

## RESEARCH ARTICLE

# Cytology-Based Screening During Antenatal Care as a Method for Preventing Cervical Cancer

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### Abstract

**Background:** Cervical cancer is one of the most serious threats to women's lives. Therefore, the present study aimed to know the dynamics in the collection of cytologic samples during antenatal care as a method of cervical cancer screening and to identify the factors associated with its performance. **Material and Methods:** Analytical cross-sectional study carried out with pregnant and postpartum women in Fortaleza, Ceará, Northeastern Brazil. Data were collected using a questionnaire addressing sociodemographic variables, antenatal care, pregnancy and cytology-based screening for cervical cancer during antenatal care. Measures of central tendency were calculated and the Chi-squared test and Fisher's exact test were used with a significance level of 5%. **Results:** Participants were 229 pregnant women and 89 postpartum women. Age ranged 18 to 43 years, with a mean of 27.9 years (SD=6.1). Only 35 (11%) participants had Pap smears during antenatal care. A total of 283 women did not have Pap smears during pregnancy; of these, 229 (80.9%) did not have the test because of lack of clear information from the health professional, 25 (8.8%) for fear of bleeding or abortion, and 29 (10.3%) because they had had the test before pregnancy. Undergoing cytology-based screening for cervical cancer was associated with high-risk pregnancy ( $p=0.002$ ), antenatal care provided by a physician ( $p=0.003$ ), knowledge about the possibility of having the test during pregnancy ( $p<0.001$ ) and paid job ( $p=0.043$ ). **Conclusion:** The percentage of cytology-based screening for cervical cancer during antenatal care was low. Therefore, health education is suggested to improve this figure. However, receiving antenatal care at MEAC, having consultations with a physician, and knowing that it is possible to have a Pap smear during pregnancy were significant protective factors for undergoing cytology screening during pregnancy.

**Keywords:** Antenatal care- prevention- uterine cervical neoplasms- pathology

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### Introduction

Cervical cancer is one of the most serious threats to women's lives. It is estimated that more than one million women worldwide currently have cervical cancer. Most of them have not been diagnosed, nor do they have access to treatment. In 2012, 528,000 new cases of cervical cancer were diagnosed, and 266,000 women died of the disease – nearly 90% of them in low- to middle-income countries. Deaths due to cervical cancer are projected to rise by 25% over the next 10 years (Bristreo et al., 2014).

Estimates show that 15,590 new cases of cervical cancer were diagnosed in Brazil in 2014. This type of cancer is the third most common cancer in Brazilian women and the second in Northeastern Brazil, behind only breast cancer. In the state of Ceará, the incidence rate of cervical cancer in 2014 was 20.27 cases per 100,000

women, one of the highest in Brazil (INCA, 2014).

Cervical cancer– if diagnosed and treated early– constitutes a preventable cause of death. Early diagnosis enables the effective treatment of the disease, which has one of the highest chances of cure among all cancer types. In Brazil, the Ministry of Health recommends cytology-based screening for cervical cancer in women aged 25-64 years. Cytology-based screening is effective in the detection of cervical cancer and Brazil's National Health Care System, also known as the Unified Health System (Sistema Único de Saúde – SUS), provides such preventive examination free of cost to women at primary health care centers (Santos et al., 2014)

According to the World Health Organization, the examination should cover at least 80% of the female population aged 25-49 years in order to effectively prevent cervical cancer (WHO, 2006). In addition, cervical cancer

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screening should be performed at least once for every woman in the target age group where most benefit can be achieved – 30-49 years (WHO, 2014).

Despite that, some authors have reported barriers to cervical cancer screening, namely social inequalities. Understanding the role of different socioeconomic determinants in this process could be effective in carrying out specific actions to tackle social inequalities and reduce their impact on health at different stages of life. The large disparities in health that can be measured within and between countries are a challenge to the world. However, social health inequalities are avoidable, and their reduction represents an achievable goal and an ethical imperative (Merletti et al., 2011).

Until a few years ago, the only method of screening for cervical cancer was the Papanicolaou (“Pap”) smear or cytology. In high-income countries, where Pap smears have been used for population-based screening for more than three decades, there has been a large reduction in morbidity and mortality from cervical cancer. However, population-based cytology screening in low- and middle-income countries is often unsuccessful because financial investments are not sufficient (WHO, 2014).

