Strategy 3M plus to reduce incidence disease dengue haemorrhagic fever in Public Health Centre (PHC) Tigo Baleb Bukittinggi West Sumatra-Indonesia

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Abstract. Disease of Dengue Haemorrhagic Fever (DHF)) is contagion which because of virus dengue and contagious through larva mosquito of Aedes aegypti. This disease can attack everybody and death. In Bukittinggi represent non-area of endemic DHF, but almost every year the progress of occurrence DHF, District which at most case of DHF is Aur Birugo Tigo Baleb (ABTB), besides wide of smallest area also there is environmental factor which related case of DHF. This Research aim to know related of existence larva mosquitoes Aedes aegypti and Implementation of 3M Plus with improvement incidence disease Dengue Haemorrhagic Fever in PHC Tigo Baleb Bukittinggi. Research method is analytic survey with study design of case control use test of chi square. Research location in District of ABTB, its research responder is 78 with technique of totally sampling. The research show existence snap fingers at house snapping fingers at and suffering DHF 61.5%, do not snap fingers at and suffer DHF 38.5%. Value of House Index (HI) 43.6%, Container Index (CI) 17.9%. Implementation of 3M Plus unfavorable and suffer DHF 69.2%, while implementation of 3M Plus good and suffer DHF 30.8%. From result of research \( p_{\text{value}}=0.003 \) (\( p<0.05 \)), there are relation existence larva mosquitoes Aedes aegypti with Improvement incidence disease Dengue Haemorrhagic Fever and \( p_{\text{value}}=0.040 \) (\( p<0.05 \)), there are relation of 3M Plus with Improvement incidence disease Dengue Haemorrhagic Fever. Suggested, Public Health Service in Bukittinggi and PHC Tigo Baleb conduct socialization and enableness of society to join in to conduct eradication of mosquito Aedes aegypti regularly so that can degrade number incidence of disease DHF.

1. Background
The progress of national development for decades in Indonesia has had an impact on the health sector despite the recent economic crisis. The future of Indonesian society to be achieved through health development is the society, nation and state characterized by its people living in a healthy environment, have the ability to maintain, and have the highest health level throughout the territory of the Republic of Indonesia[1].

The optimal level of health for the community, health efforts are carried out with maintenance approach, health promotion (promotive), preventive prevention, curative disease, health restoration (rehabilitative), and traditional health service efforts are implemented thoroughly, integrated and Sustainable success [2].
To achieve optimal public health status, the Eradication Program focuses on preventing disease, reducing morbidity and mortality and reducing the adverse effects of infectious and non-communicable diseases. Infectious diseases are still a priority issue in the development of public health in Indonesia. In the list of Infectious Disease Surveillance, (SK Menkes No.145710 October 2003) a number of infectious diseases are listed as issues that must be a priority by the region. The problem of infectious diseases is still apprehensive, some types of diseases even show a tendency to increase and not successfully overcome such as pulmonary, malaria, and dengue haemorrhagic fever [3].

Dengue Haemorrhagic Fever (DHF) is an infectious disease caused by dengue virus and is transmitted through the bite of Aedes aegypti mosquito. This disease can attack all people and can lead to death. Generally, affects children under 15 years of age, but can also attack adults, and often cause extraordinary events (outbreaks) or outbreaks [4].

In Indonesia, DHF emerges as an outbreak for the first time found in Surabaya in 1968. Data from around the world shows Asia ranks first in the number of DHF patients each year. Meanwhile, from 1968 to 2009, the World Health Organization (WHO) noted Indonesia as the country with the highest dengue fever case in Southeast Asia and the second highest in the world after Thailand [5].

In the last 5 years the number of cases and infected areas has been increasing and widespread. It is estimated that every year there are 300 million cases in Indonesia, 500,000 cases of dengue that require hospitalization and at least 12,000 of them die, especially children [5].

DHF prevention and eradication program has lasted for approximately 43 years and succeeded in reducing mortality from 41.3% to 0.87% in 2010, but has not succeeded in reducing morbidity. The number tends to increase, spread more broadly, attacking not only children but also older age group. In 2011 through August 24,362 cases were recorded with 196 deaths [6].

In 2012 the number of DHF patients in Indonesia reported as many as 90,245 cases with the number of deaths 816 people. In line with the increase in number / morbidity, the number of districts / cities affected by dengue fever in 2012 also increased from 374 (75.25%) to 417 districts / cities (83.9%) [6].

