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Non-performance of Pap smears among pregnant women in the Extreme South of Brazil: prevalence and associated factors

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Abstract *Cervical cancer is the third most common cause of cancer among women worldwide, and Pap smears are the best screening strategy for its detection. This study evaluated the prevalence and the associated factors of the non-performance of Pap smears among pregnant women above the age of 25 during prenatal care in the municipality of Rio Grande, Brazil, in 2013. The multivariate analysis was performed by Poisson regression evaluated by prevalence ratio (PR). Of the 1,474 pregnant women included in the study, 21.6% (95% CI, 19.5%–23.7%) had not been screened. The adjusted analysis evidenced a PR for the non-performance among puerperae with 0-4 years schooling of 2.14 (95% CI, 1.35–3.38) compared to those with 12 years or more. Reporting previous abortion and alcohol use during pregnancy showed a PR of 1.38 (1.10–1.73) and 1.39 (1.04–1.84) of not doing so compared to the other, respectively. Finally, performing 1–5 prenatal visits evidenced a PR of 1.35 (1.03–1.77) compared to the others. A high proportion of pregnant women non-performing Pap smears and non-compliance with the basic recommendation by the Brazilian Ministry of Health has been found. Health professionals should reinforce the need for this test and active search for pregnant women in the community with the profile described herein.*

Key words *Prenatal care, Papanicolaou test, Risk factors, Screening test*

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Introduction

Cervical cancer is the third most frequent tumor in the Brazilian female population, behind only breast and colorectal cancer. It is the fourth cause of cancer death among women in Brazil, with a mortality rate of 4.4/100,000[1].

Provided it is diagnosed early, only skin cancer has a more significant potential for prevention and cure than cervical cancer. Its main screening strategy is the conventional Pap smears (Papanicolaou). This test is recommended for women between 25 and 64 years of age and with a triennial frequency for those with two consecutive negative results[2]. The predominant type of search for this type of service in Brazil is opportunistic, that is, for reasons other than the early diagnosis of the disease. As a result, half of the cases are diagnosed in advanced stages of the disease, when the prognosis is worse[3].

About 20% of Brazilian women aged between 25 and 64 years have never performed a single Pap smear test[1]. Among those who have already undergone this test, a significant proportion did so at less than recommended intervals, while others are late[4]. Most of the studies addressing this theme seek to evaluate the coverage[4-9] and the focus[4] and identify those with a delayed Pap smear[5]. The studied age ranges are entirely different, especially when we include pregnant women, which hampers comparisons and prevents the determination of the real extent of the problem[5-12].

The pregnant women are a population group that can portray how screening guidelines are being followed. In Brazil, 90% of the pregnant women undergo at least one prenatal care visit, and about half of them are at the age when this examination is recommended[10]. Considering that this test should be requested at the first visit, one would expect a higher rate of coverage and, therefore, lower morbimortality rates. Among all Brazilian women, the death rate from cervical cancer is 5 per 100,000, a rather high rate, although the coverage of this test is 78.7%[1,13,14].

The increased rate of Pap smears could lead to a drastic reduction of morbimortality rates for this disease[15]. Thus, encouraging its performance during prenatal care visits could contribute to the lower number of deaths by this cause. Although it has contributed significantly to curb morbimortality due to various causes in Brazil, the Family Health Strategy has not yet shown a significant increase in coverage for this type of test[16]. Many missed opportunities for Pap smears are observed here.

This study aims to measure the prevalence and identify factors associated with the non-performance of Pap smears among pregnant women who had at least one prenatal care visit, who were 25 years of age or older and had a child in the municipality of Rio Grande (RS) during 2013.

Methods

This study was conducted in Rio Grande, a municipality with a population of little over 200,000 inhabitants located in the extreme south of the state of Rio Grande do Sul. Ninety-five percent of the population live in the urban area and practically all births (99.5%) occur in the only two local maternity hospitals.

Since 2007, perinatal surveys have been carried out every three years to evaluate the quality of gestation and delivery care in this municipality. The most recent study was conducted in 2013, from where data shown in this paper originated.

This perinatal study included all births occurring from January 1st to December 31st, 2013, whose birth weight was equal to or greater than 500 grams or reached at least 20 weeks of gestational age. Also, their mothers should reside in urban or rural areas of the municipality of Rio Grande.