Cervical cancer screening offers protective benefits and is associated with a reduction in the incidence of invasive cervical cancer and cervical cancer mortality. However, the rate of participation in screening is very low in low- and middle-income countries (Bayu et al., 2016). Given that, antenatal care is considered an opportune moment to perform cytology screening in order to prevent cervical cancer.

With this in mind, the present study aimed to know the dynamics in the collection of cytologic samples during antenatal care as a method for cervical cancer screening and to identify the factors associated with its performance.

## Materials and Methods

This is a quantitative descriptive and analytical cross-sectional study carried out with pregnant and postpartum women receiving hospital-based care. The study assesses the frequency of cytology-based screening for cervical cancer during antenatal care.

Interviews were carried out using a questionnaire that addressed: demographic variables (age, marital status); socioeconomic variables (religion, paid job, education and household income); number of pregnancies (nulliparity or multiparity); type of antenatal care (high risk/hospital and low risk/health care center); and data on antenatal care (number of consultations, knowledge about the possibility of having a Pap smear during pregnancy, Pap smear performed during antenatal care, and reasons for not having a Pap smear) and antenatal care provider (physician or nurse, or both physician and nurse).

Data collection took place in the emergency room of the Assis Chateaubriand Maternity Hospital (Maternidade Escola Assis Chateaubriand – MEAC), which serves high-risk (hospital-based care) and low-risk pregnant women (primary health care center-based care). Data were collected by an interviewer and an observer who were previously trained by interviewing six pregnant

women. This procedure ensured that the data collected were accurate and reliable.

MEAC is part of a Complex of Teaching Hospitals linked to the Federal University of Ceará, located in the city of Fortaleza, Ceará, Northeastern Brazil. Its mission is to promote teaching and research activities and to provide maternal and child care. Activities aimed at women’s health care include: antenatal care offered to high-risk pregnant women, emergency obstetric care, and childbirth care offered to both low-risk and high-risk pregnant women from the city of Fortaleza and from country towns in the state of Ceará.

In 2014, 18,124 consultations were performed at the MEAC emergency room. Of these, 5,605 resulted in hospitalizations. The MEAC serves patients from all areas of the city of Fortaleza, which is why the hospital was chosen to be the setting of the present research.

The sample size was estimated using Epi Info and taking into consideration the following parameters: 37,577 children were born in Fortaleza in 2012; the prevalence of pregnant women who get Pap Smear during antenatal is 25%; and sampling error was set at 5% plus 10% ( $n + 10\%$ ) for potential losses. Therefore, the minimum sample size should comprise 315 pregnant and/or postpartum women with a 95% confidence level.

Absolute (n) and relative (%) frequencies were calculated for all categorical variables. Frequencies (absolute and relative), means, median, standard deviation, and minimum and maximum ranges were calculated for numerical variables. Frequencies (absolute and relative), prevalence ratio and confidence intervals were calculated for each of a set of data. Chi-squared test or Fisher’s Exact test were used to check for bivariate associations with a significance level set at 5%. Statistical analysis was performed using SPSS version 22 (SPSS Inc., Chicago, IL, USA).

Inclusion criteria were: postpartum women, or women in the third trimester of pregnancy, aged 18 years or older who had attended at least one antenatal consultation in the city of Fortaleza. Informed written consent was obtained prior to data collection. Patients who received antenatal care outside Fortaleza or who were not able to answer the questionnaire were excluded.

The project was approved by the Ethics Committee of the Assis Chateaubriand Maternity Hospital (Maternidade Escola Assis Chateaubriand – MEAC) under Approval No. 701.106.

## Results

Participants were 229 pregnant women and 89 postpartum women whose age ranged 18 to 43 years, with a mean age of 27.9 years (SD=6.1). In all, 35 (11%) women underwent cervical cancer screening during antenatal consultations. Of the 153 (48.1%) women who knew they could have the test during pregnancy, only 29 (19.0%) did so.

A total of 283 (89%) women had not undergone cervical cancer screening; of these, only 29 (10.4%) had already been tested over the past three years and 229 (80.9%) said they did not have the test because the

Table 1. Inferential Analysis of the Association between Sociodemographic Characteristics and Cytology Screening During Pregnancy. Fortaleza, Ceará, 2015.

