

Healthy family index assessment through community-based health information system approach

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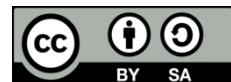
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ABSTRACT

The healthy Indonesia program with a family approach (*PIS-PK*) has not been implemented optimally. There are several obstacles and challenges in this program's implementation, e.g., human resources. A community-based health information system (CBHIS) is a strategic approach to obtain data and information at the population level by directly involving cadres and the community. A project with the CBHIS approach was implemented in Kasemen Village, Serang, Banten Province, Indonesia to support the *PIS-PK* program. The study aimed to determine the population's health status according to the healthy family index through the CBHIS approach. The data of healthy family indicators in the village were collected by cadres using a mHealth application. Overall, 1316 households consisting of 5312 residents were registered. The analysis results of the healthy family index showed that most families in the Kasemen subdistrict were pre-healthy (64.2%), almost one third were unhealthy (27.8%) and only a small proportion were healthy (8%). Assessing the healthy family index through the CBHIS approach can support decision-making at the community level, thereby determining the magnitude of family health problems and providing appropriate interventions to improve community health status. Well-trained cadres equipped with better electronic data collection tools may be an alternative to community-based data collection.

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1. INTRODUCTION

Implementation of the healthy Indonesia program with a family approach (*PIS-PK*) is one of the Indonesian Ministry of Health's priority efforts to improve the people's quality of life. The Healthy Indonesia Program aims to improve the degree of public health through health and community empowerment efforts supported by financial protection and equal distribution of health services [1]. This program was implemented with a family approach strategy through the assistance of public health center as the first-level health service provider. Through the primary health center, the Ministry of Health applies a family health approach to integrate individual health efforts and community health efforts to ensure public health programs' sustainability, especially on the preventive level [2].

A healthy family is determined by calculating an index based on 12 indicators. The healthy family index (*IKS*) is divided into the following three categories: healthy family ($IKS > 0.8$), pre-healthy family ($IKS, 0.5-0.8$), and unhealthy family ($IKS < 0.5$). Indonesia's national healthy family index is 0.16, indicating that Indonesian families are generally unhealthy [3], [4]. The healthy family index is calculated manually, starting from the subdistrict level to the village level. This index must be calculated in several stages to obtain the regional level.

However, *PIS-PK* implementation still has several obstacles, including Internet network problems, especially in remote areas. Limited internet access, long data calculations, and inadequate training, and limited health worker in public health center become challenges to ensure this program appropriately run [5], [6]. In addition, supporting resources such as human resources, facilities, and funding are still inadequate [3], [7]-[9]. Therefore, obtaining the results of *PIS-PK* indicator calculation takes a long time [2].

One of the strategies developed to obtain health indicators in a population structure that is in line with *PIS-PK* is applying a community-based health information system (CBHIS). CBHIS is a health information system that involves collaboration between community members and health workers to determine health indicators in a population. CBHIS is a reasonably dynamic system that includes collecting data, managing, and analyzing health data as the basis for priority health service programs that will be given to the community [10]. CBHIS has three significant functions as follows: i) case management, which includes recording individual needs to support treatment planning, being able to provide two-way information and tracking patients for follow-up, ii) accountability, which includes reporting of inputs and outputs, iii) planning, which comprises resource allocation and advocacy and is used to assess population-level needs (results) [11].

Kasemen is one of the priority sub-districts for development in the city of Serang. Apart from being an area with the potential for developing coastal areas, Kasemen District is also a tourist area known as Old Banten. However, the development of the Kasemen area still needs attention, especially the health aspect. A case study on 76 children in Kasemen District showed that poor sanitation and lack of hygiene behavior were related to the incidence of worm infection in children. This results showed that there are still 65% of children who practice open defecation, 70% of children who do not have access to healthy latrines, 83% of children do not wash their hands with soap before eating and 54% do not wash their hands with soap after defecating [12]. Besides, Kasemen District still has a ratio of doctors to a population far from the WHO standard, around 1: 32,279, while the ideal set standard is 1: 2,500 population [13]. The low ratio of health personnel to the population also results in the low coverage of public health efforts, especially in conducting direct monitoring of their work areas, one of which is *PIS-PK*. Therefore, a community-based approach by empowering cadres could potentially increase the coverage of this program. At the end of 2019, the CBHIS approach started to be implemented in Kasemen District, Serang City, Banten. Collaboration between health cadres in the community and health workers in healthcare facilities has produced reasonable health indicators. Apart from recording demographic data, this system also monitors health data, particularly the *PIS-PK* indicators. Knowing the index of healthy families in the community is useful. This study aimed to determine the population's health status and family status based on a healthy family index using the CBHIS approach.

