# Assessment of trends in cervical cancer and its precursors to monitor screening policies in developing settings

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## METHODS

The 1996-2013 database from the Aracaju Cancer Registry and from the Brazilian Mortality Information System (SIM) were used to calculate age-standardized rates (ASR) for all invasive tumors, ICD-10: C53 and preinvasive lesions, ICD-10: D06. Rates were calculated for the age groups 0-24, 25-34, 35-44, 45-54, 55-64, and 65+. Trends were assessed by calculating the annual percent change (APC) using the Joinpoint Regression Program.

## RESULTS

We have assessed 1,030 incident cancer cases, 1,871 incident in situ lesions, and 334 deaths, as distributed by age groups: 0-24: 1.5%, 11.7%, 0.6%; 25-34: 11.5%, 37.9%, 9.5%; 35-44: 20.6%, 29.1%, 14%; 45-54: 23.2%, 12.9%, 20.3%; 55-64: 17.4%, 5.1%, 26%; 65+: 25.7%, 3.2%, 29.5% (Figure 3). Considering morphology, 80% of invasive neoplasms were squamous cell carcinoma (Figure 1.). Table 1 depicts annual number of cases and deaths, ASRs and their confidence intervals, where we observe data stability with discrete fluctuation. ASRs showed a decreasing but non-significant trend up to 2008, and then a rising but also non-significant trend until 2014. Carcinoma in situ has demonstrated an inverse pattern. Mortality has shown a decreasing trend throughout the time series (Table2 and Figure 2).

## CONCLUSIONS

Trend analysis have shown that Pap smears are effective in diminishing cancer incidence and mortality. However, decreasing trends of in situ lesions signal that health policies should be reassessed; otherwise, invasive tumors will recover high rates.

## BACKGOUND

Cervical cancer needs control in developing countries. Before assessing results of HPV vaccination, Pap smear continues a major screening tool. Brazilian screening recommendations elect women from ages 25 to 64; and then stop after at least two negative tests in the five years prior to that age. To better understand trends, we have examined incidence and mortality rates of invasive carcinoma and incidence of in situ lesions. The main objective was to calculate cancer incidence and mortality trends and incidence trends of its precancerous lesions in a mid-sized northeastern Brazilian city.

Table 1. Data on annual age-standardized rates with confidence intervals, 1996-2014.

| Year | Incidence, invasive | | | Mortality | | | Incidence, in situ | | |
|---|---|---|---|---|---|---|---|---|---|
| | N(971) | ASR | 95%CI | N(316) | ASR | 95%CI | N(1737) | ASR | 95%CI |
| 1996 | 59 | 32.3 | 24.1; 40.6 | 15 | 8.1 | 4.0; 12.3 | 40 | 1.19 | 12.1; 23.0 |
| 1997 | 66 | 36.1 | 27.4; 44.9 | 12 | 6.1 | 2.6; 9.5 | 44 | 17.6 | 12.4; 22.8 |
| 1998 | 53 | 28.2 | 20.6; 35.8 | 16 | 8.8 | 4.5; 13.1 | 58 | 23.0 | 17.1; 28.9 |
| 1999 | 59 | 30.0 | 22.4; 37.7 | 20 | 10.1 | 5.7; 14.5 | 50 | 20.1 | 14.5; 25.7 |
| 2000 | 55 | 24.1 | 17.7; 30.4 | 24 | 11.4 | 6.8; 16.0 | 47 | 17.4 | 12.4; 22.3 |
| 2001 | 75 | 34.5 | 26.0; 42.3 | 14 | 6.2 | 2.9; 9.4 | 75 | 27.7 | 21.4; 33.9 |
| 2002 | 75 | 33.0 | 25.5; 40.4 | 16 | 6.9 | 3.5; 10.2 | 91 | 33.0 | 26.2; 39.8 |
| 2003 | 64 | 29.5 | 22.2; 36.7 | 22 | 10.3 | 6.0; 14.6 | 49 | 17.3 | 12.4; 22.1 |
| 2004 | 54 | 24.3 | 17.8; 30.7 | 19 | 8.4 | 4.6; 12.1 | 123 | 43.3 | 35.6; 50.9 |
| 2005 | 57 | 23.6 | 17.5; 29.8 | 21 | 9.8 | 5.6; 14.1 | 152 | 51.5 | 43.3; 59.7 |
| 2006 | 58 | 24.5 | 18.2; 30.8 | 14 | 5.8 | 2.8; 8.9 | 163 | 55.1 | 46.7; 63.6 |
| 2007 | 37 | 12.9 | 8.7; 17.0 | 14 | 5.1 | 2.5; 7.8 | 121 | 37.4 | 30.7; 44.0 |
| 2008 | 30 | 9.6 | 6.2; 13.1 | 21 | 7.1 | 4.1; 10.1 | 126 | 36.8 | 30.4 43.3 |
| 2009 | 33 | 10.3 | 6.8; 13.8 | 16 | 5.4 | 2.7; 8.0 | 95 | 27.6 | 22.0; 33.1 |
| 2010 | 47 | 14.5 | 10.4; 18.7 | 22 | 6.7 | 3.9; 9.5 | 153 | 40.2 | 33.8; 46.5 |
| 2011 | 50 | 15.1 | 10.9; 19.3 | 13 | 3.7 | 1.7; 5.7 | 116 | 30.7 | 25.1; 36.3 |
| 2012 | 52 | 15.8 | 11.5; 20.1 | 21 | 6.7 | 3.9; 9.6 | 114 | 29.6 | 24.1; 35.0 |
| 2013 | 47 | 12.8 | 9.1; 16.5 | 16 | 4.1 | 2.1; 6.2 | 120 | 29.1 | 23.9; 34.4 |
| 2014 | 59 | 15.5 | 11.5 19.4 | 18 | 4.8 | 2.6 | 7.1 | 137 | 33.1 27.5 38.6 |

