Original article

Cervical cancer screening in Teresina, Piauí, Brazil: evaluation study using data of the Cervical Cancer Information System, 2006-2013*

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Abstract

Objective: to assess the cervical cancer screening tests in Teresina, Piauí, Brazil. **Methods**: this is an evaluation study of Teresina Cervical Cancer Information System (Siscolo), for the period from 2006 to 2013, based on descriptive statistical analyses. **Results**: 604,331 pap smear tests of women residents in Teresina were registered on the system; 1.8% presented premalignant or malignant cytological conditions (atypical cells, intraepithelial lesions and cancer); positive results were higher among women aged >64 years old; there was a reduction of 43.9% in the number of tests performed among women in the target age group of the screening program; there was an increment in the percentage of unsatisfactory samples, from 0.33 to 0.89%. **Conclusion**: Teresina cervical screening program presents some limitations that need to be overcome, especially concerning the insufficient tests offer, its low proportion of positive results and the growing number of unsatisfactory samples.

Keywords: Uterine Cervical Neoplasms; Vaginal Smears; Cervical Intraepithelial neoplasia; Mass Screening; Program Evaluation.

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Introduction

Cervical cancer is the third most frequent type of cancer in the Brazilian female population; 16,340 new cases and an incidence rate of 15.85/100,000 women are estimated for 2016.[1]

The cervical cancer is preventable and curable when early detected.[2] This neoplasn begins in the form of precursor lesions, which may or may not progress to an invasive process in a period of 10 to 20 years.[2] This relatively long time span, allows preventive actions to be performed in order to break the disease epidemiological chain.[3] The substantial reduction in the incidence and mortality from cervical cancer in some countries has been associated with the implementation of population-based screening programs.[4]

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The conventional method for cervical cancer screening is the cervix cytopathology test, or pap smear test, considered a low cost, simple and easy to perform test.[5]

Despite current efforts to broaden access to this test for early detection of cervical cancer, we have observed a reduced production of cervical cancer screening tests in most Brazilian states between 2012 and 2013.[5] Piauí has stood out for presenting, in the 2002-2012 period, one of the largest increases in morbidity and mortality rates due to cervical cancer when compared to other Brazilian states, and for following with the same trend estimated for the 2016-2017 period.[1]

This study aimed to evaluate the screening of cervical cancer in Teresina, Piauí, Brazil.

Methods

This is an evaluation study of screening for cervical cancer in the city of Teresina.

The database of Teresina Cervical Cancer Information System (Siscolo) was used and it presents the records of all pap smear tests performed by the Brazilian National Health System (SUS). The analysis focused on the period from 2006 to 2013. Siscolo is a open access system; the version 4.0 is used since its implementation in 2006, and incorporates the new Brazilian Nomenclature for Cervical Reports[6] and uses the Bethesda System as a reference.

All pap smear tests from women living in Teresina, registered at Siscolo from 2006 to 2013 were considered in this study.

The following characteristics and indicators of Siscolo were selected to evaluate cervical cancer screening: proportion of tests performed per year and age group; ratio test/target population; proportion of positive results; proportion of premalignant or malignant alterations in the tests per year and age group; completeness of variables; previous cytology tests; time since the last preventive screening; percentage of unsatisfactory samples; and presence of the transformation zone.

The absolute and relative annual rates (%) of the tests were calculated according to age groups (in years: <25, 25-64, and > 64).

The percentage variation in the number of tests conducted in the period from 2006 to 2013 was calculated using the formula A, as follows:

[(number of tests performed in 2013 in the age group – number of tests performed in 2006 in the age group)/number of the tests performed in 2006 in the age group] x 100

To calculate the percentage variation in the proportion of tests performed on specific age groups, compared to the total number of tests, Formula B was applied:

(percentage of tests carried out in 2013 in the age group) – (percentage of tests carried out in 2006 in the age group)

The ratio between pap smear tests and target population was presented in two age groups, because since 2011, with the advent of new Brazilian Guidelines for Screening Cervical Cancer,[7] the age group for screening has been widened, passing from 25-59 to 25-64. The target population was obtained from the 2010 Demographic Census and by population estimates provided by the Brazilian Institute of Geography and Statistics (IBGE) and published on its website (http://www.ibge.gov.br). This indicator assesses whether the tests offered to the target population were enough to reach the coverage goal of the Program for the Control of Cervical Cancer.

