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Elimination of Open Defecation Through Community-Based Action Research Study In North Sumatra

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Abstract

Open defecation still remains a global problem in developing countries. WHO has a target to eliminate the incidence of diarrhea by 2025. The prevalence of diarrhea in Indonesia in 2020 was 9.8%, cases in Kutalimbaru village were 18.39%. Environmental sanitation, including the presence of latrines, is a significant factor contributing to diarrhea. Open defecation because latrines are not available causes river water that is used as a source of drinking water to be polluted. The aim of this research was to assess health problems related to diarrhea experienced by the community. To obtain prevalence/ proposed open defecation and diarrhea, among communities in Kutalimbaru North Sumatera. This type of research was a mixed method through data collection of 406 heads of families out of 907 heads of families as a population using simple random numbers. Data collection was carried out using a questionnaire containing socio-economic conditions, basic sanitation including waste water disposal, waste, ownership and the condition of latrines, clean water and drinking water. The results of data recapitulation found 4 existing problems. Determining the priority of the problem using the CARL method and deciding on the problem of latrine availability as a priority. Community engagement was carried out through education regarding the environmental problems they face, as well as building latrines in a mutual cooperation manner using a latrine social gathering system requiring Rp. 5,261,000 to build a healthy toilet. The implementation of community engagement is beneficial for the community to have healthy latrines and reduce the incidence of diarrhea.

Keywords: Community Engagement, Diarrhea, Latrine, Open Defecation.

Introduction

The problem of open defecation is a global problem in the world. The WHO has announced the elimination of open defecation by 2025 (1). This problem has also been included in the Sustainable Development Goals (SDG's), target 6.2 which aims to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation by 2030 (2). The world community, including Indonesia, has also implemented it. Community Lead Total Sanitation (CLTS) is a trigger for the community to change sanitation behavior to end open defecation (3,4). Indonesia has been running the CLTS program since 2014 with 5 pillars and the first pillar is to stop open defecation (5). Open defecation can pollute clean water, especially rivers which are used as a source of clean water for the community. Diarrhea is a digestive tract infection that is a health problem in the world, including Indonesia, and is an environmental-based disease. Around 2 billion cases of diarrhea and 1.9 million children under five die from diarrhea worldwide every year (6). It is estimated that 62% of deaths due to diarrhea and 16% of cases of malnutrition in children under 5 years of age are caused by exposure to feces resulting from poor drinking water, sanitation and hygiene practices (7). 78% of deaths due to diarrhea occur in developing countries, especially in Africa and Southeast Asia. Basic Health Research in 2018 stated that the prevalence of diarrhea for all age groups was 8% and the prevalence rate for toddlers was 12.3%, while for babies, the prevalence of diarrhea was 10.6% (8). The results of the 2020 Indonesian Nutritional Status Survey show that the prevalence of diarrhea was 9.8%. Infectious diseases, especially diarrhea, contributed to deaths in the group of children aged 29 days-11 months, according to 14.5% (6). Diarrhea cases are number 1 of the 10 biggest diseases at the Kutalimbaru Health Center. The prevalence of diarrhea cases in 2021 was 2.7% (9). Implementation of the first pillar of CLTS

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(Community Lead Total Sanitation), namely the percentage of villages with Stop Open Defecation reached 57.01% of the national target (60%) in 2022, while Kutalimbaru District only reached 21.43% of the national target (5,9). These achievements explain that diarrhea is still a problem in Deli Serdang Regency, especially Kutalimbaru District.The government has implemented a Community Lead Total Sanitation (CLTS) program which aims to change hygienic and sanitary behavior through community empowerment. CLTS has 5 pillars, namely stopping open defecation, washing hands with soap, processing drinking water and food properly, processing household waste and managing household liquid waste so that it does not pollute the environment (10). The implementation of the CLTS program, especially the first pillar, Stop Open Defecation, has been implemented since 2014 through education and the construction of public latrines, but the problem of open defecation has not been resolved in Indonesia. Healthy latrine coverage is still 65% in Kutalimbaru, while the national standard is 100% (6). Kutalimbaru is crossed by the Belawan River watershed, people still use the watershed as a source of clean water and defecate in the river. The success of the CLTS program through the Community Engagement approach, is a collaborative process to address community health, using knowledge from across disciplines, based on consent and active participation from the community by considering social capital, processes or the environment (11). Community involvement is related to good ethical practices, community building trust and social relationships (12). The Community Engagement model will be applied in this research. The research aims to diagnose actions regarding health problems related to efforts to eradicate open defecation in Kutalimbaru.

