Ecological Analysis of Health Resource Related to Measles at Primary Health Center in Indonesia

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Abstract

Measles is a vaccine-preventable disease. The case increases over the past 3 years in Indonesia. The study aimed to analyze the correlation between health resources and measles. The ecological analysis was conducted using secondary data from the Ministry of Health report in 2019. All provinces were taken as samples. Apart from measles cases as a dependent variable, while the independent variable consists of a ratio of public health center (PHC), a number of active *Posyandu*(Integrated Health Post), adequacy of midwives, availability of five typesof promotive-preventive health workers at PHC, availability of drug and essential vaccine at PHC and the obedience of district drug warehouse to applied good management of drug and vaccine. The univariate analysis shows a descriptive table. Bivariate analyses were analyzed using a scatter plot. The results showa gap of measles cases between province in Indonesia were uneven. The highest measles cases occurred at Central Java (1.310cases) and the lowest at North Maluku (0 cases). The mean of suspect measles was 226, the higher cases of mean were dominated at Java. The variable of health worker and health logistic depict a random pattern with measles cases. It was concluded that the effectiveness of health workers to prevent measles was measured by their performance. As well as optimizing the potential of five types of promotive-preventive health workers at the PHC. The choice of method in distribution management and vaccine management at the health center level must be a concern.

Keywords: *ecological analysis,health resources, measles, primary health center.*

Background

Measles is a public health challenge in Indonesia. The agent is *Paroxymyvirus*that highly contagious and often cause outbreaks. The disease cause life long complications even mortality. The disease infects the respiratory tract which is transmitted through droplets containing a virus. Symptoms of measles include high fever, skin rash, and cough. Humans asa host who transmitted the disease[1]. People with measles are very susceptible to infected by other diseases caused attacked the respiratory tract and the immune system[2].

Half of global measles mortality came from South-East Region (SEARO)[3].Indonesia is one of the "big six countries" with measles endemic[4].The susceptible group of measles in Indonesia wasa child aged more than 1-year-old, unvaccinated infants, adolescents, and young adultsfor the second dose. The high incidence of measles occurred in a child aged less than 5 years were reached 5% in 2013[5].More than 11,000 cases of suspected measles are reported in Indonesia each year, as much as 12% to 39% were being confirmed measles. The incidence rate of measles per 100,000 population during 2011-2017 tends to decline but tends to increase in the last 3 years (2015-2017). The frequency of measles outbreak has also increased over the last 3 years

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(2015-2017). Measles outbreak report coverage during 2015-2017 spread wider to 30 provinces (before only 27 provinces)[6].

Measles elimination is targeted to be achieved by 2020, however,measles cases finding an increasein 2019. Ensuring the quality of immunization can be seen from the aspect of facilities and service providers.A studyfound inadequate the facility of the vaccine will encourage the measles risk[2]. According to the background, the study aimed to analyze the correlation between health resources with the case of suspected measles at primary healthcare.

Materials and Methods

The study was designed using an ecological analysis approach. Ecological studies focus on comparisons between groups, not individuals. The data analyzedwas aggregate data at a certain group or level, which in this study was the province level. The variables in an ecological analysis can be aggregate measurements, environmental measurements, or global measurements[7,8].

The study was conducted using secondary data from the 2019 Indonesia Health Profilereport. A total of 34provinces in Indonesia were involved in this analysis. The dependent variable in this study was measles cases. There were 3 independent variables analyzed, namely adequacy of midwives at PHC, the availability of five typesof a promotive-preventive health worker at PHC, the obedience of district drug warehouse to applied good management for drug and vaccine.Data were analyzed by univariate and bivariate. The bivariate analysis was performed using the scatter plot.

Results and Discussion

Measles elimination is a success indicator of Millennium Development Goals (MDGs) to reduce 2 to 3 global child mortality by 2015[9].WHO-SEAR set regional goals for eliminating measles by 2020[10]. Indonesia as part of them has conducted a campaign of MR vaccination as government commitment to measles elimination, control of congenital rubella syndromeat 2020[11].The suspected cases of measles in 2019 increased compared to 2018. The number of cases found in 2019 was 8,819, while in 2018 it was only 8,429. The distribution of suspected measles cases occurred in almost all provinces in Indonesia. Only 1 province out of 34 provinces in Indonesia had no suspected measles cases, namely North Maluku[12].

Identified nine provinces with suspected measles cases above the average including Central Java (1,310), Jakarta (1,069), Aceh (944), East Java (658), West Java (621), Yogyakarta (591), South Sumatra (568), South Sulawesi (293), and Lampung (252). The case of suspected measles dominated at Java Island. Java was the highest population density in Indonesia. Someone can be infected by measles while doing activities either at home, school,or public space[13]. Research of Yogyakarta found a higher population density will increase the transmission risk of measles. A high-density population encourages easier transmission between people[14].