Variables	n (%) total	n (%) cytology screening	PR (95%CI)	p-value
<b>Age group</b>				
18 to 24 years	96 (30.2)	11 (11.5)	1.30 (0.63 - 2.68)	0.124 <sup>1</sup>
25 to 35 years	182 (57.2)	16 (8.8)	1	
36 years or older	40 (12.6)	8 (20.0)	2.26 (1.04 - 4.92)	
<b>Religion</b>				
Catholic	177 (55.6)	23 (13.1)	1.63 (0.72 - 3.67)	0.492 <sup>2</sup>
Protestant	106 (33.4)	9 (8.5)	1	
None	35 (11.0)	3 (8.6)	1.04 (0.27 - 4.1)	
<b>Marital status</b>				
Married	258 (81.1)	26 (10.1)	1.59 (0.79 - 3.20)	0.400 <sup>2</sup>
Single	57 (17.9)	9 (15.8)	1	
Other	3 (0.9)	-	-	
<b>Paid job</b>				
Yes	205 (64.5)	28 (13.7)	2.19 (1.00 - 4.84)	0.043 <sup>1</sup>
No	113 (35.5)	7 (6.7)	1	
<b>Income</b>				
Less than 1 MW	23 (7.2)	2 (8.7)	1.13 (0.26 - 4.98)	0.372 <sup>2</sup>
1 to 2 MW	191 (60.1)	25 (13.1)	1.70 (0.80 - 3.64)	
More than 2 MW	104 (32.7)	8 (7.7)	1	
<b>Education</b>				
Up to 8 years of study	72 (22.6)	6 (8.3)	1	0.429 <sup>1</sup>
9 years of study or more	246 (77.4)	29 (11.8)	1.39 (0.60 - 3.23)	
<b>Drinking</b>				
Yes	20 (6.3)	-	-	0.248 <sup>2</sup>
No	222 (69.8)	25 (11.3)	1	
Yes, but not during pregnancy.	76 (23.9)	10 (13.2)	1.16 (0.59 - 2.31)	
<b>Smoking</b>				
Yes	20 (6.3)	-	-	0.324 <sup>2</sup>
No	278 (87.4)	33 (11.9)	1.19 (0.31 - 4.59)	
Yes, but not during pregnancy.	20 (6.3)	2 (10.0)	1	

<sup>1</sup>, Chi-squared test; <sup>2</sup>, Fisher's Exact test; MW, Minimum wage (Approximately US\$ 238 in 2015)

health professional had not offered it. The other 25 (8.7%) women reported fear of bleeding or miscarriage as reasons for not having the test.

With regard to socioeconomic variables, only "paid job" was significantly associated with cervical cancer screening (p=0.043). This group had a 2.2 times higher prevalence of cervical cancer screening than women without a paid job.

No statistically significant differences were found between age groups (18-24 years, 25-35 years, and 36 years or older). However, women aged 36 years old or older presented a 1.26 times higher prevalence of

Table 2. Inferential Analysis of the Association Between Obstetric Variables and Cytology Screening During Antenatal Care. Fortaleza, Ceará, 2015

Variables	Cytology screening during antenatal care		PR (95%CI)	p-value
	Total = 318	Yes = 35		
<b>Number of pregnancies</b>				
Multipara	213 (67.0)	24 (11.3)	1.08 (0.55 - 2.12)	0.821 <sup>1</sup>
Nullipara	105 (33.0)	11 (10.5)	1	
<b>High-risk pregnancy</b>				
Hospital	149 (46.9)	25 (16.8)	3.15 (1.52 - 6.54)	0.002 <sup>1</sup>
Outpatient clinic	169 (53.1)	10 (5.9)	1	
<b>Number of antenatal consultations</b>				
Up to 6	137 (43.1)	12 (8.8)	1	0.258 <sup>1</sup>
7 or more	181 (56.9)	23 (12.7)	1.46 (0.75 - 2.83)	
<b>Interviewee's condition</b>				
Pregnant	89 (28.0)	15 (16.9)	1.93 (1.03 - 3.60)	0.038 <sup>1</sup>
Postpartum	229 (72.0)	20 (8.7)	1	
<b>Gestational age at first consultation</b>				
Up to 12 weeks	206 (64.8)	24 (11.7)	1.16 (0.59 - 2.28)	0.665 <sup>2</sup>
12 weeks or more	109 (34.3)	11 (10.1)	1	
Did not know	3 (0.9)	-	-	
<b>Professional providing antenatal care</b>				
Physician	100 (31.4)	20 (20.0)	2.95 (1.53 - 5.69)	0.003 <sup>2</sup>
Nurse	25 (7.9)	2 (8.0)	1.18 (0.28 - 4.93)	
Physician and nurse	193 (60.7)	13 (6.8)	1	
<b>Knowledge about the possibility of having the test during pregnancy</b>				
Yes	153 (48.1)	29 (19.0)	5.05 (2.16-11.83)	<0.001 <sup>2</sup>
No	160 (50.3)	6 (3.8)	1	
Did not answer	5 (1.6)	-	-	

