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Comparing Community Socio-Demographic Profiles towards Dengue in Two Selected Areas in Medan, North Sumatra, Indonesia

Sorimuda Sarumpaet[1], Fotarisman Zaluchu[2], Syarifah[3]

[1]*Department of Epidemiology, University of Sumatera Utara, Indonesia*
sorimuda_sarumpaet@yahoo.com

[2]*AISSR, University of Amsterdam, Dutch*
fotarisman@gmail.com

[3]*Department of Behavior Science, University of Sumatera Utara, Indonesia*
syarifah_usu@yahoo.com

***Abstract*— Dengue outbreak occurs in Indonesia, including Medan. We selected socio-demographic profile of the community, its behavior and environment in order to see dengue dynamic within the same location. Medan Baru represents the highest reported case, and Medan Area, for the lowest reported case. A total of 840 respondents, calculated by WHO's rapid survey (2 x 210 from each sub-district). Respondents were the head of household (male or female) and have been living in the area for a minimum of two consecutive years. Questionnaires were distributed to assess the demographic profiles, knowledge, attitude and practice. Environment assessment made to measure environmental risk. We found that Medan Area carryinga higher risk of dengue.The majority of respondents was adults, women, those living in permanent homes and whose educational background was up tosecondary high school or less.Most respondents lived in their own house and spent most of their time in the morning outside the home to work. Respondents' knowledge of and attitude towards dengue were relatively good.Generally, the respondents participated in some efforts to prevent dengue. Many mosquito'slarvae were still present in more than 1 container. After deployed binary logistic regression at*α*=0,05, the risk factors of dengue in Medan Area were higher to those who performed activities at home in the morning with poor quality of hygiene both inside and outside home.This research concluded that people were highly exposed to the risk of dengue when they failed to maintain and manage a healthy living environment maximally.**

***Keywords*— Dengue, socio demographic, dengue history, behavior, environment, Medan**

I. INTRODUCTION

In the WHO-SEAR regions, including Southeast Asia and the Western Pacific, Indonesia ranks as the second large dengue infection after India, with an estimated total 7,590,213 apparent cases and 23,009,108 in-apparent cases each year. The costs of dengue prevention and control are extremely high, estimated about $ 1 billion every year[1]. Indonesian Ministry of Health noted that currently dengue fever is spreading widely and creates outbreaks almost every year in Indonesia.

Dengue is not evenly distributed in the population. Various studies have been conducted to determine the circulation of dengue virus (DENV) within a community[2], [3]. Researchescarrying out separate factors have also been done before, for instance by modeling the various aspects of socio-demography[4], [5], the environment, including mosquitoes [6]–[8], people's behavior [5], [9]–[11] and even dengue epidemiology[12]–[14]. All of these studies found a tendency of the variables that are considered as the risk factors of dengue incidence in the community.

Researches that combine all of these factors are still very limited. There is no scientific literature on this subject, including on the occurrence of dengue fever in Medan, a region where dengue outbreaks commonly occur. This study aims to look at the all factors such as demography and behavioral and environmental diseases which may cause variations of cases even in the endemic areas like Medan.

II. METHODS

The report of dengue cases issued by District Health Office (DHO) Medan determined the early selection of research location.The report indicated that most cases of dengue in the City of Medan occurred in the district of Medan Baru, while the fewest in the district of Medan Area. The finding of this research offered information about the locations which were prone to the high risk of dengue. This research calculated the incidents of dengue fever suffered by the respondents.

Respondents were male or female, who were considered as the head of household by the time of

interview. Respondents should have been living in the study area for at least two years. To the respondents, questionnaires were distributed to assess their demographic profiles, behavior, anddengue history. At respondent houses, collecting potential mosquitoes' larvae and larva's breeding places was done. The size of research samples is determined by applying the rapid survey technique of WHO, that is, 2 x 210 respondents = 420 respondents in each. In total, this study involved 840 respondents.

To know the risk factors of dengue, all variables were categorized into high risk and low risk, as shown in Table 1.

The dependent variables were the incidents of fever and dengue history. To obtain answers to these variables, the following 3 questions were asked to the respondents: “do you have any history of fever?”; “Have you/family members ever been diagnosed of having a fever yet not treated?”; and “Have you/family members ever been diagnosed as having a dengue fever and then treated in hospital?”

