

## Residential area, hygiene behaviour, and pre-cervical lesions of women aged 25-64 years in Indonesia

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### Abstrak

**Latar belakang:** Kanker serviks merupakan penyakit kanker dengan prevalensi tertinggi di Indonesia. Penelitian ini bertujuan untuk mengidentifikasi hubungan antara wilayah tempat tinggal, perilaku kebersihan diri, dan lesi prakanker serviks pada wanita pernah kawin umur 25-64 tahun di Indonesia.

**Metode:** Studi ini menggunakan data Riset Penyakit Tidak Menular tahun 2016 di daerah perkotaan di 34 provinsi Indonesia. Populasi dan sampel adalah wanita pernah kawin berusia 25-64 tahun yang diwawancara dan dilakukan pengambilan apus serviks menggunakan metode Inspeksi Visual Asetat (IVA) untuk mengetahui indikasi prevalensi lesi prakanker serviks. Analisis hubungan menggunakan regresi logistik dengan metode enter, dengan total sampel yang dianalisis 37.456 responden.

**Hasil:** Hasil analisis menemukan proporsi 7% wanita dengan hasil tes IVA positif. Wanita yang tinggal di sekitar lokasi industri berisiko 1,2 kali (Adjusted OR= 1,2; 95% CI= 1,1-1,4) positif terhadap hasil periksa IVA daripada mereka yang tidak tinggal di wilayah tersebut. Sedangkan perilaku hygiene perorangan seperti membersihkan alat kelamin setelah selesai berhubungan seksual tidak bermakna secara signifikan terhadap hasil IVA positif.

**Kesimpulan:** Ada hubungan antara tinggal di lingkungan industri dengan hasil IVA positif pada wanita usia 25-64 tahun menunjukkan pentingnya penapisan dini secara teratur pada wanita terutama yang tinggal daerah industri. (*Health Science Journal of Indonesia 2019;10(1):51-7*)

**Kata kunci:** Lesi prakanker, serviks, IVA, lingkungan, industri

### Abstract

**Background:** Cervical cancer is a cancer with the highest prevalence in Indonesia. This study aims to identify the relationship between residential area, personal hygiene behavior, and precancerous cervical lesions in ever-married women aged 25-64 years in Indonesia.

**Method:** This study uses data on the 2016 Non-Communicable Disease Research in urban areas in 34 Indonesian provinces. The population and sample were ever-married women aged 25-64 years who were interviewed and also performed cervical smear extraction using the Visual Inspection with Acetic Acid (VIA) method to determine indications of the prevalence of cervical precancerous lesions. Relationship analysis using logistic regression with enter method, with a total sample analyzed by 37,456 respondents.

**Results:** The results of the analysis found a proportion of 7% of women with positive VIA test results. Women living in the vicinity of industrial sites were 1.2 times at risk (Adjusted OR = 1.2; 95% CI = 1.1-1.4) positive for VIA results than those who did not live in the area. While individual hygiene behaviors such as cleaning genitals after completing sexual intercourse did not significantly affect the positive VIA results.

**Conclusion:** There is a relationship between living in an industrial environment with positive VIA results in women aged 25-64 years showing the importance of regular early screening among women, especially those who live in industrial areas. (*Health Science Journal of Indonesia 2019;10(1):51-7*)

**Keywords:** Precancerous lesions, cervix, VIA, environment, industry

Government of Indonesia launched a national program for the Prevention and Initial Detection of Cancer in Indonesian Women in 2015-2019 at the Nanggulan Community Health Center (Puskesmas) Kulonprogo Regency, Yogyakarta Special Region to coincide with the commemoration of Kartini Day on May 21, 2015. Indonesia is one of the countries with the high cancer rates. Data from the Ministry of Health shows that in 2015, on average every hour the number of cervical cancer patients increased by 2.5 people and the death victim was 1.1 people.<sup>1</sup>