<sup>1</sup>, Chi-squared test; <sup>2</sup>, Fisher's Exact test; MW, Minimum wage (Approximately US\$ 238 in 2015)

cervical cancer screening compared to those aged 25-35 years. Additionally, there were no statistically significant differences between religions or deleterious habits (drinking and/or smoking) in relation to cervical cancer screening during antenatal care (Table 1).

Nearly half of the patients (149; 46.9%) were classified as high-risk pregnancy; of these, 25 (71.4%) had undergone cervical cancer screening. High-risk pregnancy was significantly associated with cervical cancer screening (p=0.002) – the prevalence of Pap smear in women with high-risk pregnancy was 3.15 times higher than that in women with low-risk pregnancy.

Cervical screening was significantly associated with antenatal care exclusively delivered by a physician (p=0.003). The prevalence of cervical screening was 2.95 times higher among women who received antenatal care by a physician alone compared to women who received antenatal care by nurses or by both physicians and nurses.

Likewise, cervical screening was statistically

associated with knowledge about the possibility of having a Pap smear during pregnancy ( $p < 0.001$ ). These women had a 5.05 times higher prevalence of cervical screening than those who did not know they could have the test.

The obstetric factors (number of pregnancies, number of consultations, and gestational age at first consultation) did not show statistically significant differences.

## Discussion

The present study stands out for addressing the importance of the Pap test performed during antenatal care in preventing cervical cancer.

Cervical cancer is the most challenging type of cancer during pregnancy since the pregnant uterus itself is affected; however, there are still many questions and controversies regarding this subject (Han et al., 2013).

The findings of the present study reveal low rates of collection of cytologic samples during antenatal care for cervical screening and highlight the factors associated with Pap smear noncompliance.

The World Health Organization emphasizes that pregnancy is not the ideal time for taking cervical samples for cytology screening because it can give misleading results. However, if the woman is in the target age group and it is likely that she will not return after giving birth, the health professional should proceed with the smear (WHO, 2014).

The low percentage (11%) of patients who had undergone cytology-based screening during antenatal consultations is a major concern. Even though 48.1% of the pregnant women knew that they could have the test, the lack of information and encouragement appeared as determinants of not having the test. It should be noted that most of the women did not have the test either because the health professional did not offer it or because they were not informed about it.

Likewise, some patients reported not having the test for fear of bleeding or miscarriage. In this context, researchers emphasize that pregnant women who experience cervical cancer prevention try to ignore the word “cancer” when it comes to the possibility of being sick. They also point out how these problems are discussed between patients and health professionals. Thus, the biomedical model of care fails to provide women with a more comprehensive care (Moreira et al., 2013).

Researchers have found that pregnant women are three times more likely to present with early-stage cervical cancer than the controls because of regular pregnancy-related obstetric examinations. Since most of cervical cancer lesions are asymptomatic, their diagnosis almost always occurs in control visits, which are more common during antenatal care (Van Calsteren et al., 2005; Nygård et al., 2007).

Research conducted in Norway to estimate the effect of the Pap smear during pregnancy has suggested the provision of Pap smears to all pregnant women since it increases the coverage of cervical cancer screening programs. The same research emphasizes that almost one-third of Norwegian women aged 25-69 do not have a Pap smear in the recommended period and thus constitute

a population with a high risk of cervical cancer (Nygård et al., 2007).

Of all the patients with high-risk pregnancy, only 16.8% had undergone cytology-based screening. On the other hand, only 5.9% of the patients with low-risk pregnancy had undergone cytology-based screening. Women with high-risk pregnancy presented a 3.15 times higher prevalence of cytology screening during antenatal care compared to women with low-risk pregnancy. A systematic review conducted by Gonçalves et al. (2009) found a consensus in the literature in favor of the diagnosis of cervical cancer and preneoplastic lesions during pregnancy.

