Majalah Kesehatan Indonesia

Volume 4, Issue 1, April 2023, p. 17–22
P-ISSN 2745-6498, E-ISSN 2745-8008

Determinants of Dengue Fever Incidence in Dense Residential Areas: A Systematic Literature Review

Nurdin[1*)], Martini[2], Mursid Rahardjo[3]

[1*), 2, 3] Department of Environmental Health, Faculty of Public Health, Diponegoro University

ARTICLE INFO

Article history:

Received 21 December 2022
Accepted 19 February 2023
Published 10 April 2023

Keyword:

Determinants factor
Minimize case
Dengue Hemorrhagic Fever

**) corresponding author*

Nurdin

Department of Environmental Health, Faculty of Public Health, Diponegoro University
Jl. Prof. Sudarto Tembalang, Semarang, Central Java Indonesia

Email: nurdin@gmail.com
DOI: 10.47679/makein.2023126

ABSTRACT

The problem of dengue hemorrhagic fever (DHF) has become a major concern for the government in addition to other diseases both infectious and non-communicable. DHF every year always brings victims and is difficult to avoid. This study aims to determine the determinants of dengue incidence. This research uses the literature review method from various reference sources such as scientific journals, manuals from ministries/institutions, proceedings, books, and others. The results of this research reported that there are four determinants that affect the incidence of dengue fever in Indonesia, namely social, economic, environmental, and institutional factors. In the social factor, there are 4 sub-factors, while in the economic factor there are four, in the environment, there are seven and 11 of the institutional sub-factors. This research recommends that in overcoming dengue fever, it is necessary to do it thoroughly, involve all interested actors and be carried out programmatically and sustainably.

INTRODUCTION

Dengue fever (DHF) is a dangerous environment-based disease that is still a global health problem. The incidence of DHF in Indonesia is still fluctuating, indicating that the handling carried out in the community is still not running optimally. Several studies have shown that community empowerment is able to increase community knowledge and awareness by using implementation targets. Dengue fever (DHF) is a mosquito-borne disease that occurs in tropical and subtropical regions of the world. In mild dengue fever, it will cause high fever and flu-like symptoms. While for severe dengue fever, it causes serious bleeding, sudden drop in blood pressure (shock) and even death (Alifia et. al., 2021).

Millions of cases of dengue hemorrhagic fever infection occur worldwide each year. Dengue fever is most common in Southeast Asia, the western Pacific islands, Latin America and Africa. But the disease has now spread to new areas, including localized outbreaks in Europe and the southern United States. Researchers are now working to create a dengue vaccine. For now, in areas where dengue is common, the best way to prevent infection is to avoid mosquito bites and take necessary steps to reduce mosquito populations. The risk factor for dengue occurs in populations living in tropical or subtropical regions such as in Indonesia and some countries in southeast Asia. western Pacific islands, Latin America and Africa.

Dengue fever is caused by one of the four types of dengue virus. People will get infected because it is transmitted through mosquito bites. The two mosquitoes that can transmit this virus are Aedes aegypti and Aedes albopictus. These two types of mosquitoes that most commonly spread the dengue virus are commonly found both in and around residential areas. When a mosquito bites a person infected with the dengue virus, the virus enters the mosquito. Then, when the infected mosquito bites another person, the virus enters that person's bloodstream and causes infection.

At last count, dengue fever cases were spread across 472 districts/cities in 34 provinces and deaths occurred in 219 districts/cities in Indonesia (Pusdatin Kemenkes, 2020). 74.35% or 377 districts/cities have achieved an Incident rate (IR) of <49/100,000 population. The development of DHF cases

and deaths in Indonesia from 1968-2020 (updated November 30, 2020) was highest in 2016 at 204,171 cases. Then in the following year it decreased, but in 2018 it increased again to 95,893 cases (Kemenkes RI, 2021).

Meanwhile, the proportion of DHF cases based on age groups aged 14-44 years has the highest prevalence followed by age 5-14 years, 33.97%. Followed by ages 1-4 years at 14.88%, ages > 44 years at 11, 57 and the lowest at 3.13% occurred in children under one year of age (Pusdatin Kemenkes, 2020). Based on gender, in Indonesia DHF affects 53.11% males and 46.89% females. Meanwhile, the proportion of DHF deaths per age group was highest at the age of 5-14 years at 34.14%. While the lowest was at the age of less than 1 year, 10.32%.