Ministry of Health mentions in 2013 Indonesia is still a hotbed of dengue fever or already endemic. Until the middle of this year, dengue fever cases occurred in 31 provinces with 48,905 people, 376 of whom died. The number of dengue fever patients in the first half of this year shows an increase compared to last year [7].

To overcome dengue problems in Indonesia since 2004 the Ministry of Health has worked closely with Provincial Health Office and District Health Offices to implement a national program of dengue haemorragic fever prevention. The program includes epidemiological surveillance / early alert system and outbreak response, counseling, vector eradication for adult mosquitoes by spraying, focusing and periodic larva examination, larvalidation and vector surveys. In addition, cross-program cooperation through Pokjanal DHF and 3M movement period, treatment / case management including doctor training and procurement of suggestions for buffer stock [3].

Based on West Sumatera Provincial Health Profile in 2012, there are several regencies / cities in West Sumatera that belong to dengue endemic areas of Padang City with 1,626 cases per 100,000 population (868 cases and 758 cases), Pesisir Selatan Regency Number of cases 634 per 100,000 population (Male 305 cases and Women 329 cases), Kota Bukittinggi with number of cases 107 per 100,000 population (Male 54 cases and Women 53 cases).

In Bukittinggi, during 2010-2013 has been recorded cases of dengue from year to year has increased. In 2010 dengue cases 83 cases, decreased in 2011 to 68 cases, and in 2012 increased again 107 cases, so that in 2013 has not decreased 142 cases, reported from each PHC found in Bukittinggi. PHC that have the highest cases of DHF by 39 cases are PHC Tigo Baleh. In this case, the geographical condition of Bukittinggi, which consists of 3 subdistricts, among others, is the smallest subdistrict of Aur Birugo Tigo Baleh which has an area of 6.25 km², consisting of 8 Kelurahan which is the work area of PHC Tigo Baleh. During the year 2013 cases of dengue fever recorded at PHC Tigo Baleh are spread in 8 Kelurahan.
PHC Tigo Baleh supported by the local government made various efforts in overcoming the emergence of cases of dengue fever by doing a variety of counseling about the dangers, prevention and control of mosquito Aedes aegypti through the program of Mosquito Nest. The most important effort, easy and cheap is emphasized to the community is doing the mosquito nest in a physical way that the environment management with 3M plus. Regular larva monitoring activities are also routinely conducted through trained jumantik cadres, as well as selective abuse activities ie abate powder in schools, public places and houses with positive larva [8].

Until now, efforts to eradicate the DHF vector that has been done and It has not shown optimal results so that cases of DHF are still high and increasing every year in the work area of PHC Tigo Baleh. The results of interviews and observations in the community show that they rarely do mutual cooperation to clean up the environment, there are still visible places where used pieces of cans into puddles and become a hotbed of mosquitoes.

The most appropriate way to eradicate Aedes aegypti mosquitoes is to eradicate the mosquito larva in the breeding place. Eradication of mosquito nest DHF can be done with 3M method and abatesasi technique. The 3M program consists of: draining the bathtub once a week, closing the water reservoir both inside and outside the house and bury secondhand items that can accommodate the rain water and allow the water inundated inside [9].

From the results of Sulina [9] research in Medan city 2012 obtained the result that there is a relationship presence of larva Aedes aegypti and implementation of 3M Plus with the incidence of DHF.

2. Methods
Subjects in this study were all people who tested positive for dengue and listed as a patient in PHC Tigo Baleh, in the period January to December 2016 and all those who declared free of dengue residing in PHC Tigo Baleh Bukittinggi and do not live with case as many as 39 peoples are free of dengue. The research method used design of case control and analytic approach, data collection as well at a time when the independent variables and the dependent variable in carefully while at the same time. In this case we have seen that the existence of Aedes aegypti mosquito larvae and implementation of 3M plus as the independent variables and the incidence of DHF as the dependent variable in PHC Tigo Baleh Bukittinggi.

3. Result and Discussion
3.1 Univariate Analysis

![Figure 1. Frequency Distribution of Aedes aegypti Mosquito larva at PHC Tigo Baleh](image)
Based on figure 1 can be seen that the presence of larvae that flicked and suffered dengue is 24 respondents (61.5%), and the presence of larvae that do not flick and suffer from DHF is 15 respondents (38.5%).