Methodology

Subject

This research began with a survey to analyze environmental problems in Kutalimbaru, followed by qualitative research to overcome the problems that will be intervened together with the community. The population in this research was the people who live in Kutalimbaru sub-district, (3,637 people and 907 families) this village is a description of a singular community in North Sumatra. The community is the Batak Karo tribe which has the same characteristics. The sampling technique used was cluster sampling from 5 hamlets located along the river and densely populated, then selected based on proportional sampling The sample size was determined using the Lemeshow formula with a type I error of 0.05, d = 0.05, p = 0.413, and given that sample size was estimated at 406 families, represented by housewives (13). Data were collected using a questionnaire containing questions about socio-economics, basic sanitation including the condition of waste water drainage channels, rubbish, latrine ownership and latrine conditions, clean water and drinking water. Measures for fulfilling health requirements for healthy homes were in accordance with Minister of Health Regulation number 2 of 2023 concerning Implementing Regulations of Government Regulation number 66 of 2014 concerning Environmental Health. Next, the primary data is used as part of the initial stage of problem identification.Data integration is used in this research in the form of quantitative data and qualitative data. Quantitative data in the form of socioeconomic, and basic sanitation community in Kutalimbaru village which is used to determine the description of socioeconomic and sanitation facilities owned by the community, this data is the basis for knowing the problems in the community. Qualitative data collected through interviews with the results of knowing the perceptions, attitudes, beliefs of the community related to sanitation, as well as obstacles in the construction of latrines, in addition to FGDs aimed at building an atmosphere in the community, analyzing causal indicators, diagnosing actions with the results of latrine construction design. The step taken to overcome bias is to validate the research by triangulation method. Triangulation includes sources, methods and data (14,15). The method used is through the stages of atmosphere building, socialization, community empowerment and community organizing

Procedures

The research stages in action research consist of a cycle of diagnosis (problem), action planning, action implementation, and action evaluation (16). The type of action research study carried out was Traditional Action Research, where problem solving is collaborative between the researcher and those being studied. The detailed research

stages were as follows:

The basic sanitation problem diagnosis cycle involves collecting data through questionnaires related to basic sanitation compliance data, then the data results were analyzed to select problems that are urgent and based on community needs. Next, interviews were conducted with village heads, health officers and the community to follow up on problems found regarding basic sanitation conditions at the research location. Action planning. Activities include Focus Group Discussions on the results of selected problem findings through data collection and interviews with related parties. Determining problem priorities with method CARL (Capability, Accessibility, Readiness, and Leverage). Capabilities is the availability of resources (funds, facilities and equipment) in this research is the willingness of funds and labor to build shared latrines. Accessibility is convenience, existing problems are easy to overcome or not. The convenience of this research is the existence of regulations for mutual cooperation activities and funding and maintenance regulations if the latrine building can be used. Readiness is the readiness of human resources, motivation, competence, and community readiness. Leverage is how much influence one criterion has on another in the discussed solution. This method emphasizes the capability or ability of program implementers to overcome obstacles and limitations in solving problems (17).

The steps for determining problem priorities using the CARL method are as follows:

- Provide a list of problems obtained from situation analysis activities.
- Determine the score for each criterion, for example agreed 1 - 10. (scoring based on mutual agreement). Discussion participants provide scores or grades for each problem based on CARL criteria. Next, to get the priority value, you need to multiply the value of each criterion (CxAxRxL). The higher the multiplication value, the more priority the problem is for solving. Discussion participants were community leaders, health workers, village heads and local communities. The results of the discussion on determining problem priorities result in the problem being selected as a priority and the form of handling the problem as well as the implementation schedule, materials and tools and the parties carrying out the implementation, each person's duties as implementer of the activity are determined.
- Implementation of actions. Based on action planning, interventions were carried out in the form of activities that are solutions to problems that were addressed jointly between the researchers and the community as research objects in accordance with the agreed schedule and division of tasks.
- Action evaluation was carried out to assess whether the intervention carried out in the community is right on target and can overcome the problem or not.