Because this paper is related to Pap smears during the prenatal care period and that this test is not routinely recommended for women with up to 24 years of age, the denominator of this study consisted of only puerperal women who had undergone at least a prenatal care visit, who were 25 years of age or older, who had never taken the test or had performed it more than three years ago. Mothers were approached only once, at the hospital, within 48 hours of delivery.

The calculation of the sample size was estimated from data from this same study. Considering the available "n" of 1,474 postpartum women, the prevalence of the outcome (non-performance of the Papanicolaou in the last three years) of 21.6%, a desired confidence level of 95%, losses of 3.0%, it was possible to work with a margin error of 2.2 percentage points[17].

Regarding the study on the identification of associated factors, working with an alpha error of 0.05, a beta error of 0.20, exposed/unexposed ratio of 79/21, a prevalence of disease among the unexposed of 23% and risk ratio of 1.4, the study should include at least 1,331 puerperae. This value is already adjusted by 15% for control of potential confounders and 3.0% for loss-

es. These calculations were performed using Epi Info 6.04[17].

Interviewers were previously trained, and a pilot study was conducted. The information sought addressed demographic characteristics (mother's age and skin color and whether she lived with her companion); socioeconomic status (household income, schooling, paid work during pregnancy); reproductive history (parity, age at first delivery, prior abortion and pregnancy planning); life habits (tobacco and alcohol use and physical activity during pregnancy). Pregnant women under the guidance of a physician, nurse or physical educator regularly engaged in directed physical exercise specific to the pregnancy were considered to have performed physical activity. Other general exercises performed as a school activity, work activity or household chores were not considered). Finally, the type of care received during gestation and delivery was investigated, including the number of prenatal care visits performed, the trimester of onset and place of prenatal care visits, and whether they were done in the public or private sector).

The questionnaires were double-entered in the Epi Data 3.1[17] program, the comparison made in Epi Info 6.04 and the consistency and final analysis in 11.0[18].

The crude and adjusted analyses were performed by Poisson regression, with robust adjustment of the variance[19]. The outcome measure was expressed by the prevalence ratio (PR), 95% confidence interval (95% CI) and a p-value of Wald's test for heterogeneity and linear trend. Regarding the adjusted analysis, a three-level hierarchical model was elaborated assuming that those located at the first level (more distal to the outcome) were overdetermining vis-à-vis the others[20]. At the first level, demographic variables (age, skin color, and marital status - whether or not living with companion) and socioeconomic variables (household income, maternal schooling, and paid work during the gestational period) were included; the second level contained the variables related to the reproductive life (parity, number of children, prior abortion, spontaneous or induced abortion, planning of pregnancy of this last pregnancy and age at first delivery) and behavioral (tobacco use during the gestational period pregnancy-specific physical activity); the variables related to the use of health services (number of prenatal care visits, number of visits, trimester of onset of visits and type of service – public or private – where the prenatal care visits were conducted) were entered in the third level. This model followed the others employed when assessing risk factors for the same outcome, with a single conservative difference, i.e., all variables included in the model were adjusted in the final model, regardless of the p-value resulting from its association with the outcome (non-performance of Pap smears in the last pregnancy)[5,8-12]. This avoids the emptying of the final model and allows the assessment of the occurrence of eventual negative confounders[21]. The analyses were conducted in Stata 11.0 with a significance level of 95 % for two-tailed tests[18,21].

About 7% of the interviews were partially re-implemented by telephone or home visit to the mother to evaluate the quality of the data collected. The Kappa index of agreement for all variables tested ranged from 0.63 to 0.89, which is at least satisfactory[21].

The consent form was read to the mothers and, in case of agreement, two copies were signed, and one of them was retained by the participant. The research protocol was submitted and approved by the Health Research Ethics Committee (CEPAS) of the Federal University of Rio Grande. Also, data confidentiality, voluntary participation and the possibility of leaving the study at any time without any justification were assured.