N: number of cases; ASR: age-standardized rate; 95%CI: 95% confidence interval.

Table 2. Joinpoint analyses of carcinoma in situ incidence, invasive carcinoma incidence and mortality, with APC for ASR and age-specific groups, and 95% CI.

| Age group | Inc, in situ | | Inc, inv | | Mortality | |
|---|---|---|---|---|---|---|
| | JP | APC(95%CI) | JP | APC(95%CI) | JP | APC(95%CI) |
| All | 2005 | 13,4*(5.7;21.8) -5.1*(-9.6;-0.4) | 2005 2008 | -2.3(-6.0; 1.6) -25.5(-54.3;21.4) 6.2(-2.2; 15.3) | 0 | -3.8*(-5.9;-1.7) |
| ≤24 | 2006 | 23.8*(12.5;36.3) -5.5(-12.6;2.2) | - | - | - | - |
| 25-34 | 2005 | 14.6*(4.6;25.5) -2.1(-7.7;3.9) | 0 | -6.8*(-9.8;-3.7) | 0 | -3.5(-7.7; 0.9) |
| 35-44 | 2005 | 11.1*(3.5;19.3) -6.8*(-11.9;-1.5) | 0 | -3.9*(-6.8;-0.9) | 0 | -4.5*(-8.9;-0.1) |
| 45-54 | 2006 | -9.2*(3.9;14.8) -12.6*(-17.8;-7.1) | 2006 2009 | -5.8*(-9.4;-2.0) -28.3(-62.8;38.0) 21.6*(7.1;38.1) | 0 | -5.4*(-9.1;-1.5) |
| 55-64 | 0 | -1.1(-5.3;3.2 | 0 | -7.3*(-10.5;-3.9) | 0 | -2.4(-7.1;2.5) |
| ≥ 65 | 0 | 2.7(-2.6;8.3) | 0 | -4.5*(-7.8;-1.1) | 0 | -2.0(-5.7;1.8) |

APC: annual percent change; ASR: age-standardized rate; CI: confidence interval; JP: number (year) of joinpoints; Inc, in situ: carcinoma in situ incidence; Inc, inv: invasive carcinoma incidence. *Significant APC

## ACKNOWLEDGEMENTS

## REFERENCES

1. Torre LA, Islami F, Siegel RL, Ward EM, Jemal A. Global Cancer in Women: Burden and Trends. Cancer Epidemiol Biomarkers Prev. 2017;26(4):444-457. doi:10.1158/1055-9965.EPI-16-0858
2. Ministério da Saúde, Instituto Nacional de Câncer, INCA (Brasil). Diretrizes brasileiras para o rastreamento do câncer do colo do útero. Rio de Janeiro; 2011.
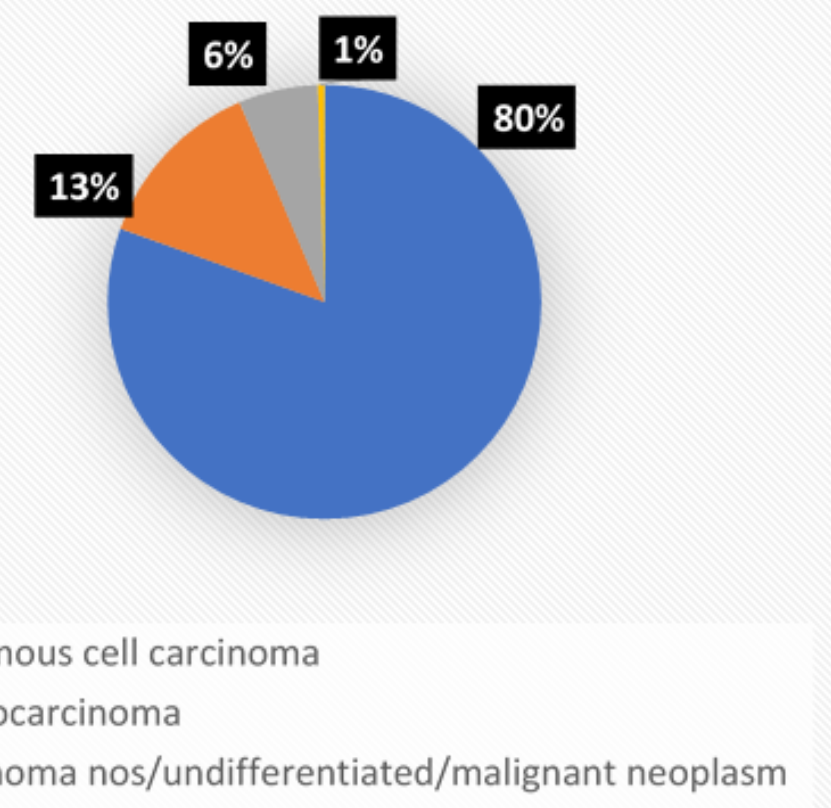
Figure 1. Number and percent of cases of cancer of the cervix by morphology