Results

Table 1 shows the results which include socio-economic data and the results of the implementation of the Action research study phase. The number of people who are respondents in this study is 406 families. the data taken includes work, income, and number of family members. The following are the results of the socio-economic data of the Kutalimbaru community

Table 1: Socioeconomic Distribution of the Community in Kutalimbaru Village

Characteristics	n = 406	%
Work		
Farmer	258	63.5
Self-employed	49	12.1
Building construction workers	23	5.7
Driver	20	4.9
Other	56	2.5
Income		
Below the Deliserdang Regency Minimum Wage (<Rp. 3,400,015)	371	91.4
Above the Deli Serdang Regency Minimum Wage (≥Rp.	35	8.6

Characteristics	n = 406	%
3,400,015)		
Distribution of Number of Family Members		
1-2 people	129	31.7
3-4 people	182	44.8
>4 people	95	23.3

Based on Table 1, it can be seen that the majority of people in Kutalimbaru village were farmers (63.5%), with the majority of people's income being below the Deli Serdang minimum wage (91.4%), based on the distribution of the number of family members. The number of family members was mostly 3-4 people totaling 182 people (44, 8%).

Basic sanitary conditions

Table 2 explain the results of basic sanitation including waste water drainage channel conditions, waste, latrine conditions, clean water and drinking water, and waste water drainage channel in kutalimbaru.

Table 2: Distribution of Community Basic Sanitation Conditions in Kutalimbaru Village

Basic Sanitary Conditions	Yes	No
Rubbish	406	0
Trash Requirements		
Closed trash can	21 (5.2%)	385 (94.8%)
Watertight trash can	28 (6.9%)	378(93.1%)
Frequency of cleaning rubbish 1 x a day	393(96.8%)	13 (3.2%)
Garbage is burned	380 (93.6%)	26 (6.4%)
Waste is composted	18 (4.4%)	388 (95.6%)
Toilet		
Toilet ownership	362 (89.2)	44 (10.8%)
The distance between the well and the septic tank is more than 10 m	322 (79.3%)	84 (20.7%)
There is running water available in the toilet	333 (82%)	73 (18%)
Availability of cleaning tools	311 (76.6%)	95 (23.4%)
Availability of soap in latrines	326(80.2%)	80 (19.8%)
Latrine ventilation meets requirements	272 (67%)	134 (33%)
Latrines do not smell	356 (87.7%)	50 (12.3%)
The toilet is protected from vectors	320(78.8%)	86 (21.2%)
Clean water and drinking water		
Availability of clean water	386 (95.1%)	20 (4.9%)
Clean water quality meets the requirements of quality, quantity, continuity and affordability)	315 (77.6%)	71 (17.5%)
Source of drinking water from gallons	362 (86.7%)	44 (10.8%)
Drinking water from clean water sources is boiled	44 (10.8%)	362 (86.7%)
SPAL (Waste water drainage channel)		
Ownership of Waste Water Disposal Facilities	291 (71.7%)	115 (28.3%)
Waste water drainage channel is flooded	272 (67.0%)	134 (33.0%)
Routinely clean waste water drainage channel	164 (40.4%)	242 (59.6%)

Basic sanitation conditions from the results of observations and questionnaires found that not all houses had basic sanitation facilities that met the requirements, even though they did, they did not meet the requirements. All households had rubbish bins, but only 21 (5.2%) had closed rubbish bins, and 28 (6.9%) were watertight, the frequency of throwing rubbish was routine every day. Final waste management were burning 380 (93.6%) and only 18 (4.4%) was processed into compost for organic waste. The availability of clean water sources in households was 386 (95.1%), and

the remainder take water from rivers. The results of the analysis regarding the quality, quantity, continuity and affordability of clean water for 71 households have not been met. People use drinking water from gallons was 362, if from other sources the water was boiled first before consumption. Based on the houses that have sewerage channel, it was found from observations that 272 (67.0%) were in a flooded condition. The number of people who routinely clean sewerage channel was 40.4% (164 heads of families). Based on latrine ownership, 44 (10.8%) did not have a latrine, so people still practice open defecation into the river.