Results

The Live Births Information System (SINASC) evidenced 2,769 births whose mothers lived in the municipality of Rio Grande. Of this total, 2,687 were interviewed, which shows a loss rate of around 3%. In addition to these losses, 73 were excluded because they did not have a single prenatal care visit and 1,140 (42.4% of the total) because they were under 25 years of age. In total, 1,474 puerperae aged 25 years or older and who had had at least one prenatal care visit remained.

Table 1 shows that most of these mothers were white (68.1%), were older than 30 years (57.2%), had a companion (89.5%), had a household income ≥ four minimum wages (52.2%), nine years of schooling (72.8%) and were under paid work during pregnancy (54.9%). Just over a third of them (34.2%) were primiparous, more than half (53.6%) had their first child as adolescents, about 30% reported previous abortion, 16.3% said they were smokers, and nearly one-third said they practiced some exercise before or during pregnancy. Regarding prenatal care, at least eight out of 10 had six or more visits and

started them in the first trimester of pregnancy. Finally, 21.6% (95% CI: 19.5%-23.7%) had not performed a Pap smear test in the last three years.

Table 2 shows the prevalence of the outcome by category and the crude and adjusted analyses. The prevalence of non-performance of Pap smears ranged from 13.0% among those with 12 years of schooling or more to 38.5% among those who started prenatal care in the third trimester of gestation. After adjusting for variables of the same level and previous levels, puerperae with 0-4 years schooling showed that the preva-

Table 1. Characteristics of pregnant women over 25 years of age who did at least one prenatal visit in the city of Rio Grande (RS), Brazil.

Variables	%	n
Maternal age (years)		
25-29	42.8	632
30-34	35.2	519
35 and over	22.0	323
Skin color		
White	68.1	1005
Brown	21.8	321
Black/Brown	10.1	148
Marital status/living with husband/companion	89.5	1318
Monthly household income in minimum wages		
Up to 0.9	3.1	46
1-1.9	21.7	319
2-3.9	23.0	340
4 and over	52.2	769
Schooling (in years)		
0-4	6.1	90
5-8	22.1	326
9-11	48.2	710
12 and over	23.6	348
Engaged in paid work during pregnancy	54.9	808
Number of children		
1	34.2	502
2	33.8	498
3	16.0	237
4 and over	16.0	237
Age at first delivery (n = 1020)		
13-16	20.5	209
17-19	33.1	338
20-24	29.1	297
Above 25	17.3	176
Prior abortions	29.4	300
CBehavioral		
Tobacco use	16.3	239
Alcohol use	9.0	132
Engaged in physical activity (before or during)	31	457
Number of prenatal care visits performed		
1-5	11.8	174
6 and over	88.2	1300
Started prenatal care visits in the first trimester	82.1	1209
Place of prenatal care visits		
Private	57.5	847
Public	42.5	627
Prevalence of non-performance of Pap smears	21.6	319
Total	100.0	1.474

lence of non-performance of the Pap smear test was 2.4 (95% CI: 1.35-3.38) times higher than the value obtained among those with 12 years of schooling or more. Having reported abortion at some time in the past and ingested alcohol drink during this pregnancy revealed that the prevalence of non-performance of Pap smear test was 1.38 (1.10-1.73) and 1.39 (1.04-1.84) times greater than the value obtained regarding mothers who did not consume alcoholic beverages and who did not suffer any abortion, respectively. Finally, mothers who performed 1-5 prenatal care visits showed that the prevalence of non-performance of the Pap smear test in this group was 1.35 (1.03-1.77) times the value obtained in the reference group, that is, for those who completed six or more visits throughout prenatal care.

Discussion

Despite having performed at least one prenatal care visit, two out of ten pregnant women had not been submitted to Pap smears, and they should have been. The main factors associated with the failure to perform were low schooling, previous abortion, alcohol intake during gestation and a low number of prenatal care visits.

We must consider at least three aspects regarding the performance of this test when interpreting the results shown here: 1) it may be difficult for some women to differentiate gynecological examination from Pap smears; 2) possible bias of information and recall, both subjected to the respondent's report; and 3) overestimation of their performance because this is the expected behavior[11].

Despite these limitations, we decided to proceed because most of the studies that address this subject use the same methodology, which facilitates comparability and self-report is entirely accurate[22].