- Squamous cell carcinoma
- Adenocarcinoma
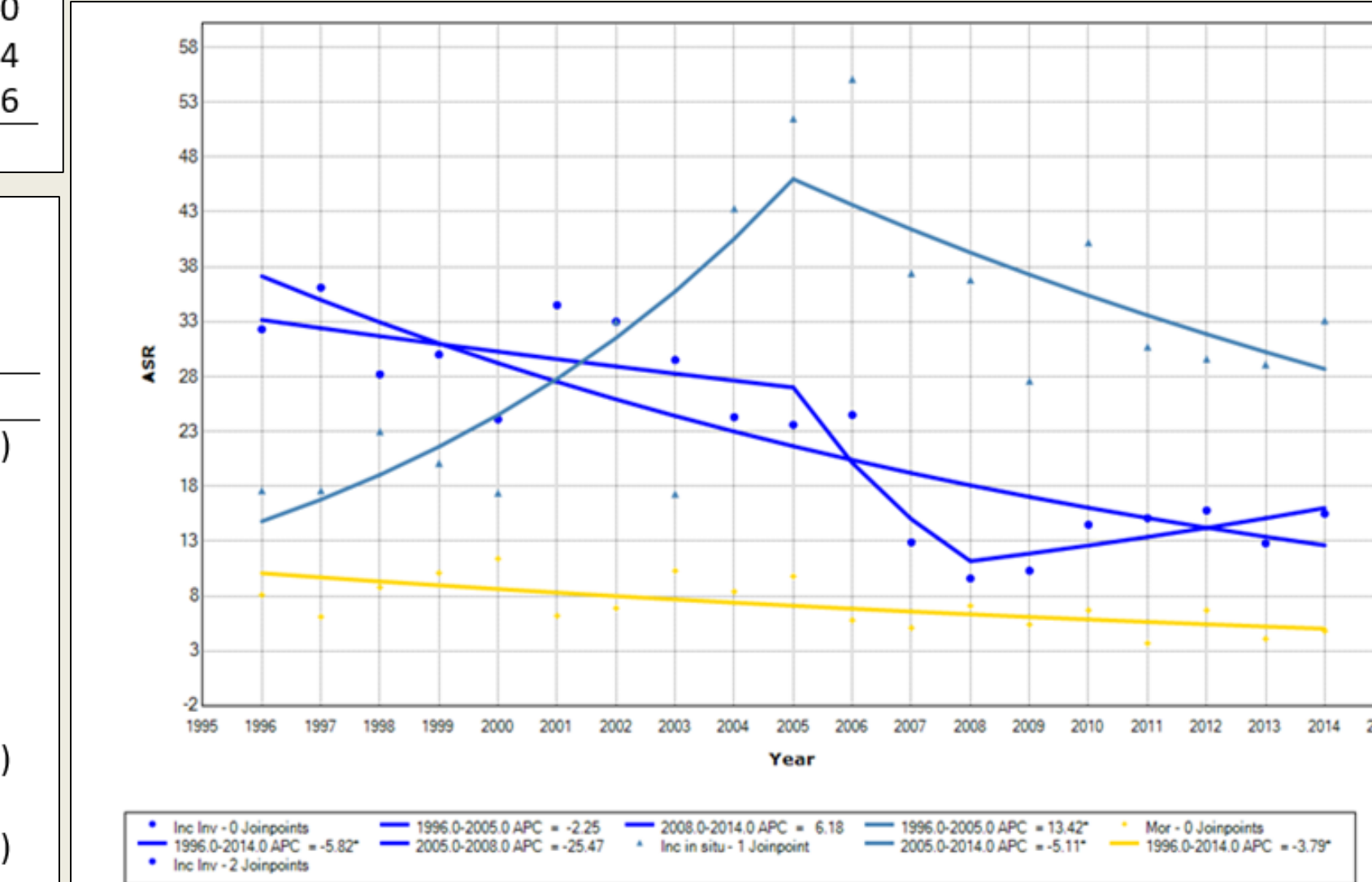- Carcinoma nos/undifferentiated/malignant neoplasm
- Others