Cancer is one of the main causes of morbidity and mortality worldwide, with around 14 million new cases in 2012. The number of new cases is expected to increase by around 70% over the next 2 decades. Cancer is the second leading cause of global death, and is responsible for 8.8 million deaths in 2015. Globally, almost 1 in 6 deaths are caused by cancer.<sup>2</sup>

About 70% of cancer deaths occur in developing countries, where around one third of cancer deaths are due to behavior and diet. Tobacco use is the most important risk factor for cancer which contributes to around 22% of cancer deaths.<sup>3</sup> Infection can also cause cancer, such as hepatitis and human papilloma virus (HPV), which are responsible for up to 25% of cancer cases in developing countries.<sup>4</sup>

In Indonesia alone, cancer is the second leading cause of death after cardiovascular disease. At the 2013 Basic Health Research (RISKESDAS), the prevalence of cancer in Indonesia was 1.4 per mile (‰) or an estimated 347,792 people.<sup>5</sup> Cancer of the cervix and breast was the highest prevalence of cancer in Indonesia in 2013, cervical cancer is 0.8 ‰ and breast cancer is 0.5 ‰.<sup>6</sup> Meanwhile, data from the WHO Information Center on HPV and Cervical Cancer show that 2 out of 10,000 women in Indonesia suffer from cervical cancer and an estimated 26 women die from cervical cancer everyday.<sup>7</sup>

The national program for the Initial Women's Cancer Prevention Movement in Indonesian actually exists, but now it is more focused on effort to invite the public, especially members of the Family Welfare Empowerment (PKK), to be more active in prevent cancer. Last year the cost of cancer treatment has become the highest disease cost reaching 1 trillion rupiah. Therefore there must be a movement to reduce mortality and morbidity due to cancer by encouraging patients to get early treatment. The national program for prevention of cervical cancer that has been implemented at this time is by early detection of cervical cancer using the visual inspection of cervix with acetic acid (VIA) method.

Prevention of cervical cancer will be more effective if combined with carrying out specific protection efforts by providing immunization for Human Papilloma Virus (HPV) which becomes a new vaccine into the national immunization program.<sup>7</sup> In developed countries, a pre-cancerous lesions screening program is identified at an early stage so that women can be easily treated up to 80%. In developing countries, access to effective screening services is limited, so the disease is often not quickly identified. In addition, the prospect of treatment for diseases is low, so the mortality rate from cervical cancer in these countries is higher.<sup>8</sup>

In addition to prevent cervical cancer with initially detection, other efforts must also be taken to reduce deaths and morbidity due to cervical cancer. Several studies have shown that lifestyle and environment play a role in increasing the development of HPV infection into cervical cancer.<sup>9-12</sup> Environmental factors, sanitation and personal hygiene such as the use of sanitary napkins and maintaining cleanliness during menstruation, the use of cleaning substance with fragrances and washing sensitive area after sexual intercourse is thought to have a relationship with reproductive tract infections and also cervical cancer.<sup>13-17</sup> Control of cancer-causing infections and lifestyle-related carcinogens have played a significant role in prevention, but environmental and occupational contributions are frequently less addressed.

Although until now experts have not found a definite cause of cancer, some studies have suggested an association between environmental factors and cancer, as found in positive cases of VIA in women in the diamond mining in Cempaka District, Banjarbaru City. The study aims to determine the results of VIA examinations of women in mining areas. The study sample of 30 people according to the inclusion criteria was selected by purposive sampling technique. The results showed that 7 women (23.3%) were examined for VIA with positive results. Based on interview questionnaire research, all respondents used mining water for their daily needs. Diamond mining activities can produce follow-up materials in the form of sand and gold if the mining process uses mercury which is one of the most dangerous heavy metals that can cause damage to many organs. Continuous use of mercury will pollute the waters of the area, so that if waters exposed to mercury waste will trigger the formation of reactive oxygen species (ROS) which results in damage to cell DNA and trigger a carcinogenic process if it enters the body.<sup>18</sup> Handling of mercury waste and securing the environment around diamond mining by making

settling ponds can reduce the risk of water pollution in the mining environment.<sup>19</sup>

In this study, writer wish to identify the relationship between environmental factors, personal hygiene behavior, characteristics, and precancerous cervical lesions in ever-married women aged 25-64 years in 34 provinces in Indonesian urban areas.