Action Diagnosis

The results of data collection from the basic sanitation aspect found 4 (four) problems, namely rubbish, latrines, clean water and domestic wastewater drainage. Based on these problems, problem prioritization was carried out using the CARL method shown in Table 3.

Table 3: Calculation Results for Determining Problem Priority

Problem	C	A	R	L	Total	Rank
Basic sanitation						
Latrines (open defecation)	9	8	8	7	4096	I
Waste management (burned)	8	7	7	7	2744	IV
Clean water and drinking water	8	7	7	8	3136	III
Domestic waste water drain	8	8	8	7	3584	II

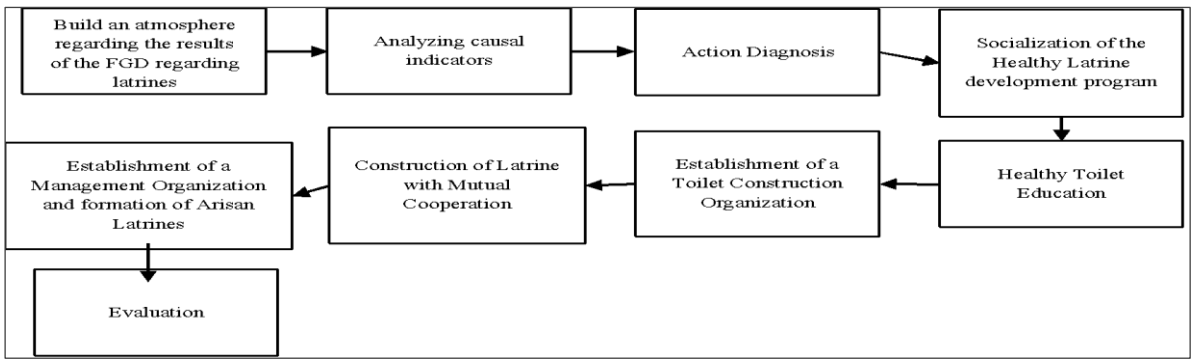

Figure 1: Action Planning

Based on CARL's analysis in Table 3, the priority problem that will be addressed was the condition of the existence of latrines with open defecation behavior in the river. The results of this priority problem were then discussed to plan action.

Action Planning

Actions were decided into program implementation Community engagement with the following process:Meeting with community leaders, health officials and regional heads to discuss the stages of solutions to overcome the latrine problem. The following were the steps for implementing actions to overcome the problem of open defecation (Figure 1). The initial stages of carrying out Focus Group Discussion (FGD) were followed by building an atmosphere in the target community, analyzing causal indicators, then carrying out action diagnosis, planning build a latrine. Latrines were built with environmentally sound principles, namely a building process that considers environmental and sustainable aspects (18). The action diagnosis stages were divided into 4 forms of activity, namely:

Healthy Toilet Education

Education was carried out to the community with the aim of providing knowledge to the community about the causes, impacts of diarrhea, and preventive steps that can be taken by building latrines so that clean water sources are protected from contamination.

Socialization of Healthy Latrine Model Designs

At the socialization stage of the healthy latrine design, a socialization event was held regarding the introduction of healthy latrines that would be built and the construction of healthy latrines was aimed at reducing the prevalence of diarrheal diseases in the area. At this stage, the requirements for healthy latrines were explained and how to maintain the cleanliness of healthy latrines in the area.