Data were managed by SPSS. To know the difference between the two locations, Chi-Square test was deployed at α=0,05. The main contributor variables to the risk of dengue were calculated by using Binary Logistic Regression test at α=0,05. Trained enumerator and investigator assisted the researchers to collect data. Ethical clearance was declared by the Ethical Committee Medical Faculty, University of North Sumatra.

III. RESULTS

This study collected 840 respondents:420 respondents fromMedan BaruDistrict and the other half from the Medan Area District. All of sample gave respond to the questionnaire. Selected characteristics of respondent are presented in Table 1.

TABLE I
VARIABLES AND ITS CATEGORIES

Variable	Risk Category	Details
Socio-demography		
Age	Low High	≥35 years old <35 years old
Sex	Low High	Male Female
Work Status	Low High	Permanent Not permanent
Education	Low High	Senior high school and higher Secondary high school or less
Housing status	Low High	Owner Rent
Activity in the morning	Low High	Mainly Outside Mainly Inside
Activity in the night	Low High	Mainly Outside Mainly Inside
Behavior		
Knowledge	Low High	Upper mean (Good) Below mean (Not Good)
Attitude	Low High	Upper mean (Good) Below mean (Not Good)
Perception of personal ability to control dengue spreading	Low High	Confident Not confident
Past experience of prevention (mosquitoes killing)	Low High	Only 1 activity in the past More than 1 activities in the past
Past experience of prevention (larva killing)	Low High	Only 1 activity in the past More than 1 activities in the past
Future availability	Low High	Able to participate Unable to participate
Health seeking	Low High	Frequently accessible Rarely accessible
Environment		
Indoor	Good Bad	Larva negative larva positive at least in 1 container
Outdoor	Good Bad	Larva negative larva positive at least in 1 container

Table 2 described the socio-demographic profiles of the respondents. Both areas displayed significant differences of variables. Variables of high risk categories were found in Medan Area, such as, female, most houses were rented ones, morning activities were inside the house, evening activities were outside the house. By contrast, Medan Baru displayed different variables of high risk categories, such as, not permanent house and low level of education. When a difference test was carried out, it came up that the variables of house ownership and activities in the morning were statistically different in these both areas.

Table 3 presented different assessments of the respondents’ behavior. Variable of high risk category was found more prominent in the district of Medan Baru, that was, poor knowledge and attitude. On the contrary, variables such as the willingness to cooperate to eradicate dengue in the past and the future and seeking for health treatment at health facilities were more dominant in the district of Medan Baru. Assessment of environment also proved that the hygienic conditions in the

district of Medan Baru were better than those in the district of Medan Area (Table 3). The area with higher risk of dengue could be seen in Table 4. The table showed the number of fever incidents in Medan Area was much higher than that in Medan Baru. Meanwhile, the higher number of respondents/family members diagnosed as having who were treated either in hospital or at home was found in the district of Medan Baru.

TABLE II
SOCIO-DEMOGRAPHIC PROFILE OF RESPONDENTS

Socio-demographics	Medan Baru District (%)	Medan Area District (%)	p
Age group	43.55 (95% CI: 42.36-44.73)	44.22 (95% CI: 43.04-45.40)	0,542
>35 years old	295 (70.2)	304 (72.4)	
15-34 years old	125 (29.8)	116 (27.6)	
Sex			0,618
Male	96 (22.6)	90 (21.4)	
Female	324 (77.1)	330 (78.6)	
Work status			0,435
Permanent	303 (72.1)	313 (74.5)	
Not permanent	117 (27.9)	107 (25.5)	
Education			0,187
Secondary high school or less	243 (57.9)	224 (53.3)	
Senior high school and higher	177 (42.1)	196 (46.7)	
Housing status			0,000*
Owner	249 (59.3)	239 (56.9)	
Rent/ Government	171 (40.7)	181 (43.1)	
Mainly activity in the morning			0,000*
Mainly inside	221 (52.6)	291 (69.3)	
Mainly outside	199 (47.4)	129 (30.7)	
Mainly activity in the night			0,327
Mainly outside	43 (10.2)	52 (12.4)	
Mainly inside	377 (89.8)	368 (87.6)	