Also, this survey included all pregnant women in a medium-sized municipality, a unique situation in Brazil. It allowed us to estimate the actual coverage and not only the number of procedures performed, as it happens in official statistics. It achieved a high response rate and dealt

Table 2. Crude and adjusted analyzes for non-performance of Pap smears in this last pregnancy among pregnant women aged 25 years and over who did at least one prenatal visit in Rio Grande (RS), Brazil, in 2013. (n = 1474).

Level	Variable	Prevalence of non-performance of Papanicolaou (%)	Prevalence Ratio (CI95%)	
			Crude	Adjusted
I	Maternal age (years)		p = 0.994	p = 0.866
	25-29	21.6	1.00	1.00
	30-34	21.8	1.01 (0.81-1.26)	1.06 (0.85-1.32)
	35 and over	21.7	1.00 (0.78-1.29)	1.03 (0.80-1.33)
	Skin color		p = 0.046	p = 0.399
	White	20.2	1.00	1.00
	Black/brown	24.8	1.23 (1.00-1.49)	1.09 (0.88-1.34)
	Marital status		p = 0.584	p = 0.859
	Living with companion	23.4	1.00	1.00
	Living without companion	21.5	0.92 (0.68-1.24)	0.97 (0.71-1.34)
	Household income in tertiles		p < 0.001	p = 0.229
	First	24.9	1.00	1.00
	Second	25.7	0.68 (0.53-0.88)	1.17 (0.92-1.50)
	Third (best)	17.1	0.25 (0.21-0.29)	0.97 (0.72-1.30)
	Maternal schooling (years)		p < 0.001	p = 0.020#
	0-4	31.1	2.40 (1.59-3.62)	2.14 (1.35-3.38)
	5-8	28.5	2.20 (1.59-3.04)	1.98 (1.37-2.85)
	9-11	21.6	1.66 (1.22-2.26)	1.55 (1.13-2.14)
	12 and over	13.0	1.00	1.00
	Paid work during pregnancy		p = 0.005	p = 0.268
	No	25.0	1.00	1.00
	Yes	18.9	0.76 (0.62-0.92)	0.89 (0.71-1.10)

it continues

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Level	Variable	Prevalence of non-performance of Papanicolaou (%)	Prevalence Ratio (CI95%)	
			Crude	Adjusted
II	Number of children		p < 0.001	p = 0.227
	1	15.1	1.00	1.00
	2	20.5	1.35 (1.03-1.77)	1.53 (0.73-3.19)
	3	28.2	1.87 (1.40-2.50)	1.88 (0.88-4.01)
	4 and over	31.3	2.06 (1.56-2.73)	1.89 (0.87-4.09)
	Prior abortion		p = 0.008	p = 0.005*
	No	22.2	1.00	1.00
	Yes	30.0	1.35 (1.08- 1.68)	1.38 (1.10-1.73)
	Planning current pregnancy		p = 0.003	p = 0.954
	Yes	18,1	1.00	1.00
	No	24,5	1.35 (1.10-1.65)	0.99 (0.78-1.26)
	Age at first delivery (years)		p = 0.012	p = 0.649
	13-16	29.7	1.86 (1.35-2.78)	1.25 (0.81-1.94)
	17-19	27.2	1.71 (1.17-2.50)	1.30 (0.86-1.97)
	20-24	22.9	1.44 (0.97-2.14)	1.26 (0.84-1.89)
	25 and over	15.9	1.00	1.00
	Tobacco use		p < 0.001	p = 0.548
	No	19.1	1.00	1.00
	Former smoker	24.2	1.27 (0.96-1.68)	1.10 (0.81-1.50)
	Smoker	31.0	1.62 (1.29-2.04)	1.16 (0.88-1.52)
	Alcohol use		p < 0.001	p = 0.025*
	No	20.5	1.00	1.00
	Yes	34.1	1.66 (1.29-2.16)	1.39 (1.04-1.84)
	APhysical activity specific to pregnancy		p = 0.022	p = 0.664
	No	23.5	1.00	1.00
	Yes	17.9	0.77 (0.61-0.96)	0.95 (0.74-1.21)
III	Number of prenatal care visits performed		p < 0.001	p = 0.028*
	1-5	35.1	1.77 (1.40-2.22)	1.35 (1.03-1.77)
	6 and over	19.8	1.00	1.00
	Trimester of prenatal care visits onset		p < 0.001	p = 0.275
	First	19.3	1.00	1.00
	Second	31.9	1.66 (1.33-2.06)	1.23 (0.94-1.60)
	Third	38.5	1.99 (1.21-3.29)	1.27 (0.74-2.17)
	Place of prenatal care visits		p = 0.050	p = 0.07
	Private	19.8	1.00	1.00
	Public	24.1	1.21 (0.99-1.47)	0.81 (0.64-1.02)