Alterations in cytopathologic exams were presented according to age group and year of the exam, using the percentage distribution of alterations and the proportion

of positive results. The proportion of positive results expresses the prevalence of cellular alterations in the exams and the capacity of the screening process to detect lesions in the examined population. This proportion was calculated through the sum of all cytopathologic exams with abnormal results, divided by the total of assessed exams (satisfactory exams) and multiplied by 100. We consider positive results the following classification:[8] very low (less than 2% of the exams), low (between 2 and 2.9%), expected (between 3 and 10%) and higher than expected (greater than 10 %).

Premalignant or malignant cervical cytological abnormalities were analyzed (atypical cells, intraepithelial lesions and cancer). Intraepithelial lesions can be classified as follows: low-grade squamous intraepithelial lesion (LSIL); high grade squamous intraepithelial lesion (HGSIL); high-grade lesion – cannot exclude microinvasion (HSIL-micro).

Completeness of the variables was measured through the proportion of complete records, i.e. without 'ignored'/'missing' data. This indicator was interpreted based on the criteria used by Romero and Cunha: excellent, when the completeness percentage was >95%; good, between 90.1 and 95%; regular, between 80.1 and 90%; bad, between 50.1 and 80%; and poor when ≤50%.[9]

The variables 'previous cytology test' (if the woman had undergone this test previously) and 'time since the last preventive examination' (how long ago [in years] was the test performed: that same year, 1, 2, 3, 4 or more years) were also analyzed for the age group from 25 to 64.

The quality of the examination was assessed through the variable 'adequacy of the sample' (percentage of unsatisfactory samples). A sample is considered unsatisfactory when it does not present minimal conditions for slide analysis for the diagnosis, leading to the need of a test repetition.[8] The percentage that indicates unsatisfactory samples is the number of unsatisfactory samples in relation to the total number of tests performed, multiplied by 100.

The quality of the test related to the material collected was assessed through the variable 'presence of the transformation zone (TZ)' for each of the three age groups. During the examination, the squamous, glandular and metaplastic epithelia can be collected. The sample has the presence of TZ when it allows the verification of metaplastic and/or glandular epithelium in the examined material.[10] It is mainly in the transformation zone where precursor lesions of cervical cancer come out and where cytological abnormalities are concentrated,[10] hence the importance of the samples to present TZ. This indicator was calculated by dividing the number of samples with presence of TZ and the total number of satisfactory samples, multiplied by 100.

Descriptive statistical analysis was performed using frequency distributions, with the software Excel 2010.

This study was approved by the Research Ethics Committee of the Sérgio Arouca National School of Public Health/Oswaldo Cruz Foundation: Report No.03/2014, issued on September 19th, 2014.

Results

In the period from 2006 to 2013, 604,331 pap smear tests of women living in Teresina were registered at SISCOLO. From the total of tests, 69.4% were carried out in women aged from 25 to 64 years. There was a reduction in the number of examinations in all age-groups – including the priority group of the program, which decreased 43.9% (Table 1).

It was also possible to observe that the ratio between pap smear tests and target population decreased 44.8% in women from 25 to 59 years and 51.5% in those from 25 to 64 years, over the studied period. In 2006, in Teresina, considering women from 25 to 64 years, this ratio corresponded to 0.33 test/woman/year, whereas in 2012, this value was 0.16 (Table 2).

From the total of pap smear tests performed, 1.8% presented abnormalities (10,698 pap smear tests). The atypical cells were the main types of alteration found, with higher prevalence in women >64 years old. Between 2006 and 2013, the proportion of positive results increased 0.3%, 0.6% and 2.0% for the age groups <25, 25-64 and > 64 years, respectively (Table 3).