Forming an Organization to Build Healthy Latrines to Prevent Diarrhea

The formation of the Healthy Toilet Prevent Diarrhea development organization aimed to increase public access and awareness of better sanitation, particularly through the construction of hygienic and environmentally friendly latrines. This program integrates various aspects including technical, social, economic and participatory to achieve sustainable results in improving sanitation in the community.

Construction of Healthy Latrines Through Mutual Cooperation

The construction of latrines was carried out in mutual cooperation and the community actively participates in improving the health of their environment. The Kutalimbaru village community voluntarily donated land for the construction of a latrine, then worked together to clean the latrine location, and also donated the sand needed for the construction of the latrine.

Forming a Latrine Management Organization (Healthy Latrine Gathering)

The establishment of the Healthy Latrines Gathering was an innovative step in maintaining the sustainability of community service programs related to sanitation. Healthy latrine gathering is a method that combines community participation and shared economic principles, with the aim of ensuring that the sanitation facilities that have been built are well maintained, managed and maintained by the community (19). The size of the latrine gathering was determined by the costs required to build the latrine model.

Evaluation

At the evaluation stage, an analysis was carried out on whether the construction of healthy latrines has an impact on the surrounding community and looks at the advantages and disadvantages of this activity so that it can be improved in the future. The results of the evaluation found that the community had used the toilets and the community made a picket schedule to clean the toilets regularly. The toilets built meet the toilet requirements.

Discussion

The results of observations of basic sanitation facilities showed that not all houses had basic sanitation facilities, namely clean water facilities (4.9%), latrines (10.8%) and waste water drainage (28.3%). Communities that already had basic sanitation facilities also did not meet the requirements such as latrines.The results of determining problem priorities based on the CARL method showed that the problem to be addressed was alleviating open defecation by building healthy latrines. The results of observations in communities that have latrines with healthy latrine requirements that have not been met including: the distance between the well and the septic tank does not exceed 10 m, making it possible for contamination to occur from the septic tank flow to the community well as a source of clean water. Another thing that may trigger diarrhea was a number of families use refilled water as a source of drinking water and did not process it before consumption. There were still people who defecate into rivers (10.8%) which can reduce environmental quality. River water quality can decrease due to open defecation practices and household waste being thrown into rivers (20,21). The selection of problems related to latrine facilities was related to the increase in diarrhea cases because people still defecate in the open in the river basin. Another thing that aggravates this problem was that people already have latrines but did not meet the requirements for healthy latrines based on Minister of Health Regulation No. 3 of 2014 concerning Community-Based Total Sanitation, which consists of a latrine building consisting of walls and a roof that can protect the user. The middle building is equipped with a latrine. goose neck, and has a channel to the wastewater disposal system. A healthy latrine has a distance of at least 10 meters from the waste pit to the well, does not cause odors and there are no vectors in the latrine (22). Action diagnosis was carried out through 4 stages, namely education on healthy latrines, socialization of latrine model designs, formation of a healthy latrine construction organization to prevent diarrhea, construction of healthy latrines with mutual cooperation, and evaluation.The design of the latrine model to be built was socialized to the community therefore the latrine being built complies with the requirements of the Ministry of Health of the Republic of Indonesia. Apart from that, there were allegations regarding the influence of the availability of facilities on latrine use, namely that one of the factors that influences open defecation behavior was the availability of facilities (23). If facilities were not available, the chances of people

defecating in the open will be high. Latrine education was carried out in the community by empowering the community to provide facilities and infrastructure, coordinating with local government officials. The participants involved were people who experienced problems and community leaders. The educational topic was about the requirements for building healthy latrines and the model of latrine to be built. The community donated land as a medium for building a latrine and agreed to build it together is a local habit that is maintained in Batak communities in North Sumatra. Encouragement, key person approach as an influential traditional leader, community organising through traditional leaders. We organised the community to participate in overcoming the problem of open defecation. This model of community empowerment based on needs and right on target is generally successful in achieving goals (24). Socialization of the healthy latrine model that will be built was carried out by making a poster as the final result of the latrine containing the size of the latrine, the area of the building, the arrangement of hanging gardens to create a comfortable impression for latrine users. Socialization using poster media can reach a large population, and is effective in conveying messages, especially to communities with the characteristics of the research location area (23,25). Figure 2 shows the results of the construction of healthy latrines carried out by the community through community engagement, the latrines built are in accordance with the latrine model in Figure 3, the latrines consist of septic tanks, toilets, clean water sources, and sinks, the latrines are built on land donated by the community.