2. RESEARCH METHOD

This research was quantitative study that sought to determine the index of healthy families in a community. This research was conducted from November to December of 2019 in Kasemen District, Serang City, Indonesia. The subjects were selected using nonprobability random sampling. Approximately 1,316 households consisting of 5,312 residents in total were registered through data collection. We included all households that had pregnant women and children under two years old and then recorded them in the CBHIS in Kasemen District.

Using a mHealth application during CBHIS implementation, cadres collected data from all communities in Kasemen Village. Previously, cadres were trained both in the *PIS-PK* program's substance and the implementation of the CBHIS approach. The mHealth application used the *Opendatakit* (ODK) platform. Cadres collected data from the household analysis unit to the individual level. The research instrument used included 12 *PIS-PK* indicators developed by the Indonesian Ministry of Health.

Data were analyzed by univariate analysis to determine the frequency distribution of these 12 healthy family indicators in the community. The family status was determined according to each indicator's recapitulation, which was adjusted to the relevance of the indicators attached to individual characteristics. Each family was given a value of one if the condition of a family member is in accordance with the indicator. However, if the condition was not suitable, the family was given a value of 0, and if the indicator was irrelevant to the family condition, the status was not calculated (N). The healthy family index (*IKS*) was calculated according to the number of indicators with a value of 1 divided by the number of indicators in the family ($12-\Sigma N$). The formula for determining *IKS* is:

$$IKS = \frac{\text{Number of healthy family indicators with a value of 1}}{12 - \text{Number of indicators that are irrelevant or not counted in the family (N)}}$$

The results of this *IKS* calculation can then determine the health status of each family by referring to the following provisions:

- *IKS* score >0.800 indicates a healthy family
- *IKS* score 0.500–0.800 indicates a pre-healthy family
- *IKS* score <0.500 indicates an unhealthy family

There are 12 indicators used while calculating the family health index: family participates in the family planning program, mother gave birth in a health facility, infants receive complete basic immunization, children undergo growth monitoring, infants receive exclusive breastfeeding, family members with pulmonary tuberculosis receive standard treatment, family members with hypertension take medication regularly, family members with mental disorders receive treatment and are not neglected, no family members smoke, are a member of the National Health Insurance, the family has access to clean water, and has access to or use healthy latrines

3. RESULTS

3.1. Respondent characteristics

The *PIS-PK* data collection through the CBHIS approach from November to December of 2019 included approximately 1,316 households consisting of 5,312 residents in total. This study covered all age groups with a slightly higher proportion of males (50.3%) than females (49.6%). Among the residents 1,142 (21.5%) were children under two years old, and 201 were pregnant women (3.8%) see in Table 1. More than half of the population had only successfully completed primary education through completing elementary school (35.3%) and junior high school (19.2%). Most of the population over 10 years of age was unemployed (45.6%) and a quarter of them worked as laborers (24.2%) as shown in Table 1.

Table 1. Respondents' age, target, and gender

No.	Characteristics of respondents	Percent
1	Age group (years)	
	0–5	24.8
	6–11	15.5
	12–25	19.1
	25–45	37.7
	46–55	2.1
	56–65	0.5
	+65	0.4
2	Gender	
	Male	50.3
	Female	49.7
3	Education	
	No school	3.1
	Still in elementary school	17.3
	Not completed primary school	5.2
	Graduated from elementary school	35.3
	Completed junior high school/equivalent	19.4
	Graduated from high school/equivalent	17.5
	Graduated from college	2.2
4	Occupation	
	Not working	45.6
	School	10.6
	Civil servants/Servants	0.7
	Entrepreneur/Service	8.2
	Farmer	0.1
	Fisherman	6.1
	Labor	24.2
	Others	4.5

3.2. Frequency distribution of healthy family indicators

Table 2 shows the frequency distribution of each *PIS-PK* indicator. The mental health indicator was irrelevant or obtained an “NA” value because no household had family members with mental illnesses. Two of the indicators showed reasonably high coverage. Families followed the family planning program if the

couples were childbearing age; either the husband or wife or both used contraceptives. A total of 1,108 families had couples of childbearing ages. The indicator regarding families participating in the family planning program showed a reasonably high coverage (81.6%). The coverage of mothers who gave birth in health facilities was also high (84.6%); this indicator applied if a mother had an infant aged 0-12 months and the infant was delivered at a health care facility.