During the studied period, the LSIL accounted for more than half of the results with alterations in the age group < 25 years (54.7%), whilst among women aged 25-64 years it accounted for 30.0% of abnormal results, and among those >64 years, 11.5%, with prevalences of 0.8%, 0.6% and 0.3% for the three age groups, respectively (Table 3).

A higher percentage of HGSIL was observed among women > 64 years (14.6% of abnormal results), when compared to the 25-64 age group (9.9% of abnormal

Table 1 – Distribution of pap smear tests performed per year and variation percentage, according to age group, in the municipality of Teresina-PI, 2006-2013

Year	Age group (in years)						Total pap smear tests performed
	<25		25-64		>64		
	N	%	N	%	N	%	N
2006	22,428	23.01	60,715	62.29	14,323	14.70	97,466
2007	22,674	22.29	65,706	64.61	13,323	13.10	101,703
2008	24,229	25.58	66,470	70.18	4,009	4.23	94,708
2009	22,454	24.26	65,907	71.20	4,199	4.54	92,560
2010	16,103	22.50	52,092	72.80	3,360	4.70	71,555
2011	10,957	21.95	36,355	72.83	2,603	5.21	49,915
2012	10,753	21.02	37,837	73.98	2,554	4.99	51,144
2013	8,867	19.58	34,055	75.21	2,358	5.21	45,280
2006-2013	138,465	22.91	419,137	69.36	46,729	7.73	604,331
Variation % (2006-2013)	-60.46	-3.43	-43.91	12.92	-83.54	-9.49	-53.54

Table 2 – Ratio between pap smear tests and target population (age groups 25-59 and 25-64 years) in the municipality of Teresina-PI, 2006-2013

Year	Pap smear	Population	Ratio pap smear/ population	Pap smear	Population	Ratio pap smear/ population
	25-59	25-59	25-59	25-64	25-64	25-64
2006	50.992	176.861	0,29	60,715	185,819	0.33
2007	56.566	200.537	0,28	65,706	210,734	0.31
2008	63.905	200.585	0,32	66,470	211,095	0.31
2009	63.379	203.567	0,31	65,907	214,568	0.31
2010	49.826	214.331	0,23	52,092	227,203	0.23
2011	34.614	216.471	0,16	36,355	229,472	0.16
2012	35.976	218.541	0,16	37,837	231,666	0.16
2013	32.368	–	–	34,055	–	–

results) and < 25 age group (3.4% of abnormal results), with prevalences of 0.3%, 0.2% and 0.1%, respectively, during the studied period (Table 3).

The cancer diagnosis was more frequent in the age group > 64 (6.3% of abnormal results), whereas in the 25-64 age group it corresponded to 1.2% of abnormal results, and in the < 25 age group, 0.2% (Table 3).

The proportion of positive results of the tests was higher for women > 64 years old (2.23%), and lower in those < 25 years old (1.47%). The LSIL were prevalent in younger women, <25 years (Table 3).

Some Siscolo variables should be highlighted for their bad completeness (classified as 'ignored'/'blank' data), according to the criteria used by Romero and Cunha.[9] The lowest percentages of completeness have been observed in the variables 'education level' and 'ethnicity/ skin color', for which the values have oscillated during the period analyzed: from 42.0% (2008) to 5.6% (2013).

In the female population from 25 to 64 years old, we found that the percentage of tests recorded for the first time increased 11.2% between 2006 and 2009, and decreased 15.9% between 2010 and 2013 (Table 4).

In Teresina, the percentage of unsatisfactory samples increased for all age groups, especially in the 2010-2013 period. The highest percentage of unsatisfactory samples was observed in the age group > 64, in 2013 (1.4%).