Efforts that can be made by the community to control DHF are currently by: 1) PSN 3M Plus through the One House One Jumantik Movement starting from the entrance of the country to the household; 2) Planting mosquito repellent plants such as zodiac trees, lavender, lemongrass basil and others; 3) using anti-mosquito lotion and 4) fishization. However, until now DHF is still a major threat even though the Covid-19 pandemic has reduced the health status of most Indonesians.

However, in densely populated areas such as Jakarta, DHF does not recognize slums or developing areas. In some sub-districts in Jakarta, some of which are developing areas, DHF cases still occur. This is interesting because the geographical demographics and welfare distribution map of the community are more established and educated than the surrounding areas.

Developing areas are certainly described as areas where the type of house available is type 45 and above, neatly organized and exclusive. Various public infrastructure facilities, environmental design and sanitation that meet the requirements of both environmental sustainability and health. The area is also guarded by a very strict security service system and not just anyone can enter the area without clear identification and purpose.

Based on the latest data obtained from one of the Public health center in North Jakarta, namely Public health center P, the data obtained in 2015 showed signs of an outbreak of DHF cases with an average of almost 10 cases per month. The peak occurred in 2016, with the highest case in April 2016 amounting to 77 cases and on average much higher than in previous years. In 2017 and 2018, cases tended to decrease and on average were much higher than in previous years. In 2017 and 2018 there tended to be a decrease.

Based on the results of in-depth interviews with representatives of residential communities in developing areas and other areas, it is concluded that in developing areas, residential owners are less concerned about the health of the surrounding environment. The residents feel that they have paid the environmental maintenance fee to the area manager, so they do not feel the need for the situation and condition of the surrounding environment. The residents always rely on household employees or home security officers to represent them in various coaching conducted by the North Jakarta City Health Office in this case the Public health center in the District. As a result, various information and counseling materials do not fully reach the owner of the dwelling so that several things that need to be decided by the owner of the dwelling are not carried out.

This literature review aims to explore what are the factors that influence efforts to minimize the incidence of DHF in order to get answers and become one of the recommendations for solving the problem of DHF. A more flexible and applicable problem-solving recommendation for local government stakeholders, public health center and community.

METHOD

This research uses the literature review method and is reinforced by field observation activities. The data sources used came from the literature of scientific publications using the academic database google scholar, garba digital reference (garuda), and pubmed as well as through interviews with respondents in the field. The article search used the keywords: DHF, determinant factors and sustainable development. This literature review is a traditional selection and review of methods and prioritizes those that play a role with the research variable, namely the determinant factors that cause dengue fever incidence.

RESULTS AND DISCUSSION

An overview of the disease and vector of Dengue Fever (DHF) can be concluded that so far two types of DHF vectors are known, namely Aedes aegypti and Ae. albopictus mosquitoes. The normal cycle of dengue infection occurs between human-human Aedes mosquitoes. Starting from the sucked blood of the patient, the female mosquito can transmit the DHF virus after passing the incubation period of 8-10 days which makes the virus replicate (multiplication) and spread which ends in salivary gland duct infection so that the mosquito becomes infected during its lifetime. So far, since DHF is a viral disease, there is no treatment to stop or slow the progression of the virus. Treatment can only be done symptomatically by relieving the symptoms seen by each patient. Fluids can be given to reduce dehydration and medicines are given to reduce fever, as well as to treat bleeding (Ira Aini Dania, 2016).

Several variables are associated with DHF incidence including attitude, mosquito nest eradication, mosquito repellent use, mosquito net use, mosquito larvae, occupancy density, periodic monitoring of larvae, fogging, larvicide, and education. The results showed that the most dominant epidemiological determinant of DHF incidence was mosquito larvae. People who live in a house with mosquito larvae have a 4.1-fold chance of contracting DHF (Agung Sutriyawan et. al., 2020).