Table 1. Descriptive statistics variables of health resources related to measles in Indonesia, 2019

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Case of suspected measles	34	0.00	1.310	226.32	338.73
The adequacy of midwive at PHC	34	0.00 %	68.45 %	10.58 %	16.89
The availability of five type promotion-preventive health worker at kecamatanPHC	34	13.62 %	92.19 %	45.62 %	17.63
The obedience of a district drug warehouse to apply good management for drug and vaccine	34	50.00 %	100.00%	91.48 %	12.61

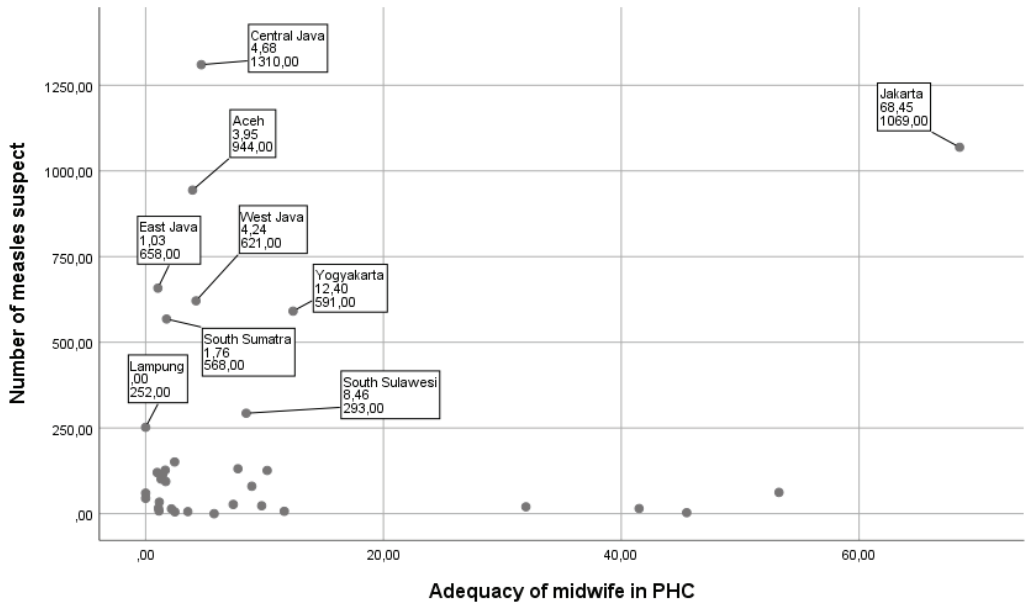
Source: The 2019 Indonesia's Health Profile

Health Worker

The health worker factor assessed the adequacy of a midwife at PHC and the availability of fivetypesof promotive and preventive personnel at PHC. The adequacy of midwives describedthe proportion of midwives shortage at PHC. Table 1 figured the proportion of midwives shortage exceeding 50% at Papua (53.26%) and Jakarta (68.45%). Three provinces did not declare a shortage of midwives (0.00%) including Lampung, Bali, and Bangka Belitung. The proportion of PHC who have 5 types of promotive-preventive health workersin Indonesia in 2019 is quite low (less than 50%) and varies between provinces. The lowest percentage was Jakarta (13.65%). Figure 1 showed a random tendency of all variables of health workers. The highest case of suspected measles in 2019 was in Central Java, both the variable was good. Meanwhile, Jakarta placed at the second rank showed both the variable were low.

Health workersand healthcare facilities were inseparable. Health workers as the main actor of service. The random pattern of results indicated the performance variability of health workers between provinces. In Indonesia, measles immunization is a responsible program of PHC but nationally also provided at *Posyandu*by midwife[15].Besides, the high ratio of *Posyandu* did not correlate to high coverage of measles immunization caused lack of health resources[16], such as the health worker[17]. The geographic disparity caused the immunization coverage of the "big six countries" especially India, Bangladesh, Indonesia, and Myanmar was not the track. The countries can not achieve the outlined goals to eliminated measles by 2020[4].The disparity between the eastern and western regions of Indonesia has inhibited the acceleration of equitable development[18,19].Although immunization was provided free charge, but not guarantee the immunization coverage achieved the target, especially for the community who live in hardly achievable areas[15]. Thus, the health workerin areas with physical constraints have to innovative programs to increase coverage.

The sufficient of health worker must be well knowledge through measurable and precise training, both the material and target people should be thought to a minimized knowledge gap and good skills of communication[16]. Several studies found increasing the knowledge of parents, especially mothers, regarding the willingness to immunization[15].Religion could be a source of public distrust, such as Aceh is the only province that applied *shari'ah law,* while had the lowest measles vaccination coverage at 54%[20]. The study found related to our study result that cases finding of suspected measles at Aceh placed at the third-ranked after Jakarta[12].