## METHODS

Sources of data is the 2016 Non-Communicable Disease (NCD) Research, which has been carried out by The National Institute of Health Research and Development, the Ministry of Health. Data collection was carried out in 76 districts / cities selected in 34 provinces in 2016. The population and samples were ever married women aged 25-64 years who lived in Indonesian urban areas on the selected census block in selected households. Sampling was carried out independently for each province through several stages.

Sampling is done independently for each province with the following withdrawal stages: first selecting a number of sub-districts in urban areas, followed by selecting a number of urban census blocks, then selecting 50 census buildings in the census block systematically, and finally selecting households that have been randomly updated in selected census buildings. Eligible women according to criteria are selected using the Kish table method. The cross-sectional study design was used to see the relationship between environmental factors, personal hygiene behavior and characteristics with pre-cervical cancer lesions at the same time.

To see the relationship between environmental factors and the characteristics of women with the results of VIA examination, the variables chosen according to data availability are living in a mining and industrial location marked by the respondent's acknowledgment whether she has lived in a mining or industrial environment, age, education level, employment status, economic status, knowledge related to cervical cancer, smoking behavior, and personal hygiene behavior. Personal hygiene behavior is assessed by the respondent's acknowledgment whether cleaning the genitals after each sexual encounter. Pre-cancerous cervical lesions are the presence of white patches (*acetowhite epithelium*) on the cervix that are assessed by inspection of Visual Acetic Acid (VIA). This examination is one method used to detect the presence of precancerous lesions. VIA is carried out by trained midwives / doctors. VIA is an examination by

observing the cervix using the naked eye. The cervix is diluted with runny acetic / vinegar (a concentration of 3–5%). If there are precancerous lesions, after waiting for approximately one minute there will be white spots called *acetowhite epithelium*. White patches indicate changes in cells (dysplasia) on the cervix. This sign concludes the positive VIA test.<sup>20</sup>

The sub-district sampling frame, census block and selected households were obtained from the SP2010 results conducted by the Central Bureau of Statistics (CBS). The instrument used was the 2016 NCD Research questionnaire, both household and individual questionnaires.

Data processing starts from data cleaning, checks the completeness and consistency of the contents of each variable, followed by re-coding variables according to operational definitions. Statistical analysis uses SPSS version 17.0 software. The analysis was carried out in several stages, namely univariate, bivariate and multivariate analysis. In final model, multivariate analysis using logistic regression was conducted to see the relationship between environmental factors, hygiene behaviour and characteristics with the results of the VIA test and to find out which variable was the most important. In the analysis of this study using p-value <0.05 was interpreted as statistically significant.

The writing of this article does not use ethical permission but rather a Data Usage License from the Data Management Laboratory, because the source of the data is secondary data (Non-Communicable Disease Research) that have been collected by the research team of the National Institute of Health Research and Development (NIHRD) in 2016.

## RESULTS

The results showed that of the total sample of 43,948 women aged 25-64 years who were successfully interviewed, only 37,456 people could be analyzed according to inclusive criteria and the willingness of women to come to the puskesmas and be examined. Of these, visual inspection of cervix with acetic acid (VIA) results showed that 7% were tested positive for pre-cancerous cervical lesions.

In the table below illustrates the behaviour of samples related to VIA examination. Most women are non-smokers and passive smokers. Almost all women claim to always clean the genitals after having sex, where most say cleaning it only with water or even with ordinary water and soap.