Table 2. Coverage of healthy family indicators

No	Healthy family indicators (n)	n	Coverage (%)
1	The family participates in the family planning program (1,108)	905	81.6
2	The mother gave birth in a health facility (436)	369	84.6
3	Infants receive complete basic immunization (399)	193	48.4
4	Infants receive exclusive breastfeeding (786)	342	43.5
5	Patients Family members with tuberculosis receive standard treatment (14)	10	71.4
6	Family members with hypertension take medication regularly (39)	11	28.2
7	People Family members with mental disorders receive treatment and are not neglected (0)	N/A	N/A
8	No family members smoke (1,316)	268	20
9	The family is already a member of the National Health Insurance (1,316)	325	24.7
10	Families have access to clean water (1,316)	1,198	91.2
11	Families have access to or use healthy latrines (1,316)	991	72.8

The health status of children under five years old can be assessed according to the indicators regarding infants who received complete basic immunization and exclusive breastfeeding. The indicator regarding the acquisition of complete basic immunization applied if a family had infants aged 12-23 months; this indicator still had low coverage. Among the 399 families who had infants aged 12-23 months, only 193 (48.4%) had infants with complete basic immunization. Meanwhile, the coverage of infants who received exclusive breastfeeding was also relatively low (43.5%). The indicator “Infants receive exclusive breastfeeding” applied if the family had an infant aged 7-23 months and the infant was only breastfed at the age of 0-6 months.

The healthy family index was also determined through by using indicators related to the standard treatment tuberculosis and hypertension. Indicators of patients with tuberculosis receiving standard treatment applied if the family members aged 15 years and over had a cough with phlegm for more than two weeks accompanied with other symptoms of tuberculosis or have been diagnosed with tuberculosis. This indicator had relatively good coverage, and 71.4% of these patients underwent regular treatment. However, the coverage of hypertension cases receiving the standard treatment remained low (28.2%). To conclude, three-quarters of people with hypertension did not receive regular medication.

The indicator “No family members smoke” applied if no one in the family smoked frequently or occasionally. This indicator had extremely low coverage (20%), or four out of five families had members who smoked. Furthermore, families that have become national health insurance (*JKN*) members had a coverage of only approximately 325 (24.7%). This *JKN* indicator applied if all family members had a social security card or other health insurance. Thus, only one out of four families had all members registered in *JKN*.

Moreover, family health status could be assessed by environmental health indicators about families that had access to clean water and healthy latrines. Families had access to healthy water facilities if the family had access to and used clean water (PDAM, dug wells, and protected springs) for their daily needs. Almost all families (91.1%) used clean water for their daily needs. Families had access to or used healthy latrines if they had access indeed and used gooseneck or *plengsengan* toilets. Roughly 991 (75.3%) families had access to or use healthy restrooms.

3.3. Healthy family index

The healthy family index was determined by assessing the indicators that are relevant to the family. The analysis results of the healthy family index showed that most of the families in the Kasemen subdistrict were pre-healthy (64.2%), and only a few were healthy (8%) as shown in Table 3. These results can explain the health status of a family and predict health problems in the community.

Table 3. Healthy family index

No	Healthy families index (<i>IKS</i>)	Coverage (%)
1	Healthy Family (>0.80)	8
2	Pre-healthy Family (0.50–0.80)	64.2
3	Unhealthy Family (0.50)	27.8

4. DISCUSSION

The health program manager could use the healthy family index to identify health problems' magnitude through the health programs' prevalence and coverage to determine the required health interventions. According to the assessment results, only 8% families in the Kasemen District were classified as healthy families. A regression analysis on 12 healthy family indicators showed that five indicators, including access to clean water, access to sanitation, *JKN* ownership, family planning programs, and delivery in health facilities, could be prioritized to provide leverage on the family health index [14]. In the present study, almost all of the leveraging indicators had fairly high coverage, ranging from 70% to 90%, except for *JKN* ownership, which only reached 20% of families in the Kasemen District.

The low coverage of *JKN* ownership could be affected by several factors related to public awareness and the *JKN* program's implementation. Several studies reported that the obstacles that occur in the national health insurance program include the unpreparedness of health service facilities and poor socialization [15], [16]. In addition, the increased budget caused by the increase in monthly premium contributions had made many citizens drop out of class and unable to pay monthly premium contributions. Low public awareness had also made them reluctant to join the program and feel that they do not need to pay their dues [17]. The culture that occurs is that new registration will be conducted if a family is stricken with a disease to receive free treatment [18].