One of the efforts in preventing DHF is to break the chain of transmission through vector control. One of them is insecticide with natural materials such as leaves, roots, stems, flowers or fruits of some plants in nature. The type of insecticide that is practical, smoke-free, does not smell pungent and can eradicate mosquitoes is the mat vaporizer. One of the ingredients of vegetable insecticides is citronella (Cymbopogon nardus) because it contains saponins, tannins, quinones and silica which cause desiccation (continuous discharge of body fluids) on insect skin so that insects will die of dryness while citronellol and geraniol are active ingredients that are disliked and avoided by insects including mosquitoes. Research by testing citronella mat (Cymbopogon nardus) as an electric natural mosquito repellent against Aedes aegypti mosquitoes, at a dose of 1000 mg (Ullya Rahmawati et. al., 2020).

A similar study with the aim to determine the effective concentration of bay leaves (Syzygium polyanthum) as larvasia of Aedes sp. mosquitoes, found that 5% concentration

was most effective in killing 89.6% of Aedes sp mosquito larvae. The research recommends that people use natural insecticides such as bay leaf extract (Syzygium polyanthum) in killing Aedes sp mosquito larvae as a substitute for chemical insecticides (Haidina Ali & Sri Mulyati, 2021).

However, control of adult mosquitoes and larvae has not shown significant success. Control of Aedes aegypti mosquitoes needs to be done in other ways, one of which is inhibiting the development of mosquito eggs. Chlorine is one of the materials that can inhibit egg development because chlorine is able to oxidize (burn) the eggs of Aedes aegypti mosquitoes by damaging the proteins contained in the eggs of Aedes aegypti mosquitoes. By using One Way Anova test analysis and Benferonny test. Univariate analysis showed that in the control group the number of unhatched eggs was 2% and at a concentration of 40 ppm the number of unhatched eggs was 94%. The results of the Anova test showed that there was a significant difference in the average number of unhatched eggs in various variations of chlorine doses (p=0.000). While the results of the Benferonny test showed there was a difference in the number of unhatched eggs at concentrations of 10 ppm and 20 ppm (p=0.000). This study aims to provide information for the community by applying a concentration of 20 ppm to spray mosquito breeding sites (Agus Widada & Moh.GazalI, 2020).

A historical research with a public health history approach was conducted with the aim of examining efforts to prevent and control dengue hemorrhagic fever (DHF) in Indonesia in the early 21st century (2004-2019) and its impact. This is important because DHF is considered as one of the threats when Indonesia is fighting the Corona Virus Disease 2019 (Covid-19) pandemic. In addition, DHF is one of the diseases that has been in Indonesia's long history. The sources used in this research are primary sources in the form of newspapers and official government publications and secondary sources in the form of related literature. The results showed that the status of DHF, which was designated as an Extraordinary Event (KLB) in 2004, caused the government to pay more attention to DHF. The government established health policies that included prevention and control efforts involving cross-sector collaboration. However, the impact of these efforts is that the number of DHF cases has fluctuated for fifteen years, even increasing sharply in 2019 (Joshua, 2021).

While related research, one of which aims to analyze the relationship of Mosquito Nest Eradication (PSN) actions with Draining, Covering and Burying (3M) Plus activities to the incidence of DHF as a prevention effort. The results showed that the 3M Plus PSN behavior associated with DHF incidence was draining (0.002) and OR 95%CI = 3.877 (1.711-8.783), covering (0.046) and OR 95%CI = 2.440 (1.090-5.465), using mosquito repellent (0.001) and OR 95%CI = 3.946 (1, 779-8,753), putting used clothes in a closed container (0.033) and OR 95%CI = 2.493 (1.144-5.435), installing wire mesh on windows and vents (0.000) and OR 95%CI = 5.053 (2.241-11.392), sowing larvicide (0.012) and OR 95%CI = 2.887 (1.321-6.309). Meanwhile, PSN 3M Plus behaviors that were not associated with the incidence of DHF were recycling used goods, keeping larvae-eating fish, working together to clean the environment, checking water reservoirs, repairing channels and gutters that are not smooth, and planting mosquito repellent plants. This study concluded that it is necessary to conduct health counseling about PSN-DBD to the community, especially to the head of the family to increase public knowledge about the importance of doing PSN 3M plus and want to apply it in everyday life (Agung Sutriyawan, 2021).