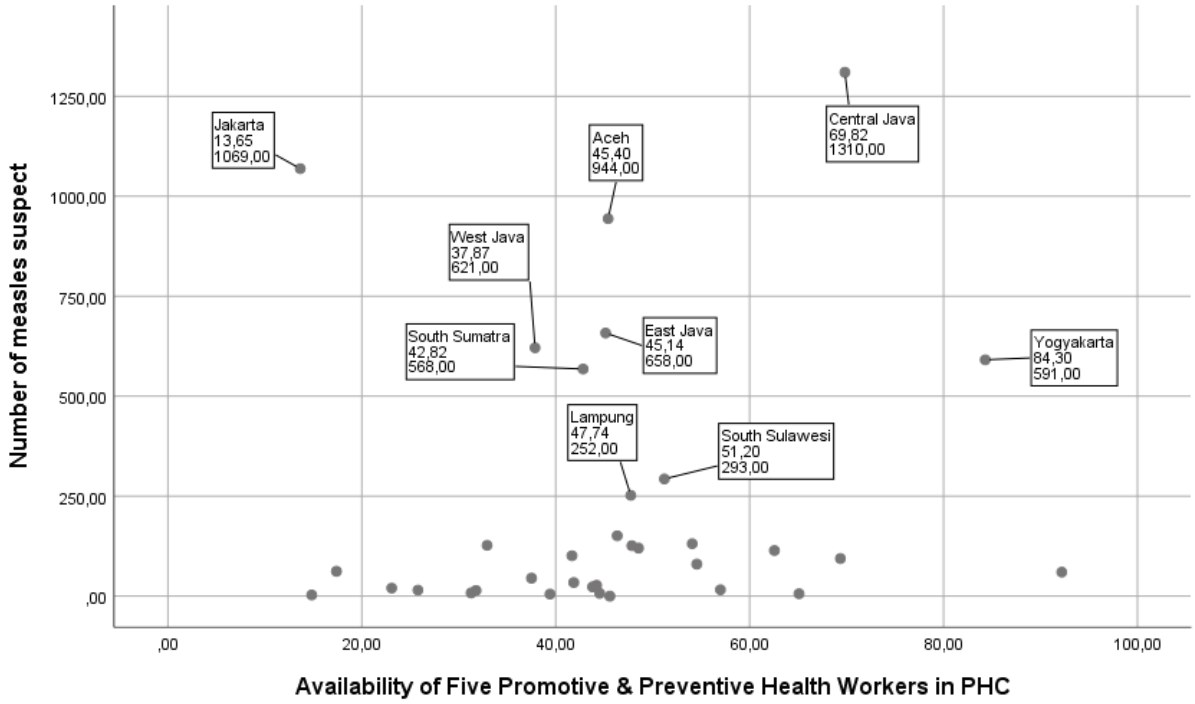


Figure1. Scatter plot of suspected measles cases with the variable of health worker in Indonesia, 2019

Source: TheMinistry of Health of the Republic of Indonesia, 2019

According to the Regulation of Minister of Health number 75, 2014, the PHC is required to recruit at least five types of promotive and preventive health workers, consist ofpharmacy personnel,medical laboratory technologist, nutritionist, public health professional, and sanitarian[21]. The health worker should be strengthened promotive-preventive program at the PHC level, such as surveillance. Evaluation of measles surveillance in East Java was weak. The problems include the accuracy and completeness of data. Besides, it is related to a lack of human resources[5]. A study of North Sumatera also recommended to all PHC and authorities to conduct a strict measles surveillance[13]. According to the study, in the low-middle, doctors and nurses were prioritized to provide services, including promotive-preventives. Meanwhile, the promotive-preventive health worker has the appropriate competence for strengthening surveillance. Unfortunately, the distribution of them varied focused on near urban, accredited, and independent financial[22].

Health Logistic

Health logistic assessed the obedience of the district drug warehouse to applied good management for drug and vaccine. Table 1 above 90% district drug warehouse applied standard management for drug and vaccine. The low coverage wasJakarta (50%), West Papua (53.85%), and North Maluku (70%). Figure 2showed a random tendency of all variables of health logistics. High suspected measles cases occurred in provinces with good health logistics.

Drug and vaccine management at Jakarta has been directly transferred to the sub-district drug warehouse through Regional Budget and Expenditure Income, while the data reported drug management in District Health Office (DHO)[12]. However, the other province from eastern Indonesia which is very likely to be constrained by geographical aspects and supporting facilities for storing drug and vaccine[23]. As cold chain product, the critical point of a vaccine is temperature control. A study at Western Uganda found the vaccine effectiveness is lower inthe Southeast Asian. The effectiveness is influenced by vaccine factors, such as vaccine quality and the adequacy of the cold chain[24]. The study in remote and border areas of Indonesia

explained unstable electricity and bad weather such as a village in a hard area of a small isle were being inhibited factors on vaccine storage. The electric generator has provided, unfortunately, the operational was constrained by the fuel prices, distance, as well as the road condition[15,25]. Vaccine damage in the PHCfrequently due to geographic constraints, travel time, lack of temperature monitoring, and inadequate supporting facilities such as cool packs[26].