In fact, health professionals should keep in mind that patients do not often go to the health center to have a Pap smear. However, they usually go to the centers for antenatal consultations. Therefore, antenatal visits are a good moment for cervical screening (Gonçalves, et al., 2011). The low frequency of Pap smears during pregnancy highlights the opportunities missed by antenatal care providers. In Fortaleza, a study conducted by Peixoto et al., (2012) found that only 17.1% of the patients had undergone cytology-based screening during antenatal care, which corroborates the low percentage found in the present study.

In Northeastern Brazil, researchers who assessed women's knowledge about Pap smear found that 98.1% of the participants had heard about it, but only 46.1% had adequate knowledge about it. The physician was the main source of information for 40.1% of the participants – this percentage was expected to be higher given the importance of such professional. Although most (96.2%) of the participants considered the test important, only 63.3% presented adequate attitudes. Neglect, lack of request from the physician and shame were the main reasons for to having the test reported by women (Fernandes et al., 2009).

In contrast, a study conducted in Boa Vista, located in Northern Brazil, found a cervical cancer screening program coverage rate of 85.6% – a rate that is higher than that recommended by the WHO. The authors found that high household income per capita and recent medical appointments were associated with a higher rate of examinations in the multivariate analysis (Navarro et al., 2015).

In the present study, the statistically significant associations of cytology-based screening with high-risk pregnancy, antenatal care at MEAC (reference institution), consultations with a physician, and knowledge about the possibility of having the test during pregnancy highlight the importance of embracing and educating pregnant woman during antenatal consultations.

It is important to note that there were no statistically significant associations between antenatal cytology-based screening and parity factors (number of pregnancies), number of consultations and gestational age at the first consultation.

Education is reported to be an important factor for cytology-based screening. However, there was no statistically significant association between education and cytology-based screening in the present study. In contrast,

the study by Peixoto et al., (2012) found a statistically significant association between pregnant women's level of education and having had cervical cancer prevention tests at some point in their lives.

Similarly, Spadea et al., (2009) found that low levels of education were associated with higher risks of different types of cancer in women, particularly cervical cancer.

The findings of the present study are corroborated by researchers who found that 80% of women were encouraged by the health teams to have a Pap smear and that 46.6% of them felt embarrassed to have the test. The authors also reported that religion did not influence the decision to have the test (Ormonde et al., 2015). In Ethiopia, 90.6% of the women refused to have the test for not presenting any symptoms and 74.9% reported emotional barriers to having the test, such as fear of the procedure being painful (Bayu et al., 2016).

In the present study, only 29 (19%) of the participants who knew they could have the test during antenatal care did so. Despite the low percentage, the figure was significantly higher ( $p < 0.001$ ) when compared to those who knew they could have the test but did not. The same has been found in a study by Santos et al., (2014), in which knowledge about the purpose of the Pap smear was significantly associated with spontaneous search for the test ( $p = 0.003$ ). This finding corroborates the idea that access to information increases the search for preventive care.

The source of information is also an important factor. Research found that receiving information in the Health Center was associated with a higher proportion exams in the past three years ( $p = 0.008$ ) (Correa et al., 2012). Thus, health professionals' interest and confidence in explaining the patient about cytology-based screening during pregnancy should be highlighted.

The association between adherence to antenatal cytology-based screening and paid work ( $p = 0.043$ ) is corroborated by a study carried out in the Brazilian capitals and in the Federal District to analyze the proportion of the testing and its association with The Human Development Index (HDI). The study found an 7% increase in the rate of effectiveness of the test in the last three years for each increase of one standard deviation in the HDI. In the city of Fortaleza, whose HDI is 0.754, circa 72% of the women had undergone cytology-based screening in the past three years, which confirms its low coverage (Falcão et al., 2014; Sadovsky et al., 2015).

Another study conducted in the city of Fortaleza, (Falcão et al, 2014) shows a much higher prevalence of adherence to cytology-based screening. However, it should be noted that the study was carried out in a community served by a local university, which shows that the provision of better health services may increase the percentage of preventive examination.