![Figure 1. 3M Plus Implementation Frequency Distribution at PHC Tigo Baleh](image)

Based on figure 2 can be seen that the implementation of 3M plus less good and suffering from DHF are 27 respondents (69.2%) and the implementation of 3M plus good and suffering from DHF is 12 respondents (30.8%).

3.2 Bivariate Analysis

Bivariate analysis was conducted to see the relationship between independent variables i.e. the presence of mosquito larvae and 3M implementation plus the dependent variable is as follows:

| The presence of larvae | DHF | | | Odds Ratio (OR) | CI 95% |
|------------------------|-----|-----|-----|----------------|--------|
|                        | Cases | Control | P value | |
| Flicking               | 24 | 61.5 | 10 | 25.6 | 0.003 | 4.640 | 1.766 – 12,189 |
| No Flicking            | 15 | 38.5 | 29 | 74.4 | | |
| Amount                 | 39 | 100 | 39 | 100 | | |

From Table 1 it can be seen that the presence of larvae that flick and suffer dengue is 24 respondents (61.5%), and the presence of larvae that do not flick and suffer from DHF that is 15 respondents (38.5%). Larval larvae and 10 dengue fever (25.6%), and larvae with no larvae and no dengue fever which was 29 respondents (74.4%). From the analysis of the presence relationship of Aedes aegypti mosquito larva with chi-square test obtained p = 0.003 (p <0.05), meaning Ha accepted that there is correlation between existence of larva of Aedes aegypti mosquito with increasing incidence of dengue disease.
Table 2. 3M Plus Implementation Relationship with Increased Dengue Haemorrhagic Fever at PHC Tigo Baleh

| Implementation of 3M Plus | Cases | Control | P value | Odds Ratio (OR) | CI 95% |
|--------------------------|-------|---------|---------|----------------|--------|
| Not Good                 | 27    | 17      | 0.040   | 2.912          | 1.150 – 7.272 |
| Good                     | 12    | 22      |         | 56.4           |        |

From Table 2 it can be seen that 3M plus less good and suffering dengue is 27 respondents (69.2%) and 3M plus good implementation and suffering from DHF that is 12 respondents (30.8%), while implementation of 3M plus less good and not suffering from DHF that is 17 respondents (43.6%), 3M plus good implementation and not suffering from DHF that is 22 respondents (56.4%). From the analysis result of 3M implementation relationship plus with chi-square test obtained p value = 0.040 (p <0.05), meaning Ha accepted that there is relation between 3M implementation plus with increasing incidence of DHF.

Table 3. Density Figure, House Index, and Container Index

| DF  | HI  | CI  |
|-----|-----|-----|
| 1   | 1-3 | 1-2 |
| 2   | 4-7 | 3-5 |
| 3   | 8-17| 6-9 |
| 4   | 18-28| 10-14|
| 5   | 29-37| 15-20|
| 6   | 38-49| 21-37|
| 7   | 50-59| 28-31|
| 8   | 60-76| 32-40|
| 9   | 77+ | 41+ |

Source: WHO

From the results of this research obtained HI value of 43.6% and CI of 17.9% which we compare with the Grouping of Density Figure (DF) obtained from the combination of HI and CI values on a scale of 1-9 with the provisions of DF 1 = low density, DF 2 = medium density and DF 3 = high density as shown in the table above, it can be conclusion that HI is in category DF 6 = high density and CI 5 = medium density. This is supported by the incident rate indicating as shown in the table below.

Table 4. The Number of Incidence Rate of DHF

| PHC Tigo Baleh | Cases of DHF | Death | CFR |
|----------------|--------------|-------|-----|
| 39             | 1            | 3.1%  |     |

At this public health centre had been seen incident rate of 39 with 1 case of death with number CFR 3.1%. this indicates that the incidence rate of DHF in this PHC areas needs further assessment.

Based on the research that has been done can be seen that the respondent cases that flicked 24 (61.5%) while the control respondent who flicked 10 (25.6%). So the value of p value obtained by 0.003 (p <0.05), mean existence of Aedes aegypti mosquito larvae have correlation with increasing incidence of dengue disease and Odds Ratio (OR) = 4.64 mean home that found mosquito larva at risk 4.64 times suffer disease DHF compared to homes that are not found mosquito larvae. Based on the observations it can be concluded that Bukittinggi is predicted to be not a dengue endemic area because geographically the altitude is more than 900 m above sea level, where at a height the Aedes aegypti mosquito cannot breed. However, in reality the District of ABTB environment field is still found larva
existence therefore District of ABTB is not classified as Free Number of larvae so that the positive house of larva becomes the driving factor of increasing the incidence of DHF in Bukittinggi.