In the period from 2006 to 2013, 601,979 tests (99.6%) were classified as satisfactory; 59.6%

Table 3 – Percentage distribution of cytological alterations in pap smear tests performed per year and variation percentage, and type of alteration, according to age (in years) in Teresina-PI, 2006-2013

Year	<25												
	Atypical cells		LSIL[a]		HGSIL[b]		HSIL-Micro[c]		Cancer		Abnormal results		Satisfactory tests
	N	%	N	%	N	%	N	%	N	%	N	%	N
2006	121	0.54	154	0.69	12	0.05	-	-	2	0.01	289	1.29	22,365
2007	97	0.43	200	0.88	9	0.04	1	-	-	-	307	1.36	22,638
2008	137	0.57	218	0.90	4	0.02	1	-	2	0.01	362	1.50	24,174
2009	149	0.66	208	0.93	16	0.07	-	-	-	-	373	1.66	22,415
2010	133	0.83	132	0.82	10	0.06	-	-	-	-	275	1.71	16,067
2011	59	0.54	71	0.65	1	0.01	1	0.01	-	-	132	1.21	10,927
2012	72	0.67	62	0.58	13	0.12	-	-	-	-	147	1.37	10,693
2013	73	0.83	64	0.73	3	0.03	-	-	-	-	140	1.59	8,789
2006-2013	841	0.61	1,109	0.80	68	0.05	3	-	4	-	2,025	1.47	138,068
Variation % (2006-2013)	-39.7	0.29	-58.4	0.04	-75	-0.02	-	-	-100.0	-0.01	-51.6	0.3	-60.7
Year	25-64												
	Atypical cells		LSIL[a]		HGSIL[b]		HSIL-Micro[c]		Cancer		Abnormal results		Satisfactory tests
	N	%	N	%	N	%	N	%	N	%	N	%	N
2006	449	0.74	313	0.52	79	0.13	7	0.01	7	0.01	855	1.41	60,506
2007	478	0.73	458	0.70	76	0.12	7	0.01	19	0.03	1,038	1.58	65,503
2008	699	1.05	377	0.57	126	0.19	15	0.02	13	0.02	1,230	1.86	66,282
2009	687	1.04	391	0.59	127	0.19	14	0.02	22	0.03	1,241	1.89	65,755
2010	659	1.27	303	0.58	113	0.22	19	0.04	12	0.02	1,106	2.13	51,938
2011	416	1.15	154	0.43	60	0.17	4	0.01	3	0.01	637	1.76	36,202
2012	551	1.47	155	0.41	117	0.31	11	0.03	9	0.02	843	2.24	37,581
2013	469	1.39	146	0.43	61	0.18	5	0.01	5	0.01	686	2.04	33,694
2006-2013	4,408	1.06	2,297	0.55	759	0.18	82	0.02	90	0.02	7,636	1.83	417,461
Variation % (2006-2013)	4.5	0.65	-53.4	-0.09	-22.8	0.05	-28,6	0.00	-28.6	0.00	-19.8	0.63	-44.3
Year	>64												
	Atypical cells		LSIL[a]		HGSIL[b]		HSIL-Micro[c]		Cancer		Abnormal results		Satisfactory tests
	N	%	N	%	N	%	N	%	N	%	N	%	N
2006	82	0.58	31	0.22	41	0.29	0	0.00	17	0.12	171	1.20	14,250
2007	88	0.66	32	0.24	31	0.23	6	0.05	17	0.13	174	1.31	13,272
2008	100	2.52	10	0.25	27	0.68	4	0.10	7	0.18	148	3.72	3,976
2009	100	2.39	15	0.36	24	0.57	5	0.12	13	0.31	157	3.76	4,177
2010	117	3.50	11	0.33	8	0.24	7	0.21	4	0.12	147	4.40	3,343
2011	55	2.13	8	0.31	9	0.35	2	0.08	2	0.08	76	2.95	2,579
2012	69	2.72	10	0.39	5	0.20	3	0.12	3	0.12	90	3.55	2,535
2013	61	2.63	2	0.09	6	0.26	3	0.13	2	0.09	74	3.19	2,318
2006-2013	672	1.45	119	0.26	151	0.33	30	0.06	65	0.14	1,037	2.23	46,450
Variation % (2006-2013)	-25.6	2.05	-93.5	-0.13	-85.4	-0.03	x	0.13	-88.2	-0.03	-56.7	1.99	-83.7

a) LSIL: low-grade squamous intraepithelial lesion
b) HGSIL: high grade squamous intraepithelial lesion
c) HSIL-Micro: high-grade lesion – cannot exclude microinvasion

presented epithelium of TZ. A constant reduction in this percentage was observed: from 71.5% (2007) to 47.8% (2013) (Table 5).