Figure 2. Cancer of the cervix, trends from age-standardized rates (ASR), all ages, with 2 joinpoints, demonstrating Annual Percent Change (APC) and 0 joinpoints, expressing Average Annual Percent Change (dark blue); carcinoma in situ incidence curve (lighter blue); and mortality curve (yellow).
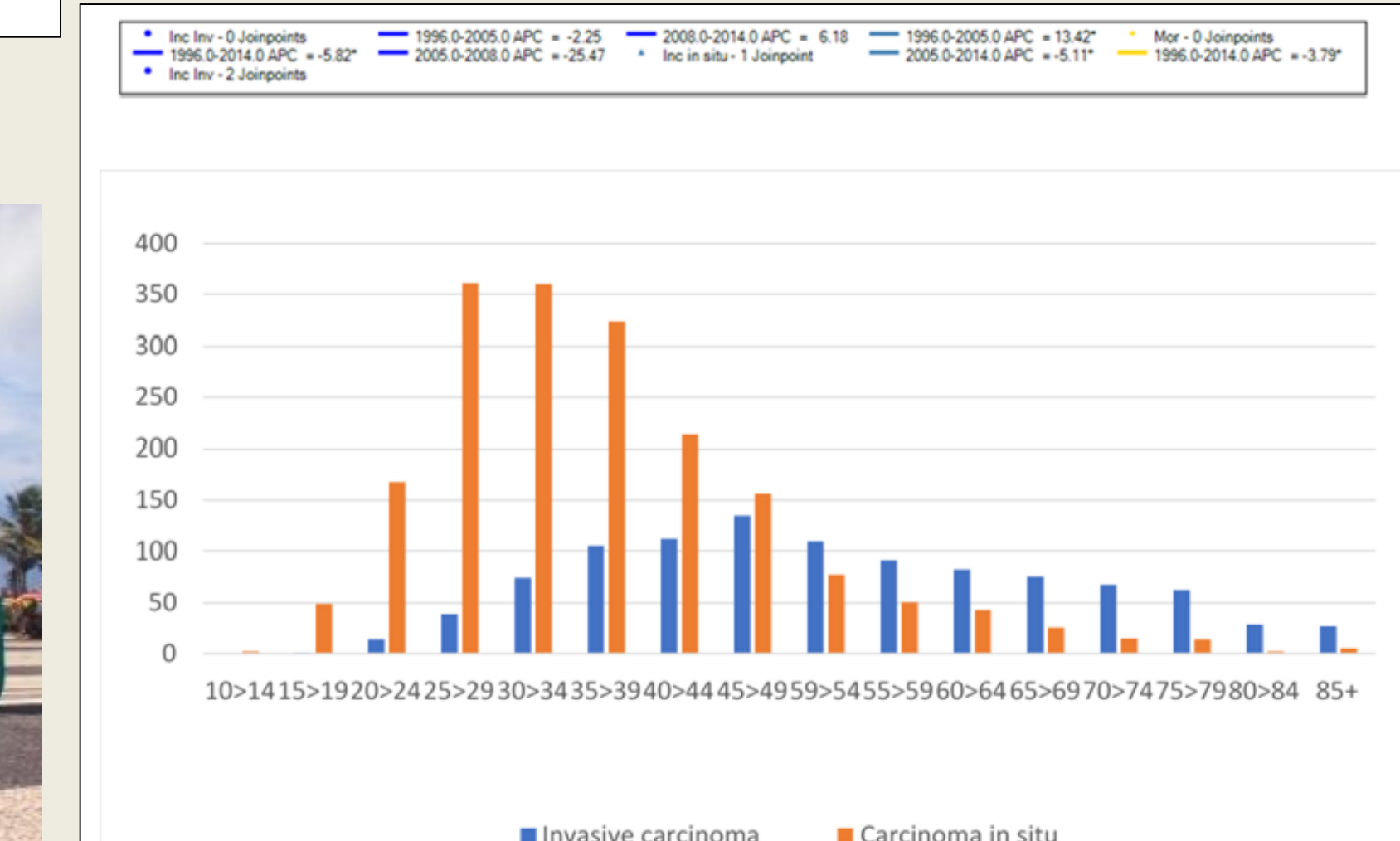


Figure 3. Number of cases of carcinoma in situ and invasive carcinoma according to age groups.

- Invasive carcinoma
- Carcinoma in situ