The results showed that there was a significant relationship between breeding sites in the household (p=0.000 and OR=5.5), temperature in the house (p=0.000 and OR=4.0) and the habit of cleaning water reservoirs (p=0.000 and OR=4.7) to the incidence of DHF. This study concluded that the community can prevent the transmission cycle of DHF by carrying out activities such as eradicating eggs, larvae, eradicating pupae in their egg-laying sites, cleaning water reservoirs at least once in less than 7 days and actively carrying out 3 M Plus activities. Coordination between various stakeholders is needed to pay attention to environmental sanitation so that there is no breeding ground for Aedes aegypti mosquitoes (Sofia et. al., 2016).

While other studies have shown that there is a statistically significant relationship between population density and the incidence of dengue hemorrhagic fever. Other variables in this study did not show a significant relationship. The results of spatial analysis showed no relationship between the variable number of free larvae and the incidence of dengue hemorrhagic fever and a weak relationship between the variable population density and the incidence of dengue hemorrhagic fever (Irwin Umi Latifah &Laila Fitria, 2018).

In an activity program, it cannot be separated from financing and other socioeconomic factors. A research aimed to determine the relationship between the level of knowledge about dengue fever and the socioeconomic status of the head of the family on the action of PSN 3M Plus in an effort to prevent dengue fever has been conducted. The research was conducted in Pajaresuk Village, Pringsewu District, Pringsewu Regency, Lampung Province. This study used an analytic observation method with a cross sectional approach. The data used were primary data collected using questionnaires to the head of the family in Pajaresuk Village, Pringsewu Subdistrict, Pringsewu District with a total of 92 respondents. The results of Chi-Square analysis showed that there was a relationship between knowledge (p value of 0.000); at the level of education (p value of 0.043); at the level of income (p value of 0.007) to dengue hemorrhagic fever prevention behavior, as well as on the employment variable obtained a p value of 0.408 to dengue hemorrhagic fever prevention behavior. In this study, the researchers concluded that there is a relationship between knowledge, education level and income level on dengue hemorrhagic fever prevention behavior and there is no relationship between employment on dengue hemorrhagic fever prevention behavior (Farhandika et. al., 2018). Based on the above reference studies, the determinants of DHF incidence can be seen in Table 1.

Dengue fever (DD) remains an important public health problem worldwide. The number of infectious cases of DD transmission has increased up to 30 times in the last 50 years (WHO, 2009). The losses caused have an impact on the social and economic fields. The social impacts include panic within the family, morbidity and mortality, and reduced life expectancy. The economic impact that is felt directly is the cost of treatment in health services, while the indirect impact is the loss of productive time and work time (Guzman et. al., 2016).

Referring to the results of the literature study, many efforts have been made by the government and the community in an effort to prevent DHF incidence in Indonesia. It has always been a classic question why it seems that dengue outbreaks are so difficult to eradicate throughout the year. So many studies have been conducted, and recommendations given but in the end, DHF cannot be eliminated. Even if stakeholders let their guard down, extraordinary events (KLB) like in 2004 could potentially happen again. The following is a

discussion of the results of the literature study on the determinants of DHF incidence in Indonesia.

Table 1.
Factors Associated with the Incidence of DHF

No.	Determinant Factor	Sub-factor	Reference
1	Social	Attitude	Setiawan dkk (2020), Abdulrahim (2017)
		Clean and Healthy Behavior (PHBS)	Abdulrahim (2017)
		Pendidikan	Setiawan dkk (2020)
		Type of Work	Muhammad dkk (2022)
2	Economy	Family income	Muhammad dkk (2022)
		Family expenses	Muhammad dkk (2022)
		Government Budget	Program Dinkes Prov DKI Jakarta
		Other Funding Sources	Program Dinkes Prov DKI Jakarta
3	Environment	Mosquito larvae	Setiawan dkk (2020)
		Residential Density	Setiawan dkk (2020), Abdul Rahim (2017)
		Humidity	Latifah dkk (2018)
		Room Temperature	Shofia dkk (2016), Latifah dkk (2018)
		Rainfall	Latifah dkk (2018)
		Residential Sanitation	Latifah dkk (2018)
		Mosquito age	Kemenkes RI (2019)
4	Institutional	Mosquito Nest Eradication Program	Setiawan dkk (2020), Program Dinkes Prov DKI Jakarta
		Mosquito Repellent Use Program	Setiawan dkk (2020), Program Dinkes Prov DKI Jakarta
		Mosquito Net Use Program	Setiawan dkk (2020), Program Dinkes Prov DKI Jakarta
		Periodic Larvae Monitoring Program	Setiawan dkk (2020), Program Dinkes Prov DKI Jakarta
		Program Fogging	Setiawan dkk (2020), Program Dinkes Prov DKI Jakarta
		Larvicide Program	Setiawan dkk (2020), Widodo &Ghazali (2020)
		Jumantik Optimization Program	Program Dinkes Prov DKI Jakarta
		Health Worker Development Program	Program Dinkes Prov DKI Jakarta
		Botanical Insecticide	Rahmawati dkk (2020), Ali & Mulyati (2018)
		Health Facilities	Abdulrahim (2017)
		Number of Visits to Public Health Center	Abdulrahim (2017)