Discussion

In the present study, we observed a sharp reduction in the number of tests in the period from 2006 to 2013, including the target population of the Program for the Control of Cervical Cancer. There was also a high percentage of annual repetition of the test, low search of women who had never undergone the examination, low positivity proportion, low presence of the transformation zone, constant increasing trend in the percentage of unsatisfactory samples and low completeness of socioeconomic data on women enrolled in the program.

This study contributes to the situational diagnosis of cervical cancer screening in Teresina, as it evaluates

Table 4 – Frequency of pap smear tests in the age group 25-64 years in Teresina-PI, 2006-2013

Year	Previous test						Time since last Pap smear test (in years)										Total tests
	Yes		No		Unknown		Same year		1		2		3		≥4		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
2006	27,486	45.86	11,261	18.55	8,538	14.06	4,838	7.97	16,813	27.69	3,659	6.03	1,119	1.84	1,357	2.24	60,715
2007	39,978	60.84	14,176	21.57	10,367	15.78	4,137	6.30	25,431	38.70	6,732	10.25	1,826	2.78	1,784	2.72	65,706
2008	39,612	59.59	16,854	25.36	9,068	13.64	4,004	6.02	25,646	38.58	6,470	9.73	1,746	2.63	1,629	2.45	66,470
2009	35,828	54.36	19,588	29.72	9,592	114.55	3,649	5.54	23,004	34.90	5,658	8.58	1,690	2.56	1,540	2.34	65,907
2010	32,855	63.07	11,362	21.81	6,766	12.99	3,232	6.20	20,319	39.01	5,672	10.89	1,747	3.35	1,680	3.23	52,092
2011	26,598	73.16	4,853	13.35	4,578	12.59	2,502	6.88	15,481	42.58	5,490	15.10	1,589	4.37	1,462	4.02	36,355
2012	29,552	78.10	2,893	7.65	5,044	13.33	2,538	6.71	16,341	43.19	6,955	18.38	1,,969	5.20	1,731	4.57	37,837
2013	25,621	75.23	1,990	5.84	5,162	15.16	2,352	6.91	14,001	41.11	5,210	15.30	24,82	7.29	1,566	4.60	34,055
2006-2013	257,890	61.53	82,977	19.80	59,115	14.10	27,252	6.50	157,036	37.47	45,846	10.94	14,168	3.38	12,749	3.04	419,137

Table 5 – Presence of the transformation zone in pap smear tests, according to age (in years) in Teresina-PI, 2006-2013

Year	<25			25-64			>64			All ages		
	n	%	N	n	%	N	n	%	N	n	%	N
2006	5,794	25.91	22,365	23,208	38.36	60,506	9,781	68.64	14,250	38,783	39.93	97,121
2007	14,621	64.59	22,638	48,257	73.67	65,503	9,668	72.85	13,272	72,546	71.54	101,413
2008	14,361	59.41	24,174	45,705	68.96	66,282	1,868	46.98	3,976	61,934	65.59	94,432
2009	13,159	58.71	22,415	44,446	67.59	65,755	2,130	50.99	4,177	59,735	64.69	92,347
2010	9,431	58.70	16,067	34,550	66.52	51,938	1,671	49.99	3,343	45,652	63.98	71,348
2011	5,966	54.60	10,927	22,785	62.94	36,202	1,019	39.51	2,579	29,770	59.89	49,708
2012	5,808	54.32	10,693	22,420	59.66	37,581	895	35.31	2,535	29,123	57.32	50,809
2013	3,922	44.62	8,789	16,877	50.09	33,694	627	27.05	2,318	21,426	47.82	44,801
2006-2013	73,062	52.92	138,068	258,248	61.86	417,461	27,659	59.55	46,450	358,969	59.63	601,979

the frequency of examinations, to the prevalence of cytological alterations, coverage of the target population, quality of sample collection, analysis of slides, and Siscolo information completeness. A possible limitation of the findings presented herein would be related to inadequate monitoring of Siscolo data by health managers.[11,12] The system was created with the purpose of recording all pap smear tests performed by SUS.7 However, one cannot rule out possible flaws in this record, and consequently, differences between the control actions for cervical cancer developed by health units in Teresina and the information registered in Siscolo.