Table 1. Several sociodemographic characteristics, household environment variables, personal hygiene behaviour and VIA test result

Variables	VIA test result				Crude odds ratio	95% confidence interval	P
	Negative (n=34836)		Positive (n= 2619)				
	n	%	n	%			
Age group (years)							
< average (<43 y.o)	17631	91.8	1573	8.2	1.00	Reference	
Average & above (>=43 y.o)	17205	94.3	1046	5.7	0.68	0.63-0.74	0.000
Formal education							
Junior high school or higher	23014	92.7	1804	7.3	1.00	Reference	
Illitery-elementary school	11822	93.6	815	6.4	0.88	0.81-0.96	0.003
Work status							
Not work	22182	92.9	1696	7.1	1.00	Reference	
Work	12654	93.2	923	6.8	0.95	0.88-1.04	0.267
Economical status							
Rich	19357	93.2	1404	6.8	1.00	Reference	
Poor	15479	92.7	1215	7.3	1.08	0.99-1.17	0.052
Ever live in mining area							
Never	34286	93.0	2592	7.0	1.00	Reference	
Yes	550	95.3	27	4.7	0.65	0.44-0.96	0.028
Living in industry area							
Never	30602	93.2	2234	6.8	1.00	Reference	
Yes	4233	91.7	385	8.3	1.25	1.11-1.39	0.000
Smoking behaviour							
Never	32379	93.0	2450	7.0	1.00	Reference	
Yes/ever smoking	2457	93.6	169	6.4	0.91	0.77-1.07	0.246
Cleaning genital after sex							
Yes	33540	93.0	2540	7.0	1.00	Reference	
No	1293	94.4	77	5.6	0.79	0.62-0.99	0.043

Table 2. Relationship between age, personal hygiene, living in mining and industry area and VIA test result

Variables	VIA test result				Adjusted odds ratio	95% confidence interval	P
	Negative (n=34836)		Positive (n=2619)				
	n	%	n	%			
Age group (years)							
<43 y.o	17631	91.8	1573	8.2	1.00	Reference	
>=43 y.o	17205	94.3	1046	5.7	0.68	0.63-0.74	0.000
Formal education							
Junior high school or higher	23014	92.7	1804	7.3	1.00	Reference	
Illitery-elementary school	11822	93.6	815	6.4	1.01	0.91-1.09	0.990
Work status							
Not work	22182	92.9	1696	7.1	1.00	Reference	
Work	12654	93.2	923	6.8	0.96	0.88-1.04	0.327
Economical status							
Rich	19357	93.2	1404	6.8	1.00	Reference	
Poor	15479	92.7	1215	7.3	1.07	0.99-1.16	0.104
Smoking behaviour							
Never	32379	93.0	2450	7.0	1.00	Reference	
Yes/ever smoking	2457	93.6	169	6.4	0.91	0.78-1.07	0.262
Cleaning genital after sex							
Yes, water+soap	21819	93.1	1608	6.9	1.00	Reference	
Yes, only water	11721	92.6	932	7.4	1.09	1.01-1.19	0.044
None	1293	94.4	77	5.6	0.83	0.66-1.05	0.125
Ever live in mining area							
No	34286	93.0	2592	7.0	1.00	Reference	
Yes	550	95.3	27	4.7	0.64	0.44-0.95	0.027
Living in industry area							
No	30602	93.2	2234	6.8	1.00	Reference	
Yes	4233	91.7	385	8.3	1.23	1.10-1.38	0.000



Of the women examined VIA, there is more positive VIA result in young women (below average age 43 years old), has completed secondary education (SMP-SMA), not working, from poor families, claiming clean genitals after having sex with a partner, ex-smoker and also passive smoking, and once lived in an industrial area.

Logistic regression analysis has indicated some variables which have significantly associated with VIA positive results. The risk factors which are significantly associated with positive cervical precancerous lesions are living in industry area (Adjusted OR=1.23; 95%CI=1.10-1.38). While ever live in mining area variable as a protective factor (Adjusted OR=0.64; 95%CI=0.44-0.95). Cleaning genital after sexual intercourse has no association with positive VIA result (p-value>0.05).