Based on the results of data processing from various previous research journals, it can be formulated that the factors that influence the incidence of DHF in terms of social aspects are 4 sub-factors, namely attitude, PHBS, education and type of work. Meanwhile, in terms of economic factors, referring to the results of data processing from various previous research journals, the factors that influence the incidence of DHF in terms of economic aspects include family income and expenses, government budgets and other sources of funds.

Healthy behavior is knowledge, attitudes, and proactive actions to maintain and prevent the risk of disease and protect themselves from the threat of disease (Husna et. al., 2016). Public awareness to always maintain personal health and the surrounding environment is still low. Based on the 2013 Riskesdas, the percentage of households in Indonesia that practice clean and healthy living behavior has only reached 55%. The process of improving behavior change tends to take a relatively long time and concerns the issue of the adequacy of officer assistance to the community to implement healthier behaviors in everyday life on an ongoing basis (Kemenkes RI, 2019).

In order to encourage increased implementation of healthy living behaviors by the community, strategies and regulatory support are needed through supportive policies in each region. Social roles carried out by the kelurahan, public health center and local government such as neighborhood association (RT) and community association (RW) are needed to provide counseling to the community regarding the importance of maintaining environmental cleanliness such as through PSN activities in order to create awareness to create a healthy and DD-free environment.

Communities with poor PSN behavior generally ignore activities that can prevent mosquito breeding. Some of the PSN behaviors that are generally still lacking in the community include 3M plus behavior, 3M which is covering, draining and brushing as well as burying / recycling and plus which is routinely checking the presence of larvae on objects that have water such as flower vases, animal drinking places, and others; repairing channels and gutters and gutters that are not smooth or damaged so that they cause stagnant water; sprinkling larvicide powder into water reservoirs; keeping larvae-eating fish in ponds / water reservoirs; installing wire mesh on vents; not hanging clothes; and wearing mosquito repellent in the morning / afternoon.

The next factor is environmental factors. Based on the results of data processing from various previous research journals, the factors that influence the incidence of DHF in terms of environmental aspects consist of aspects of mosquito larvae, mosquito age, residential density, humidity, room temperature, rainfall and sustainable environmentally friendly residential sanitation.

Based on the results of data processing from various previous research journals, factors that influence the incidence of DHF in terms of institutional aspects or Public health center programs include the Mosquito Nest Eradication Program, the Mosquito Drug Use Program, the Mosquito Net Use Program, the Periodic Flick Monitoring program, the Fooging Program, the lavarsida program, the Health worker coaching program, Vegetable Insecticides, Health Facilities, the number of visits to the Public health center periodically.

CONCLUSIONS AND RECOMMENDATION

Based on the analysis of the literature review above, it can be concluded that there are four factors related to the prospect of success of the DHF minimization program. These four factors include social, economic, environmental and institutional variables. There are 4 social factors, 4 economic factors, 7 environmental factors and 11 institutional factors. Based on the results of the literature review analysis, in order to minimize the incidence of DHF, further research needs to be carried out related to the influence of factors that affect the incidence of DHF from the perspective of sustainable development. The pillars of sustainable development include social, economic, environmental and institutional factors.

Funding Statement

The authors did not receive support from any organization for the submitted work and No funding was received to assist with the preparation of this manuscript

Conflict of Interest statement

Penulis yang namanya tercantum tepat di bawah ini menyatakan bahwa tidak memiliki afiliasi atau keterlibatan dengan pihak luar manapun dan tulisan ini murni dari sumber yang dicantumkan di daftar pustaka serta tidak mengandung plagarisme dari jurnal artikel manapun. Sumber tulisan telah dicantumkan seluruhnya di daftar pustaka.

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