Figure 2: Latrines that Have Been Built as a Result of Mutual Cooperation of the Kutalimbaru Village Community

This latrine construction will not work if it is not accompanied by resources and financial resources, therefore a latrine construction organization was formed with the structure of a chairman, secretary and treasurer with their respective duties and functions. This management was formed based on the results of deliberations with the community. Another agreement at the meeting was that funding sources would be collected from the community by providing contributions per family in addition to assistance from village funds. Resources for labor come from selected communities, then the consumption of working power is initiated by the housewives' association. This empowerment model is called community engagement (26). As a result of other agreements, a work plan matrix and finalization of toilets were prepared. The latrine being built is one latrine as a pilot model with the model shown in figure 3. Figure 3 ilustrates a latrine model that meets the requirements of a healthy latrine consisting of lighting, wall and roof, toilet pit, water trouh, wastewater, dug tank etc.

The latrine was completed in 1 month, then the community made a schedule to clean the latrine in turns from each household. Empowerment by building latrines is not yet complete. The community calculates the amount of funds spent to build a model of healthy toilet, then divides the amount of funds by the number of days in a month. The results obtained are that to build a 2x2.5m latrine, a total cost of IDR 5,261,000 is required, so every house that does not have a latrine is required to set aside IDR 14,700 per day for a year in order to have a healthy latrine like the latrine model that will be built. together. The requirement was that the latrine be built together in a cooperative manner. This collaboration system has also been implemented using the social gathering latrine