Note: * statistically significant at 0.05

TABLE III
RESPONDENT'S BEHAVIOR TOWARD DENGUE

Behavior	Medan Baru District (%)	Medan Area District (%)	p
Knowledge			0,000*
Good	227 (54)	284 (67.6)	
Not Good	193 (46)	136 (32.4)	
Attitude			0,019*
Good	235 (56)	241 (57.4)	
Not Good	185 (44)	179 (42.6)	
Self-confident that dengue can be controlled			0,000*
Yes	229 (54.5)	178 (42.4)	
No	191 (45.5)	242 (57.6)	
Involvement to prevent the mosquitoes breed or bite in the past			0,000*

Highly participative Not adequate	385 (91.7) 35 (8.3)	329 (78.3) 91 (21.7)	
Involvement to kill larvae/ pupae in the past Highly participative Not adequate	 391 (93.1) 29 (6.9)	 331 (78.8) 89 (21.2)	0,000*
Involvement to control dengue in the future Highly participate Not adequate	 344 (81.9) 76 (18.1)	 300 (71.4) 120 (28.6)	0,000*
Health seeking behavior to health facilities Frequently Rarely	 409 (97.4) 11 (2.6)	 396 (94.3) 24 (5.7)	0,025*

Note: * statistically significant at 0.05

TABLE IV
ENVIRONMENTAL ASSESSMENT

Environment Type	Medan Baru District (%)	Medan Area District (%)	p
Indoor Bad (larva positive at least in 1 container) Good (larva negative)	 24 (5.7) 396 (94.3)	 86 (20.5) 334 (79.5)	0,000*
Outdoor Bad (larva positive at least in 1 container) Good (larva negative)	 26 (6.2) 394 (93.8)	 63 (15) 357 (85)	0,000*

Note: * statistically significant at 0.05

Overall, by combining the fever history and dengue diagnosis, this research revealed that the district of Medan Area had more frequent incidents of dengue, that was as many as 9.2 percent. The incidents of dengue in the district of were only 6.6 percent. The fact presented in this research was in contrast with the data of DHO claiming that the people in the district of Medan Baru faced more risks to have dengue.Table 5 presented 3 reasons why Medan Area, not Medan Baru, was more prone to risk of dengue. The reasons were morning activities dominantly performed inside the house, poorly hygienic condition inside the house, and poorly hygienic condition outside the house.

IV. DISCUSSION

This research concluded that field assessment of dengue, seen form fever history and the history of dengue disease experienced by respondents, could come up with findings different from the report of dengue cases issued by DHO. Fever is a symptom of dengue disease. The recurrence of fever in community might ring the bell about the presence of dengue. Patients with dengue but without proper treatments in hospital merely trigger the rapid spread of dengue in the community. This was the case why Medan Area faced more risks for dengue (Tabel 4).

This research assumed that dengue was not caused by a single factor. Therefore, it was also concerned with various factors. One among those factors was socio-demography. Previous researches have revealed the role of demographic factors in dengue infection and the spread of diseases. In Hong Kong, during the epidemic, there were more children admitted to hospital than adults (ratio 4.8 to 1.0)[15]. Severe acute signs were also significant in adults rather than in children, and the same study found that patients with DHF were significantly older than patients with DF. Therefore, due to the

cost consequences for the family and community, direct or indirect, of dengue infection in adults, it is recommended to focus on adults rather than children.

By comparing three locations of serology surveys, it is found that females aged more than 30 years old were significantly correlated with the seropositivity of 1,750 participants in the study population[16]. Females has are at a higher risk compared to males was found by another study in Thailand by the same researchers[17]. In Singapore, adults tended to have DF rather than children[18]. Interestingly, in Thailand, spatial analysis of dengue in rural and urban areas, it is found that several risks for dengue infection: housewives, farmers, and traders, spending daytime in the forest, being at home after 18.00 hours, and reports of being bitten by mosquitoes[19].

The difference in risk may be explained by several reasons. In many developing countries, females and children stay at home during the daytime and are at greater risk of being bitten by mosquitoes. In adults, permeability of the capillary creates an opportunity to have more asymptomatic symptoms in comparison to children who tend to have DHF/DSS. From Basic Health Research 2013 and SDKI 2012, low income people in Indonesia have a greater risk to have disease[20], [21].

As seen in Table 1, adult age, female, living in rented house, and spending a great deal of time in the morning inside the house are the more dominant variables in Medan Area. With these variables, this district became the most risky area. The two significant variables were house ownership and activities in the morning.Although this research did not delve more into these variables, it was most likely that they were closely related to the respondents' economic activities.Based on a general observation, Medan Area was an area of home industries. It made sense then if the people just stayed and worked at home.