Wald's for linear trend; * Wald's test for heterogeneity.

with a specific group of the population that, even visiting the services systematically and over a number of times, most were not submitted to this test. Finally, we did not find in Brazil a single population-based study that included only pregnant women within the age range recommended by the Ministry of Health for the performance of the Pap smear test.

The prevalence of non-performance of Papanicolaou in this population was 21.6%. There are at least two issues that hinder the comparison of these results. The first is the small number of studies among pregnant women[5,23,24], while the second is the inclusion of women with a different age range than that recommended by the Ministry of Health, that is, not only from the age of 25.

A study carried out in 2010 in this same municipality, also with pregnant women, found a non-performance of Pap smear test rate of 33%[5]. An almost 50% greater difference is because this

study included all pregnant women, regardless of age, therefore, disregarding the Ministry's recommendation. This raises the rate of non-performance due to the non-compulsory condition to perform before the age of 25. A study among pregnant women in 2010 in Juiz de Fora (MG) found a prevalence of 26.6%. However, among those in arrears, 53.6% were up to 24 years of age[23]. In Pelotas, a neighboring city, a study conducted in 2003 that included women between the ages of 20 and 59 showed a non-performance rate of 17.0%[9]. Besides the age group, this study has a 10-year difference between the moments of data collection, a period in which a considerable expansion of primary health services in the region was observed, which was the main responsible for the provision of this type of care.

One data that may serve as a baseline for not performing this test is that provided by the 2008 PNAD, which found a prevalence of Pap smear non-performance of 13% among women aged 25-64 years[25]. Women in arrears should be added to this value, which may become closer to the prevalence found in this study. The fact is that, despite being in the required age for this test, with many of them even being late, and having visited the doctor at least once during prenatal care, two out of ten pregnant women living in the municipality of Rio Grande were not submitted to this test.

Puerperae with up to eight years of schooling showed a prevalence about twice as high of not performing the Pap smear test compared to those with 12 years or more of schooling. Schooling is one of the most important determinants of maternal and child health conditions. The higher the education of women, the better the care for their health, the higher the search for early diagnosis services, and the earlier they seek medical care when they need it[26,27].

Based on several other studies that sought to measure the independent effect of schooling on non-performance of Pap smears, even after adjusting for several confounders, all showed significant measures of effect, revealing the relevance of this variable regarding this outcome[5,9-12,28-30]. In these already mentioned studies, women with up to eight years of schooling showed at least a 50% greater probability of not performing Pap smears compared to the others.

Among those who reported previous abortion (induced or spontaneous), the prevalence of not undergoing this test was about 1.4 times higher when compared to the others. Having two or more abortions was also significantly associated with non-performance of Pap smear tests among those women treated in an area covered by the Family Health Strategy[29].

Puerperae who consumed alcohol during pregnancy had a prevalence of approximately 1.4 times higher than the non-performance of Pap smears compared to non-users of alcohol during pregnancy. We failed to find any published studies in which alcohol was maintained as a risk factor for not performing this test, after adjustment. It should be noted that individuals who routinely consume alcohol have less self-care, and this test can be included in this group since it is the early search for a possible health issue[31]. However, this lacks consistency, hence the need for other studies investigating this variable.

Performing less than six prenatal consultations increased the prevalence by 1.35 times of not performing Pap smears compared to those who completed seven or more prenatal care visits. As mentioned earlier, in a health system where screening programs are predominantly opportunistic, the search for care is directly linked to increased coverage. Thus, the more the visits, the higher the probability of performing Pap smears. This occurred in Juiz de Fora, MG, where 11 prenatal care visits were shown to be protective for Pap smears[23]. Perhaps such a large number of visits were not required to provide protection.