The results of health programs vary consistently, mainly because the prevention of colorectal cancer is carried out mostly in health services such as outpatient clinics and family health programs, which can change a lot within a same state. However, the findings of a national study reveal an average coverage of 74.3% (21). (Sadovsky et al., 2015)

It is important to note that the incidence of cervical cancer varies widely across the world, with a large difference between developed and developing countries. The implementation of effective screening programs requires government funding, which is sometimes destined to competing public health programs that are considered more important than cervical cancer screening (Catarino et al., 2015).

A total of 19,579 women underwent cervical cancer prevention in six African countries. Of these, 326 (1.7%) presented lesions suspicious of cancer, but only 96 (29.4%) underwent further investigations. It was not possible to track the type of cancer treatment for 230 women in the referral facility for several reasons: participants may have refused to go to a referral facility (because of time, cost or distance), or no treatment information was available for project participants, because of lack of communication between the services (WHO, 2012).

The ongoing efforts to cover marginalized communities have borne fruit. For instance, cervical cancer mortality in the United States and the United Kingdom has decreased by almost 70%. In low- and middle-income countries, success has not yet been achieved. After decades of attempting to implement the same strategies used in high-income countries, the least developed countries are still struggling to find an effective response (Zuma and Hausen, 2015).

From Mumbai to Mexico City and from Kampala to Kathmandu, innovative programs have shown how to effectively deliver cervical cancer prevention and treatment to women. In order to save lives today, there should be an equal, if not greater, commitment to expanding other cervical cancer prevention initiatives (CCA, 2015).

The present research has been limited to patients who attended a reference hospital; therefore, further studies should improve research on this subject. It should be noted, however, that the hospital where this research took place is a large teaching hospital with a service of excellence for university education in gynecology and obstetrics. Therefore, the results of the present research are expected to be found in other places. Additionally, they may contribute to the planning of actions aimed at cervical cancer prevention during antenatal care.

Major progress has been made in reducing mortality from pregnancy-related complications in developing countries over the past years. Significant investments in best practices based on rigorous follow-up of patients have contributed to reducing mortality and represent a great hope that lives will be saved during pregnancy (Figuerola, 2015).

In conclusion, the percentage of cytology-based screening during antenatal care in Fortaleza is below the recommended by the World Health Organization. However, receiving antenatal care at MEAC, having consultations with a physician, and knowing that it is possible to have a Pap smear during pregnancy were significant protective factors for undergoing cytology-based screening during pregnancy.

Factors that prevented the patients from having the test were mostly related to the lack of knowledge about

the possibility of having the test during pregnancy. This finding shows that health professionals miss the opportunity to carry out cervical cancer prevention for not offering it or for not providing clear information about the procedure.