One of the indicators assessed to show that a low coverage rate can contribute to family health status is the low coverage of complete basic immunization. In a similar study, the average indicator of healthy families was identified by grouping the provinces in Indonesia into four clusters; in all clusters, the complete basic immunization remained far below the national target [19]. Determinants of complete basic immunization remained low in Indonesia influenced by the history of mother's antenatal visit, mother's education, parity status, having no insurance, and the presence of a professional birth attendant [20]-[22]. Therefore, this healthy family indicator requires attention to provide intervention.

Furthermore, the indicator with relatively low coverage was exclusive breastfeeding. WHO recommends providing exclusive breastfeeding to an infant aged 0-6 months. Infants who did not undergo exclusive breastfeeding are at risk for poor nutrition during their growth and development. Factors that affect exclusive breastfeeding in infants are mostly low knowledge, attitudes, and motivation [23]-[25]. Adequate knowledge of mothers regarding exclusive breastfeeding is 10.3 times greater for exclusive breastfeeding than those who had insufficient knowledge [26].

Only 1 in 3 families had family members with hypertension who struggled with regular treatment. A study conducted in Central Jakarta found that medication adherence is related to several factors [27]. Several studies found that socioeconomic status, educational level, knowledge, and motivation influenced one's commitment to undergo treatment for hypertension [25], [27], [28]. The multivariate analysis results showed the most influential variables. The level of knowledge was the most significant factor affecting treatment adherence. High knowledge has a 7.32 times greater chance of treatment adherence. Good economic status was 5.59 times more likely to undergo treatment. The higher the educational level, the easier it is to absorb information. The education level has the potential to be 3.7 times greater in adherence to hypertension treatment [27].

Moreover, the coverage of families with no members who smoked was extremely low. The 2019 Global Youth Tobacco Survey data showed that two out of three boys and nearly one in five girls had used tobacco products. Among these students, 57.8% were exposed to cigarette smoke at home, and 60.6% were not even prevented from buying cigarettes because of their age [29]. Therefore, this indicator also needs attention to strategic interventions to reduce smoking behavior. Increased awareness of health risks, reasonable social control, and mass media campaigns is significantly related to smoking behavior reduction [30]-[32].

The high number of families with a pre-healthy index indicates that there are still strategic family health indicators that need attention, both from the government, in this case, the person in charge of regional health, and from the family. Some indicators that have low coverage are infants receiving complete basic immunization, Infants receiving exclusive breastfeeding, family members with hypertension taking the medication regularly, no family members smoke, the family is already a member of the National Health Insurance and there are still around 27.2% of families have no access to or use healthy latrines. Therefore, the *PIS-PK* Program is important to do, because it can describe the public health situation to support strategic health intervention policies. However, its implementation is constrained by insufficient resources, so it is necessary to strengthen the *PIS-PK* program with the CBHIS approach to assist implementation in the community through empowering trained cadres.

Strengthening health promotion, either directly or indirectly, such as through print or electronic media, is considered important enough to be improved. Increasing the knowledge and ability of cadres to approach families in their environment is a strategic enough to be developed. Based on the results of this

research, the person in charge of regional health, in this case, the public health center, must strengthen and empower cadres as local potentials who can support national programs, namely strengthening family health.

4.1. Limitation

This study presents an initial series of implementing the concept of CBHIS. In its design, CBHIS implementation begins with building a local population database. There are 1,316 households registered in the early implementation stages of this system, which has not covered the entire population yet. This initial project focused on families that had pregnant women and children aged below two years. However, aside from the limited coverage of the total population, one *PIS-PK* indicator was not included in the calculation, i.e., children undergo growth monitoring; hence, this indicator required a measurement result. Only 11 indicators were assessed in a composite manner. Furthermore, the disease information generated in this instrument was purely from household admissions; thus, the data did not present clinical diagnoses. Nevertheless, it was used as a proxy to determine the health status of an individual or family. Thus, the indicator of a healthy family becomes a parameter for the public health center to confirm further.

5. CONCLUSION

The healthy family index was assessed using the coverage of good indicators relating to access to health services and community behavior to environmental sanitation. The low coverage of healthy families in Kasemen District is indicated by the low coverage of several indicators of healthy families in the community. Several health indicators that need attention are complete basic immunization, exclusive breastfeeding, family members with hypertension who were undergoing regular medication, smoking behavior, and *JKN* ownership. Assessing the healthy family index through the CBHIS approach could support decision-making at the community level to determine the magnitude of family health problems and thereby providing appropriate interventions that could improve community health status.

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