## DISCUSSIONS

The results of the study show that women living in industrial areas have a greater risk of getting positive VIA test results compared to those who do not live in industrial areas. This, if associated with living in the tobacco industry area, makes a lot of sense. Ratnasari et al (2018) reported the results of a study stating that exposure to substances found in cigarettes in women working in the cigarette industry, especially in a long time, was associated with positive VIA results.<sup>21</sup>

In addition to the cigarette industry, other studies have also reported a link between the use of solid fuels, which is commonly used in industry, and cervical cancer. Air pollution, especially through burning fossil fuels such as coal, wood and straw, has been linked to lung cancer. During burning of those, carbon monoxide, particulates, sulfur and nitrogen oxide, and polycyclic aromatic hydrocarbon (PAH) mixtures are released; most PAHs have been classified by the World Health Organization as likely to be carcinogenic to humans. In this study, OR was 3.67 among women with 25-34 years of exposure to wood smoke and 6.35 among women exposed to  $\geq 35$  years. The association was even stronger among women infected with HPV. This fact strongly indicates that exposure to wood smoke is that there may be a biological effect. Current data show that the use of wood for cooking is a strong risk factor, especially among women with HPV infection. The latter shows that the effect depends on HPV, may support tumor development once HPV has created the conditions needed for the carcinogenic process to occur.<sup>22</sup> However, the possibility that the association of living in industry area and cervical cancer is in fact

due to other factors cannot be excluded. Although not conclusive, the present evidence, is important enough to warrant further investigation

While protective results are found in women who have lived in mining areas. This is not equivalent to the findings of McCormack (2012) who stated that exposure to mining and plantations can increase the contribution to cancer.<sup>23</sup> This protective result can be assumed because respondents only claimed to have lived in a mining area where it was possible for a short period of time. This variable should be controlled with the length of stay to be able to obtain the right measurement results.

The results were not significantly indicated by the variables of personal hygiene behaviour measured by the habit of cleaning the pubic area after every intercourse. There was no significant difference in the group of women who did not clean the vagina, or just cleaned it with soap or water to the incidence of precancerous cervical lesions. This finding contradicts the results of the Dianti et al (2016) study which found that there was a relationship between personal hygiene in treating genitals and cervical cancer. For example cleaning genitals using antiseptics is a risk for cervical cancer.<sup>13</sup> This is also in accordance with Sukaca et al. (2009), because the use of antiseptics that too often will cause irritation in the vagina that triggers cancer.<sup>24</sup> This is also in accordance with the theory put forward. The study results of Diananda (2007) state that washing the vagina with antiseptic drugs or deodorants will cause irritation to the cervix which stimulates cancer.<sup>25</sup>

On the other hand, from the results of the analysis, older age shows protective results, where mothers who are young (below the average of 43 years old) tend to be more at risk of positive results of the VIA test. This can be interpreted as a cervical cancer tends to occur more in young women. This finding is in line with several research published in several countries such as England and Finland. The results of those studies reported that age has a relationship with the incidence of cervical cancer, where the risk of cervical cancer increases at a young age compared to old age. This is possible related to the cervical cancer screening service policy. If the coverage of screening in the age group of 20-25 years decreases, then it will increase the number of cervical cancer incidence at a young age.<sup>26,27</sup> However, these results contradict the study reported by Benard et al (2012) which states that cervical cancer cases at a young age are very rare in USA.<sup>28</sup>

In conclusion, this study confirms the relationship between living in an industrial environment with positive VIA results and demonstrates the importance of health promotion as a way to develop healthy lifestyles in populations in industrial and mining environments.

Regular early screening (VIA or Pap smear) is believed to be essential as a preventive measure. Reducing exposure to carcinogens in industrial sites through the use of protective equipment for female workers in the industry is also important. Management of industrial waste so as not to pollute the environment is also included as crucial things that must be done to reduce the risk of cervical precancerous.

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