There is a consensus that a well-organized screening program can reduce the incidence and mortality due to cervical cancer by up to 90.0%,[13] whose evidence comes mainly from the experience of developed countries, where significant reductions were obtained after introducing population-based screening programs.[4] Cervical cancer screening covers a number of steps: the screening examination, identification of positive cases, diagnostic confirmation and treatment.[4,13,14] The parameter that distinguishes the opportunist screening from the population-based screening programs is a routine monitoring and evaluation process.[14] In the population-based screening, we can identify the individual history of women in relation to the frequency of examinations, the date of the last examination and results, among other variables, allowing the identification of women who have repeated or have taken the tests for the first time. In Brazil, the opportunistic screening is more common, in which most women undergo pap smear tests after seeking health services for some other reason. Thus, some women undergo the examination more than necessary, while others do not even have access to it.[14,15]

From Siscolo data, when we select the variable 'service provider', we can observe that in the municipality of Teresina, between 2006 and 2009, there were two laboratories with a production scale of more than 15,000 tests/year. These two companies accounted for about 70.0% of the production of municipal examinations. From 2010 on, one of them presented a sharp reduction in the production of tests, reaching only 746 tests processed in 2013. Therefore, since 2010, Teresina has a single laboratory with a scale of production of more than 15 thousand tests/year, which is responsible for 57.0%, 82.0%, 90.0% and 89.0% of the tests carried out in 2010, 2011, 2012 and 2013, respectively. Scientific evidence shows that the production scale is relevant to the quality of the analysis of the pap smear slides. This happens because suspicious lesions are relatively rare (3 to 10% of the samples), which requires a higher volume of tests so the professional in charge can become familiar with them and gain experience. Laboratories are recommended to have minimum production of 15,000 examinations/year to acquire a satisfactory level of competence – except for units of high complexity in oncology, university hospitals and monitoring laboratories.[8]

Regarding the cervical cancer, the main indicator agreed between the Ministry of Health, states and municipalities is the ratio of tests performed and the target population.[17] This indicator should be weighted by the participation of Supplementary Health in the municipality, since the tests undergone by beneficiaries of private health insurances are not registered at Siscolo. Given that the coverage of Supplementary Health among the female population in Teresina in 2006 was 15.0%, and in 2012, 22.4%, yet the present study found a ratio much lower than the expected for the indicator.[18]

Data on the offer of examinations allow to verify whether it is enough in quantity and directed according to the recommended interval (every three years after two consecutive normal tests within one year).[5] Based on the repetition of the test recommended every three years, the ratio tests/target population is expected to be 0.3 annually, in order to track 100% of women in the age group of the target population by the end of this three-year period. The repetition of pap smear test in the period up to one year is indicated only for women who were examined for the first time, or who have had tests with unsatisfactory sample, or have alterations which require monitoring in a shorter interval.[6] However, there was a high percentage of tests repetition within one year period. Similar results were also observed in another study at the same municipality of Teresina, with 464 young women who had completed a pregnancy in the first four months of 2006 in the hospitals of the capital,[19] in which the main objective was to analyze the frequency of cervical screening in young women with at least a full pregnancy. The discovery of high percentage of repeated pap smear tests associated with the reduction in the percentage of tests recorded for the first time, suggests inadequate offer of tests in the program and low ability of the

program to capture women who have not yet taken this test.