Besides the fact that 21.6% of pregnant women did not perform Pap smears when they had to, what draws attention in this study is that approximately 90% of them have completed at least six prenatal visits, and yet a significant proportion was not submitted to this test. This suggests that the increasing and timely expansion of primary health care services has not been accompanied by the use of situations where service coverage could be increased, including the early detection of cervical cancer. This, of course, contributes to the maintenance of high cervical cancer mortality rates not only in Brazil but also in other low- and middle-income countries[13,32].

This challenge must be addressed more decisively, in organized and resolute fashion, or easily preventable deaths will be recurrent in the country.

Collaborations

RJ Terlan and JA Cesar participated equally in all the elaboration stages of this paper.

References

1. Instituto Nacional do Câncer (INCA). *Estimativa 2014. Incidência de câncer no Brasil*. Rio de Janeiro: INCA; 2014.
2. Brasil. Ministério da Saúde (MS). *Controle dos Cânceres do colo do útero e da mama*. Brasília: MS; 2013.
3. Instituto Nacional do Câncer (INCA). *Inquérito domiciliar sobre comportamentos de risco e morbidade referida de doenças e agravos não transmissíveis: Brasil, 15 capitais e Distrito Federal, 2002-2003*. Rio de Janeiro: INCA; 2004.
4. Quadros CAT, Victora CG, Costa JSD. Coverage and focus of a cervical cancer prevention program in Southern Brazil. *Rev Panam Salud Publica* 2004; 16(4):223-232.
5. Cesar JA, Santos GB, Sutil AT, Cunha CF, Dumith SC. Citopatológico de colo uterino entre gestantes no Sul do Brasil: um estudo transversal de base populacional. *Rev Bras Ginecol Obstet* 2012; 34(11):518-523.
6. Martins LFL, Thuler LCS, Valente JG. Cobertura do exame de Papanicolaou no Brasil e seus fatores determinantes: uma revisão sistemática da literatura. *Rev Bras Ginecol Obstet* 2005; 27(8):485-492.
7. Correa MS, Silveira DS, Siqueira FV, Facchini LA, Piccini RX, Thumé E, Tomasi E. Cobertura e adequação do exame citopatológico de colo uterino em estados das regiões Sul e Nordeste do Brasil. *Cad Saude Publica* 2012; 28(12):2257-2266.
8. Albuquerque KM, Frias PG, Andrade CLT, Aquino EML, Menezes G, Szwarcwald CL. Cobertura do teste de Papanicolaou e fatores associados à não-realização: um olhar sobre o Programa de Prevenção do Câncer do Colo do Útero em Pernambuco, Brasil. *Cad Saude Publica* 2009; 25(Supl. 2):S301-S309.
9. Hackenhaar AA, Cesar JA, Domingues MR. Exame citopatológico de colo uterino em mulheres com idade entre 20 e 59 anos em Pelotas, RS: prevalência, foco e fatores associados à sua não realização. *Rev Bras Epidemiol* 2006; 9(1):103-111.
10. Cesar JA, Horta BL, Gomes G, Houlthausen RS, Willrich RM, Kaercher A, Iastrenski FM. Fatores associados à não realização de exame citopatológico de colo uterino no extremo Sul do Brasil. *Cad Saude Publica* 2003; 19(5):1365-1372.
11. Gasperin SI, Boing AF, Kupek E. Cobertura e fatores associados à realização do exame de detecção do câncer de colo de útero em área urbana no sul do Brasil: estudo de base populacional. *Cad Saude Publica* 2011; 27(7):1312-1322.
12. Oliveira MMHN, Silva AAM, Brito LMO, Coimbra LC. Cobertura e fatores associados a não realização do exame preventivo de Papanicolaou em São Luís, Maranhão. *Rev Bras Epidemiol* 2006; 9(3):325-334.
13. Instituto Nacional do Câncer (INCA). Atlas de Mortalidade por Câncer. [periódico na internet]. 2014. [acessado 2015 Jul 15]. Disponível em https://mortalidade.inca.gov.br/MortalidadeWeb
14. Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA). *Avaliação de indicadores das ações de detecção precoce dos cânceres do colo do útero e de mama - Brasil e regiões, 2013*. Rio de Janeiro: INCA; 2015.
15. Anttila A, von Karsa L, Aasmaa A, Fender M, Patnick J, Rebolj M, Nicula F, Vass L, Valerianova Z, Voti L, Sauvaget C, Ronco G. Cervical cancer screening policies and coverage in Europe. *Eur J Cancer* 2009; 45(15):2649-2645.
16. Victora CG, Aquino EM, Carmo Leal M, Monteiro CA, Barros FC, Szwarcwald CL. Maternal and child health in Brazil: progress and challenges. *Lancet* 2011; 377(9780):1863-1876.
17. Dean AG, Dean JA, Coulombier D, Brendel KA, Smith DC, Burton AH. *Epi-Info, Version 6: A Word Processing, Database, and Statistics Program for Epidemiology on Microcomputers*. Atlanta: Centers of Disease Control and Prevention; 2002.
18. Stata Corp. *Stata statistical software: release 11.2*. College Station: Stata Corporation; 2011.
19. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. *BMC Med Res Methodol* 2003; 3:21
20. Victora CG, Huttly SR, Fuchs SC, Olinto MT. The role of conceptual frameworks in epidemiological analysis: a hierarchical approach. *Int J Epidemiol* 1997; 26(1):224-227.
21. Kirkwood BR, Sterne JAC. *Essential Medical Statistics*. Oxford: Blackwell; 2003.
22. Caplan LS, McQueen DV, Qualters JR, Leff M, Garrett C, Calonge N. Validity of women's self-reports of cancer screening test utilization in a managed care population. *Cancer Epidemiol Biomarkers Prev* 2003; 12(11 Pt 1):1182-1187.
23. Ribeiro L, Bastos RR, Ribeiro LC, Vieira MT, Leite IC, Teixeira MT. Não adesão às diretrizes para rastreamento do câncer do colo do útero entre mulheres que frequentaram o pré-natal. *Rev Bras Ginecol Obstet* 2013; 35(7):323-330.
24. Gonçalves CV, Duarte G, Dias da Costa JS, Quintana SM, Marcolin AC. Perdas de oportunidades na prevenção do câncer de colo uterino durante o pré-natal. *Cien Saude Colet* 2011; 16(5):2501-2510.
25. Martínez-Mesa J, Werutsky G, Campani RB, Wehrmeister FC, Barrios CH. Inequalities in Pap smear screening for cervical cancer in Brazil. *Prev Med* 2013; 57(4):366-371.
26. Travassos C, Viacava F, Pinheiro R, Brito A. Utilization of health care services in Brazil: gender, family characteristics, and social status. *Rev Panam Salud Publica* 2002; 11(5-6):365-373.
27. Haidar FH, Oliveira UF, Nascimento LFC. Maternal educational level: correlation with obstetric indicators. *Cad Saude Publica* 2001; 17(4):1025-1029.
28. Amorim VMSL, Barros MBA, César CLG, Carandina L, Goldbaum M. Fatores associados à não realização do exame de Papanicolaou: um estudo de base populacional no Município de Campinas, São Paulo, Brasil. *Cad Saude Publica* 2006; 22(11):2329-3829.
29. Augusto EF, Rosa ML, Cavalcanti SM, Oliveira LH. Barriers to cervical cancer screening in women attending the Family Medical Program in Niterói, Rio de Janeiro. *Arch Gynecol Obstet* 2013; 287(1):53-58.

30. Borges MFSO, Dotto LMG, Koifman RJ, Cunha MA, Muniz PT. Prevalência do exame preventivo de câncer do colo do útero em Rio Branco, Acre, Brasil, e fatores associados à não-realização do exame. *Cad Saude Publica* 2012; 28(6):1156-1166.
31. Machado IE, Lana FCFL, Felisbino-Mendes MS, Malta DC. Factors associated with alcohol intake and alcohol abuse among women in Belo Horizonte, Minas Gerais State, Brazil. *Cad Saude Publica* 2013; 29(7):1449-1459.
32. Tsu V, Jeronimo J. Saving the World's Women from Cervical Cancer. *N Engl J Med* 2016; 374(26):2509-2510.

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