentage to that found in the PSE monitoring data for the year 2019, when 92.75% of the municipalities committed to the Program's 12 actions. This result may be related to the incentive payment for conducting program actions,

other than the eye health action.<sup>17</sup> The healthy eating and physical activity actions, for example, were the second and fifth most conducted actions within the PSE in 2019.<sup>17</sup> These themes, widely publicized in some schools, have been included in the school curriculum, as shown by a study conducted in the municipality of Itapevi, SP,<sup>22</sup> where 100% of schools committed to the program, and when interviewed, they replied that they carried out these actions in 2014.

The results of the PSE eye health action are the fruit of the synchronous work of the primary health care teams, especially those of the Family Health Strategy, jointly with the teams of public school Elementary Education professionals.<sup>6,23</sup> These education professionals recognize the importance of the joint work done to care for students, as proposed by the PSE, regardless of the challenges posed to the implementation of intersectoral work.<sup>24-25</sup> Students also recognize the effects of this eye health care provided by these professionals, especially when their eyesight problems are identified and solved.<sup>26</sup>

It is known that measurement of visual acuity is the clinical indicator most used for quality of vision. It is generally done using charts with symbols or letters (optotypes), such as the Snellen chart, and requires skills in order to be performed adequately.<sup>27</sup> Although the eye health action includes visual acuity in the scope of its activities, the recording of actions on the SISAB system are not restricted only to this measurement, as the field relating to identified vision changes also encompasses other vision problems besides changes in visual acuity.<sup>7,15</sup>

It is difficult to estimate with precision prevalence of low visual acuity based on assessment of students registered on the e-SUS AB Joint Activity Form, especially when this estimate of prevalence is based on former guidelines recommend, namely only identifying students with vision changes. As such, differently from the other assessment activities contained on the Form, this indicator may be a confounding factor at the time of recording eye health actions. Notwithstanding, there are resources to be explored in this sense, such as assessment of the 'Ophthalmic Screening' field of the Procedures Form, which is also part of the e-SUS AB strategy.<sup>28</sup>

Some 20% of school-age children had uncorrected visual difficulties and 10% needed optical correction in 2016.<sup>7,9,19</sup> A recent study, conducted in 2019, pointed to

the possibility of this need affecting 25% of school-age children in the United States.<sup>29</sup> Interventions of this type require correct referral to specific services and care, according to their needs.<sup>7,21,29</sup>

In 2019, estimates indicate that there are 20,455 ophthalmologists for a population of 208,494,900 inhabitants in Brazil, a ratio of 1/9,224 inhab., which is more than sufficient to cover the needs of this specialty in Brazil.<sup>2,19</sup> However, the bottleneck of this reality lies in the high concentration of these professional in the state capital cities and in some of the country's regions, such as the Southeast and Midwest, whereas the Northern region has the country's poorest ophthalmologist/inhabitant ratio, namely 1/12,084 inhab.<sup>2</sup>

It is known that because of its segmented nature, when the work of this specialty is not coordinated with other levels of health care it has been proven to not have resolutive capacity for improving the population's health conditions. Eye health interventions are more effective when they promote eye health and prevent blindness in the family and community environment, including in schools, reinforcing the importance of conducting eye health actions in primary health care and through the PSE.<sup>9,21,30</sup>

As such, it is also possible to envisage the need to develop studies to evaluate the effectiveness and impact of the PSE eye health action. We recommend

that its effectiveness be evaluated, given the history of eye health actions in the Brazilian school environment. These actions have increased over the years in Brazil as a whole and in a growing number of municipalities. This need for evaluation can not only elicit further scientific research and publications on the theme, but also the updating and critique of studies like this one.

We also highlight that greater provision of eye health practices at school can be yet another opportunity for access to health services. Besides identifying students with vision changes, the PSE is a further opportunity for accessing health services and revealing their health needs both met and unmet by the SUS.

We conclude that the School Health Program eye health interventions have increased over the years in Brazil as a whole, contributing to preventing visual impairment and blindness among Brazilian students.

### Authors' contributions

Fernandes LA and Köptcke LS contributed to the study concept and design, data analysis and interpretation and drafting the first version of the manuscript. Both authors have approved the final version of the manuscript and declare themselves to be responsible for all aspects thereof, including the guarantee of its accuracy and integrity.

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