## References

- Bayu H, Berhe Y, Mulat A, et al (2016). Cervical cancer screening service uptake and associated factors among age eligible women in Mekelle zone, Northern Ethiopia, 2015: A community based study using health belief model. *PLoS One*, **11**, e0149908.
- Bustreo F, Chestnov O, Kieny MP, Preface (2014). In: WHO (2014). Comprehensive cervical cancer control. A guide to essential practice. WHO, library cataloguing-in-publication data, 2nd Ed. World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.
- Catarino R, Petignat P, Dongui G, et al (2015). Cervical cancer screening in developing countries at a crossroad: Emerging technologies and policy choices. *World J Clin Oncol*, **6**, 281-90.
- CCA (2015). Cervical cancer action-a global coalition to stop cervical cancer. Progress in cervical cancer prevention the CCA report card 2015. [cited 2017 Mar 25]. Available from: [http://www.cervicalcanceraction.org/pubs/CCA\\_reportcard\\_low-res\\_2015.pdf](http://www.cervicalcanceraction.org/pubs/CCA_reportcard_low-res_2015.pdf).
- Corrêa DAD, Villela WV, Almeida AM (2012). Desafios à organização de programa de rastreamento do câncer do colo do útero em Manaus-AM. *Texto and Contexto Enferm*, **21**, 395-400.
- Falcão GB, Ibiapina FLP, Feitosa HN et al (2014). Factors associated with Pap smear for the prevention of cervical cancer in a low income urban community. *Cad Saúde Coletiva*, **22**, 165-72.
- Fernandes JV, Rodrigues SHL, Costa YGAS, et al (2009). Knowledge, attitudes, and practices related to Pap test in Northeastern Brazil. *Rev Saúde Pública*, **43**, 5.
- Figueroa J (2015). A comprehensive cervical cancer response: planning and investment. In: CCA. [cited 2017 Mar 25]. Available from: [http://www.cervicalcanceraction.org/pubs/CCA\\_reportcard\\_low-res\\_2015.pdf](http://www.cervicalcanceraction.org/pubs/CCA_reportcard_low-res_2015.pdf).
- Gonçalves CV, Duarte G, Costa JSD, et al (2009). Diagnosis and treatment of cervical cancer during pregnancy. *Sao Paulo Med*, **127**, 359-65.
- Gonçalves CV, Duarte G, Costa JSD, et al (2011). Perdas de oportunidades na prevenção do câncer de colo uterino durante o pré-natal. *Cien Saude Colet*, **16**, 2501-10.
- Han SN, Gziri MM, Van Calsteren K, et al (2013). Cervical cancer in pregnant women: treat, wait or interrupt? Assessment of current clinical guidelines, innovations and controversies. *Ther Adv Med Oncol*, **5**, 211-19.
- INCA (2014). Estimativa 2014. Incidência de câncer no Brasil. [cited 2015 Feb 3]. Available from: <http://www.inca.gov.br/estimativa/2014/sintese-de-resultados-comentarios.asp2015>.
- Merletti F, Galassi C, Spadea T (2011). The socioeconomic determinants of cancer. *Environ Health*, **10**, 7.
- Moreira RCR, Lopes RLM, Diniz NMF (2013). Prevention of cervical cancer in pregnant women: a phenomenological study. *Online Braz J Nurs*, **12**, 511-21.
- Navarro C, Fonseca AJ, Sibajev A, et al (2015). Cervical cancer screening coverage in a high-incidence region. *Rev Saúde Pública*, **49**, 17.
- Nygård M, Daltveit AK, Thoresen S, et al (2007). Effect of an antepartum Pap smear on the coverage of a cervical cancer screening programme: a population-based prospective study. *BMC Health Serv Res*, **7**, 10.
- Ormonde JrJC, Oliveira LD, Sá RM (2015). Fatores de adesão e não adesão das mulheres ao exame colpocitológico. *Gestão e Saúde*, **6**, 184-200.
- Peixoto CR, Lima TM, Costa CC, et al (2012). Perfil das gestantes atendidas no serviço de pré-natal das unidades básicas de saúde de Fortaleza-CE. *REME*, **16**, 171-7.
- Sadovsky ADI, Poton WL, Reis-Santos B, et al (2015). Human development index and secondary prevention of breast and cervical cancer: an ecological study. *Cad de Saúde Pública*, **31**, 1539-50.
- Santos MA, Audickas RC, Coutinho SC, et al (2014). A importância da prevenção do câncer do colo uterino: em pauta o exame de papanicolaou. *Recien-Revista Científica de Enfermagem*, **12**, 15-20.
- Spadea T, d'Errico A, Demaria M, et al (2009). Educational inequalities in cancer incidence in Turin, Italy. *Eur J Cancer Prev*, **18**, 169-78.
- Van Calsteren VK, Vergote I, Amant F (2005). Cervical neoplasia during pregnancy: diagnosis, management and prognosis. *Best Pract Res Clin Obstet Gynaecol*, **19**, 611-30.
- WHO (2014). Screening and treatment of cervical pre-cancer. In: WHO (2014). Comprehensive cervical cancer control: A guide to essential practice, Chapter 5. Cataloguing-in-Publication Data, 2nd Ed. World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.
- WHO (2012). Prevention of cervical cancer through screening using visual inspection with acetic acid (VIA) and treatment with cryotherapy. A demonstration project in six African countries: Malawi, Madagascar, Nigeria, Uganda, the United Republic of Tanzania, and Zambia. World Health Organization; International Agency for Research on Cancer. [cited 2017 Mar 23]. Available from: [http://apps.who.int/iris/bitstream/10665/75250/1/9789241503860\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/75250/1/9789241503860_eng.pdf).
- Zuma Mme, HAUSEN HZ (2015). Prefácio. A new era for cervical cancer prevention. In CCA. Cervical cancer action-a global coalition to stop cervical cancer. Progress in Cervical Cancer Prevention The CCA Report Card 2015. [cited 2017 Mar 25]. Available from: [http://www.cervicalcanceraction.org/pubs/CCA\\_reportcard\\_low-es\\_2015.pdf](http://www.cervicalcanceraction.org/pubs/CCA_reportcard_low-es_2015.pdf).