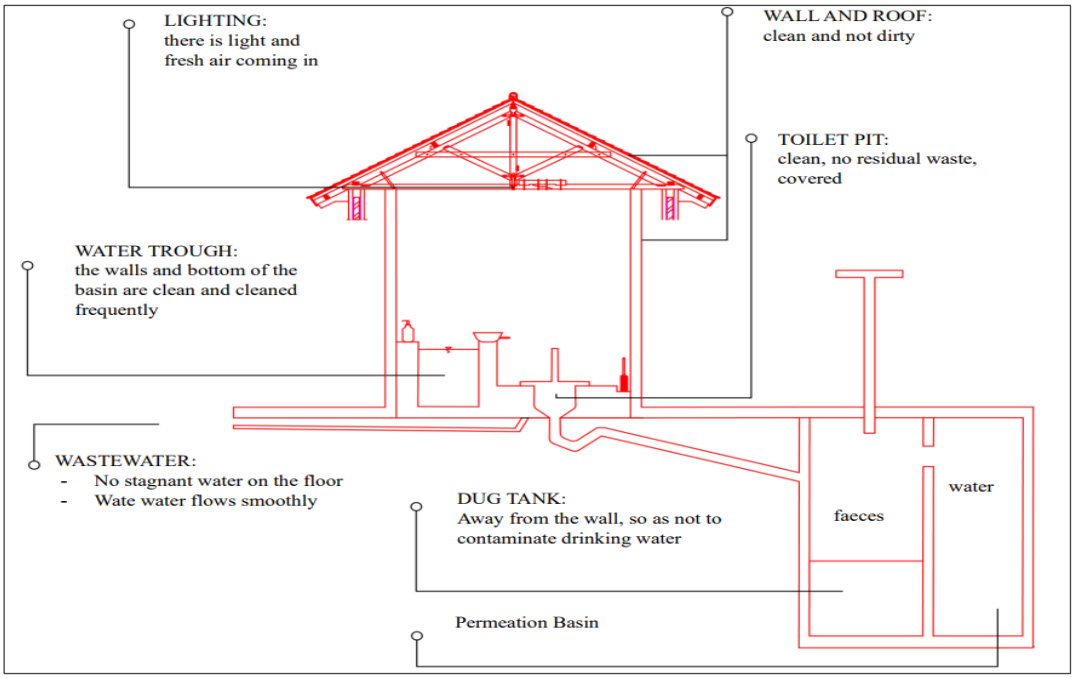

Figure 3: Model Latrine

model in West Kalimantan with a fee of Rp. 2000,-/day, so the funds collected amounted to Rp. 3,00,000/month, thus being able to build 1 latrine per month (27). whereas in the latrine arisan program in Kulonprogo, the community carries out an arisan by collecting residents' money and is coordinated by administrators in each RT and the difference between the latrine arisan in Kuloprogo is that the community only spends 30% of the total construction costs because they implement a voluntary system both in terms of collection time and nominal money collected (19). Zimbabwe has a Community Health Club (CHC) which aims to find out obstacles to latrine construction, this is done to increase sanitation coverage in Zimbabwe, CHC members are encouraged to save, borrow, and carry out activities that increase income, with this community sanitation coverage has increased (28). Based on the survey 362 (89.2%) households had their own latrines, as shown in Table 2,The number of users of the jointly constructed latrines was 35 households, so the total number of 397 households using latrines increased to 97.7%, therefore, the Indicator of the number of latrine users increased by 8.5% after the construction of joint latrines.The UN and WHO have successfully initiated open defecation eradication programmes in developing countries, including Indonesia, several countries that implement CLTS can reduce ODF rates, CLTS globally succeeds in encouraging households to build latrines (29), besides that in Bokoro, 361 villages have achieved End Open Defecation (EOD) status, Toilet coverage among households in Karen Ethnic Thailand also increased significantly after the implementation of community development. The key success factor was the participation of community involvement "local people" as leaders on the development team, especially communication for behavioral health changes(30). Another region in Indonesia that has implemented the same is Bali, where Balinese culture can be a factor in toilet ownership, as they consider defecation an activity that pollutes the environment and should be done in low places. conflicts should also be avoided by not using other people's land for defecation, which can be a trigger for the emergence of toilets in Bali . The method used was community empowerment with active community involvement in all stages of the sanitation programme from planning to implementation. Approached through community leaders and religious leaders, Balinese communities, in terms of determining the location of latrine construction, seek advice from traditional healers on the location of the latrine before it is built because it is related to the cultural value of 'purity' (31). In addition to Bali, several south Asian countries with a Hindu majority such as Bangladesh, India, and Nepal also adhere to perceptions related to purity, namely latrines

should be placed far from the home to preserve cleanliness and modesty (32). The cultural element that plays a role in empowering communities to care and be involved in improving sanitation in their respective areas is involving the community in addressing their problems through community leaders. Community involvement is related to good ethical practices, community building trust and social relationships This programme could be rolled out in other regions, taking into account the same location characteristics, culture and environmental conditions.

Conclusion

The basic sanitation problem that is a priority to be addressed is the problem of open defecation due to the lack of toilets and people still practise open defecation. Alleviating the problem of open defecation through community empowerment had been done through action research studies with the stages of providing the community with an understanding of the environmental health problems they are experiencing, and building latrine models in mutual cooperation. The research output also forms a maintained latrine organization and latrine social gathering for people who did not have latrines yet. Community engagement was carried out through education regarding the environmental problems they face, as well as building latrines in a mutual cooperation manner using a latrine social gathering system requiring Rp. 5,261,000 to build a healthy toilet.

Abbreviation

CARL : Capability, Accessibility, Readiness, and Leverage, CLTS : Community Lead Total Sanitation, CHC : Community Health Club, EOD : End Of Defecation, FGD : Focus Group Discussion, IDR : Indonesia Rupiah, UN : United Nations, WHO : Word Health Organization.

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Author Contributions

All authors designed the experiment, analyzed the data, wrote the manuscript, and approved the final version of the manuscript.

Conflict of Interest

The authors have no conflicts of interest.

Ethic Approval

The survey received ethical clearance from the Ethical Committee of the Health Ethics Research Prima Indonesia University reference number 022/KEPK/UNPRI/2022.

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