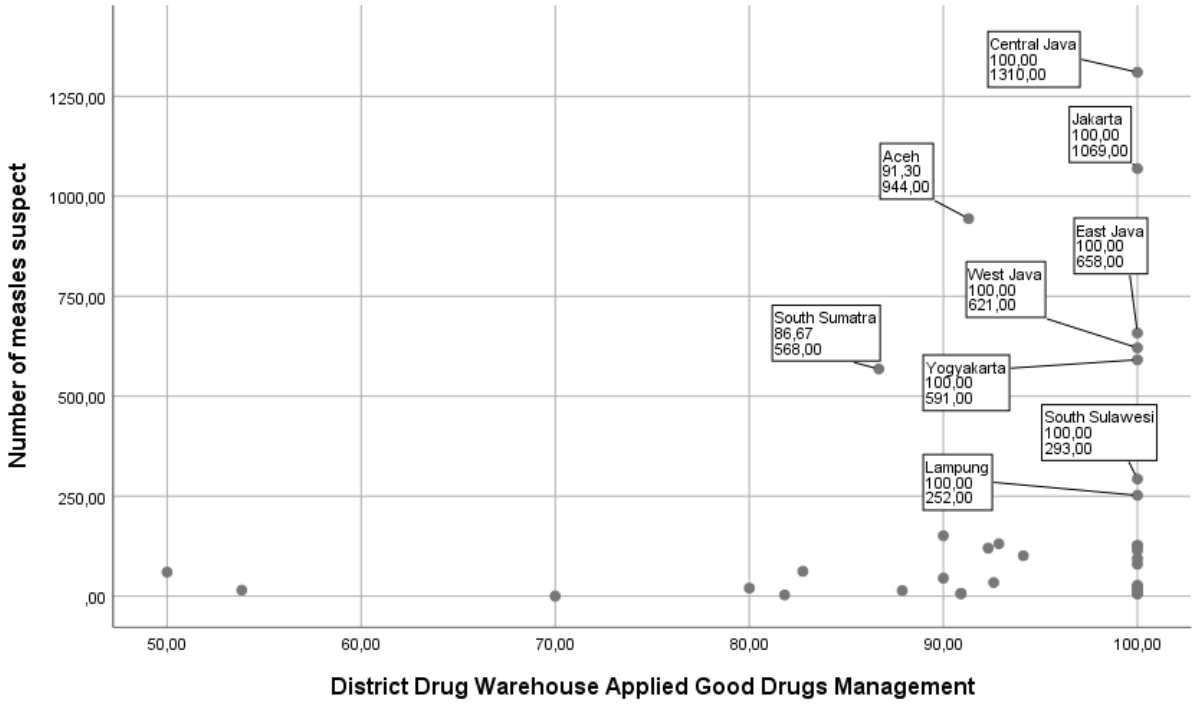


Figure2. Scatter plot of suspected measles cases with the variable of health logistic in Indonesia, 2019

Source: TheMinistry of Health of the Republic of Indonesia, 2019

The assessment provides at the DHO level, while the weakness of drug and vaccine management potentially at PHC and other lower levels. A study at PHC inSidoarjo showed the weakness of recording of a cold chain, consist of weekly and monthly maintenance such as storage tools and routinely temperature recording[27]. Meanwhile, the study at Pasuruan found not standard vaccine distribution facilities, inappropriate treatment vaccine preparation, and vaccine after used by the midwife at *Posyandu*[28]. Distribution management a crucial process to maintained the vaccine quality. A study figured a better vaccine distribution management in Belitung. The DHO was distributed to PHC. The distribution to the *Posyandu* by midwifes and supporting by standard facilities such as proper vaccine carrier and an ice pack. As the isle area, the health worker developed a good relationship with the boat's owner, there were almost no problems related to the vaccine's quality in the field[15].

Conclusions

All variablesfigures a random tendency, which means no correlation with the number of suspected measles. The effectiveness of health workers to prevent measles was better measured by their performance. As well as optimizing the potential of promotive-preventive health workers at the PHC. Management of vaccine storage and distribution at the PHC level must be a concern. Physical factors, such as geographical and electrical disparity also socio-economics factors, such as religion must be considered as inhibiting factors.

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Ethical Clearance: The study was conducted by utilizing secondary data from published reports. For this reason, ethical clearance is not required in the implementation of this study.

Conflicting Interests: Nil

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