Countries where well organized screening programs were implemented, which reduced the incidence and mortality rates for cervical cancer, such as the United States, Norway and the United Kingdom, presented proportion of positivity of 6,8%,[20] 4,9%[21] and 6,4%[22] respectively. In Teresina, we observed a low proportion of positive results (1.8%), possibly a sign that suspicious alterations are not being identified in the laboratories, leading to false negative tests. In a study on the screening of cervical cancer in Brazil, with Siscolo data for the period from 2002 to 2006,[11] the researchers have observed an increase in positive results for Pap smear tests in the country of 22.9%, with positivity of 2.3% in 2002 and 2.9% in 2006, but with significant variation between age groups and regions: increase in positive tests in the Southeast (53.1%), South (6.3%) and Midwest (26.9%); and reduction in the North (12.4%) and Northeast (2%).[11] In 2006, the Northeast presented positivity of 2.2% of the tests, whereas the North presented 3.3%, the Midwest 3.7%, the South 2.2% and the Southeast 3.4%.[11] Comparing these country data with the findings of this study for Teresina, in 2006, there are fewer positive tests than in the other capitals of the country.

The high proportion of atypical cells of undetermined significance (55.4% of abnormal tests) observed in this study points to the need for technical training for slides analysis. This ratio works as an indicator of laboratories quality. The literature indicates that 20 to 40% of patients with atypical cells will present low-degree lesions and from 5 to 15% of them will present high-degree lesions.[23] In the older age groups, the prevalence of LSIL decreased, whereas the prevalence of HGSIL increased, especially for the age group of 64 years and over. There are similar findings in studies conducted in England,[24] in São Paulo[25] and in the municipality of Rio de Janeiro,[26] among others. The LSIL are considered non-precursor lesions and most of them regress spontaneously. Recently, it was suggested that the treatment of precursor lesions in adolescents and young women might be associated with increasing obstetric and neonatal morbidity.[27] For women aged over 64, the significant percentage of precursor lesions and cancer probably express the non-carrying out of pap smear and/or the low quality of screening, in earlier periods of their lives.

A research with Siscolo data for Brazil pointed to a gradual increase in the percentage of unsatisfactory samples of pap smear tests in the Midwest and Northeast regions, from 2002 to 2006.[11] The minimum quality standard established by the Pan American Health Organization for this indicator corresponds to a 5% limit; however, the goal is that it tends to zero, in order to ensure the effectiveness of screening.[28] For Teresina, the indicator is within that limit, although it has shown constant increasing trend in the analyzed period, which could indicate the need for evaluation, in order to improve the screening program.

The low presence of the TZ in the present study points to the need for technical training addressed to the stage of material collection. In a study on the screening of cervical cancer in the state of Maranhão in 2012, the authors pointed out that 64.2% of the tests had the presence of TZ[12]. Comparatively, in Teresina, the presence of TZ in the same year was 6.8% lower than in Maranhão. Health professionals, when presenting the test results to women, should check if the sample have presence of TZ, since most of precursor lesions of cervical cancer arise in this area.[10]

In an evaluative study on the quality of SISCOLO data in Vitória, the capital of Espírito Santo State,[29] authors pointed the completeness of the variables 'education level' and 'ethnicity/skin color' as bad. Other authors point out the completeness of socioeconomic variables in other information systems as bad, assigning the failure to complete these fields to the little importance given by health professionals for these characteristics,[30] although they are important variables to identify the socioeconomic level of women screened and, therefore, for the development of strategies for prevention and control of cervical cancer.

Even though the analyses of this study are restricted to the screening program for cervical cancer in Teresina, we believe that several of these limitations are common to other Brazilian municipalities' programs, and the study can be a basis for the development of qualification strategies of this neoplasia control actions.

Finally, the cervical screening program from Teresina has some limitations that need to be overcome, especially the inadequate offer of tests, the low proportion of positive results and the increasing number of unsatisfactory samples. The need for more professional training in primary health care, responsible for screening this neoplasia – including sample collection – and of laboratory personnel in

charge of analyzing the slides is to be highlighted. On the other hand, although the Siscolo presents a high potential as a management tool in the control program of cervical cancer, we suggest it to be structured as a longitudinal information system, enabling the understanding of the care offered to women over time. The quality of information registered at Siscolo and the establishment of routines for periodic and continuous evaluation of the data should be prioritized by health managers, in order to qualify the screening actions.

Authors' contributions

Damacena AM, Luz LL and Mattos IE contributed to the design of the study, data analysis, drafting and review of the manuscript.

Damacena AM organized the database to carry out the statistical analysis.

All authors have approved the final version of the manuscript and declared to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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