The role of behavior towards the presence of dengue was also considered in this research. Table 2 informed some facts about kinds of behaviors which were not supportive to address dengue. Only a half of the respondents who had adequate knowledge of dengue, and were participative in eradicating dengue.People'sbehavior in relation to dengue was explored by using knowledge, attitude and practice assessment by a number of researchers. In the rural setting of Malaysia, it is found that 68.5 percent and 91.5 percent of respondents had good knowledge and a good attitude towards dengue and Aedes respectively, while only 51.5 percent adopted prevention and control of this disease[22].

TABLE V
DENGUE HISTORY

Disease History	Medan Baru District (%)	Medan Area District (%)
Fever experience		
Yes	10 (2.4)	27 (6.4)
Never	410 (97.6)	393 (93.6)
Dengue History		
Respondent/ family members diagnosed		
Yes	4 (1)	6 (1.4)
No	416 (99)	414 (98.6)
Respondent/ family members hospital care due to dengue		
Yes	14 (3.3)	6 (1.4)
No	406 (96.7)	414 (98.6)
Incident	(28/420) x 100 = 6,6 %	(39/420) x 100 = 9,2 %

TABLE VI
BINARY LOGISTIC REGRESSION ANALYSIS

Factors that influence Sub-District High-Risk Profile	OR	95% CI	p
Working inside the house most of the time	2.042	1.503-2.776	0.000*
Poorly hygienic condition inside the house	3.314	1.941-5.658	0.000*
Poor hygienic condition outside the house	2.174	1.243-3.803	0.007*

Note: * statistically significant at 0.05

By undertaking case control studies between families with (case) and without members having DF/DHF (control), knowledge and practice for prevention of mosquitoes in a control group is found better [23].

It was obvious that the respondents in Medan Area were more well-informed about dengue than those in Medan Baru. However, in terms of action (practice), respondents in Medan Baru performed much better. Indeed, ignorance of dengue was

found to double the seropositivity risk in northern Thailand [16]. Fighting against dengue requires knowledge and affirmative actions. The campaign launched by the Indonesian government, known as "3M Plus" (to drain, to cover and to bury or reuse while plus is including all form of preventions) places a heavy emphasis on real and observable actions.

The basic principle to understand dengue spreading is to understand the dengue's vector transmission and human whose behavior tend to collect water. Aedesaegypti lays its eggs in man-made breeding places, such as flower vases, used car tires, or any containers that can collect rainwater. Adult mosquitoes prefer to rest indoors and feed on human blood during daylight [24]. Aedesaegypti mosquitoes like to live around human houses and environments and lay their eggs in clean water containers. Larval forms can usually be found in various containers, like plastics and metal, used tyres, mud pots, iron drums, coconut shells or cement tanks [25]–[27].

As can be seen in Table 3, indoor environment is the most prominent place of the mosquitoes' larva. Housing is a place for a vector to live and breed. Aedesaegypti in immature stages were found in 63 per cent of people's houses who were DHF positive in Trinidad, West Indies. In addition, it has been also proven that water tanks, drums and buckets are the water containers where 98 per cent of pupae are found[28]. Public facilities like cemeteries are also appropriate place for Aedes to breed[29].

Increasing human activity and unplanned urban society contributed significantly to the rapid rise of dengue infection[30]. Like most of the towns in Indonesia where DHF is endemic, the area has crowded environments, poor hygiene and sanitation levels, bad housing conditions, and low income levels[31]. Table 5 indicated that the high risk of dengue in Medan Baruwas caused by a combination of environment factor and socio-demography factor of the respondents. These areas should be seriously addressed in the future.Some campaigns to prevent dengue have not brought any impact on the respondents' change of hygienic-related behaviors, either in preventing the spread of dengue or managing a more healthy environment.

V. CONCLUSION

This research provides more significant information on how to identify the pattern of dengue spread in community. The report of dengue cases made by DHO does not have to be parallel with the survey taking into account the other risk factors of dengue circulation in the community.In the district of Medan Area, an area with a much high risk of dengue, the risk factors were the activities in the morning which were mostly carried out inside the house and the poor quality of environment. In addition to indicating the ineffectiveness of various programs in encouraging personal initiatives to manage a more healthy environment, this research recommends specific measures to address the incidents of dengue by paying attention to the profile of each area. If it is done, then the expected outcomes of dengue prevention and eradication are within our reach.

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