This shows that there are still people in the District of ABTB who have not taken action in the form of prevention of DHF, which is to prevent dengue fever, its transmitting mosquito must be eradicated, because the vaccine to prevent it does not yet exist. The right way to eradicate Aedes aegypti mosquitoes is to eradicate larva in breeding grounds [1].

Based on the research that has been done by Sulina [9] in line with the results of research by researchers using Exact Fisher test obtained p value of 0.002 (p value <0.005) which means that the presence of larvae has a significant relationship with the occurrence of dengue disease in Environment XVIII Kelurahan Binjai.

According to the researcher's assumption that the relation of presence of Aedes aegypti mosquito larvae with increasing incidence of DHF, due to dengue fever vector mosquito disease, and more and more is found existence of mosquito larva have big chance for dengue disease in environment District of ABTB.

Based on the research that has been done with the result shows the respondents of the less good case of 3M Plus implementation is 27 (69,2%), while the control respondent is not good implementation of 3M Plus equal to 17 (43,6%) so that p value of 0.04 (p <0.05), it means that 3M Plus implementation is related to increasing incidence of DHF and Odds Ratio (OR) = 2.912 means that people who have poor implementation 3M Plus will be at risk 2.912 times suffering from DHF compared to people who are good implementation of 3M Plus.

To prevent dengue disease the right way to combat Aedes aegypti mosquitoes are: 1) with Insecticide, 2) without insecticide is the most important way in vector control is environmental management with a view to prevent or reduce the development of vector and human contact, vector, pathogen. Eradication of larva of Aedes aegypti known as chemistry, biology and physical / 3M Plus Movement, each family must carry out regular at least once [1].

The results of this study are in line with the results of research that has been done by Sulina [9] which states there is a relationship of 3M Plus implementation with the incidence of dengue disease in XVIII Neighbourhood Kelurahan Binjai, which the analysis results using Exact Fisher test obtained p value of 0.047 (p value <0.005).

According to the researcher, most of 3M plus implementation included in good category, but still there are 27 respondents which still in less good category. This could have an impact on the increasing number of water reservoirs that could potentially become a breeding ground so as to increase the occurrence of dengue cases. The implementation of 3M Plus is still less good indicates that there is still a lack of public awareness of the importance.

Maintain cleanliness of the house and the surrounding environment to prevent the occurrence of DHF. Therefore, it is necessary to increase the motivation to make the community more effective in implementing 3M Plus through providing mutual assistance to clean up the environment given by local government officials, such as the Head of RT and the extension of the local PHC. In addition to increased motivation, coaching also needs to be done on community groups, such as youth, adolescent and youth mosques in order to increase preventive measures in the form of regular implementation of 3M Plus.

4. Conclusion
Based on the results of research conducted at PHC Tigo Baleh against 39 respondents’ cases and 39 respondents’ control so that amounted to 78 respondents, it can be concluded:

1. The presence of mosquito larva is more common in cases compared to control PHC Tigo Baleh.
2. Implementation of 3M Plus is less good in cases than controls at PHC Tigo Baleh.
3. The incidence of DHF in cases comparable to controls at PHC Tigo Baleh.
4. There is a relationship presence of Aedes aegypti mosquito larva with the incidence of dengue disease at PHC Tigo Baleh.
5. There is a relationship of 3M Plus implementation with the incidence of dengue disease at PHC Tigo Baleh.

After doing this research, it is suggested that the community should do more efforts to prevent the occurrence of DHF through mosquito nets eradication, such as the implementation of 3M Plus and to carry out environmental sanitation efforts such as cleaning home ban and doing environmental sanitation Around regularly, and pay attention to any place that has the potential to become a breeding ground for Aedes aegypti mosquitoes. This research can be used as consideration to add curriculum in the promotion of health. PHC are expected to conduct more intensive and continuous extension activities and conduct health promotion on dengue fever both individually and in groups when the community visits the PHC as an effort to increase the behaviour and increase periodic larva monitoring activity for once a week.

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