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RESEARCH ARTICLE

THE HEALTH WOMEN'S AND ENVIRONMENTAL SANITATION.

Yusriani Sapta Dewi.
Satya Negara Indonesia University.

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Abstract

This research aims to determine the health women's on environmental sanitation at Muara Angke, North Jakarta, Indonesia. Inadequate urban sanitation disproportionately impacts the women's health in informal settlements or slums. The impacts on women's health include infectious and chronic illnesses, violence, food contamination and malnutrition, economic and educational attainment, and indignity. We used household survey data to report on self-rated health and sociodemographic, housing, and infrastructure conditions. We combined quantitative survey with qualitative focus group information to better understand the relationships between environmental sanitation and the women and girls' health in Muara Angke, North Jakarta, Indonesia. We find that an average of eighty-five households in Muara Angke share one toilet, only 15% of households have access to a private toilet, and the average distance to a public toilet is over 52 meters. Eighty-three percent of households without a private toilet report poor health. Muara Angke women report violence (69%), respiratory illness/cough (46%), diabetes (32%), and diarrhea (29%) as the most frequent physical burdens. Inadequate, unsafe, and unhygienic sanitation results in multiple and overlapping health, economic, and social impacts that disproportionately impact women and girls living in urban informal settlements.

Introduction:-

Inadequate urban sanitation disproportionately impacts the social determinants of women's health in informal settlements or slums. The impacts on women's health include infectious and chronic illnesses, violence, food contamination and malnutrition, economic and educational attainment, and indignity. Adequate environmental sanitation are more than just an inconvenience. It allows users knowledge and experience to the design and management of facilities and services and to increase the likelihood that the services will be used sustainably.

Poor environmental sanitation practices exhibited in the disposal of solid waste, wastewater and excreta, cleaning of drainage including personal, household and community hygiene significantly contribute to infant and child mortality (Mmom & Mmom, 2011);(Snehalatha, Raj, Busenna, & Venkataswamy, 2014). This is contrary to the notion of environmental sanitation which aims at developing and maintaining a clean, safe and pleasant physical environment in all human settlements (Snel & Smet, 2006). Environmental sanitation comprises the disposal and treatment of

Corresponding Author:- Yusriani Sapta Dewi.
Address:- Satya Negara Indonesia University.

human excreta, solid waste and wastewater, control of disease vectors, and provision of washing facilities for personal and domestic hygiene which work together to form a hygienic environment (Supply & Council, 2005).

Improved environmental condition affects positively a wide range of development indicators. Thus, environmental sanitation is a channel to improved quality of life of the individuals and a contributor to their social, economic and physical development (Olowoporoku, 2014). Numerous studies have shown that the incidence of many diseases is reduced when people have access to, and make regular use of adequate sanitary installations (Aremu, 2012). It has been documented that about 24% of global diseases with high mortality ratio is caused by environmental exposures which can be averted (Organization, 2006). Nevertheless, most of these deaths are preventable through adequate environmental sanitation.

Environmental sanitation refer to residents' involvement in provision, utilization, and maintenance of environmental sanitation facilities and services and adherence to environmental legislation (Daramola, 2015). (Owoeye & Adedeji, 2013) findings revealed that there is low level of access to environmental sanitation facilities across the residential zones. Similarly, the proportion of residents with environmental sanitation facilities in their homes was low. The study established poor environmental sanitation practices among the residents in terms of utilization of available amenities across the residential zones. It recommended the provision of environmental sanitation facilities in homes by residents and communal provision of facilities by government and Community Based Organizations (CBOs), environmental education and also the enforcement of environmental regulations in the city and others with similar setting.

Inadequate urban sanitation disproportionately impacts women's health, dignity, and human rights. Millions of urban poor women lack access to adequate water and sanitation even though this is considered a basic human right (Organization, 2013). The health of women often correlates with the health of children and the health of communities more generally, since many women living in urban informal settlements disproportionately support economic and community activities. According to World Health Organization (WHO), improved sanitation is defined as either a flush toilet connected to either a piped sewer system or a septic system, a flush/pour-flush to a pit latrine, a ventilated improved pit (VIP) latrine, a pit latrine with slab, and/or a composting toilet (Mara, Lane, Scott, & Trouba, 2010). WHO estimates that approximately 2.6 billion people worldwide continue to live with inadequate sanitation and the environmental health risks are especially severe for the urban poor living in informal or slum conditions .

Women living in poor urban communities, particularly informal settlements often referred to as slum, bear the brunt of inadequate sanitation facilities in cities. While we use the term slum in this paper, we acknowledge and want to emphasize that there is no one definition of urban informal settlement and that the term "slum" can inappropriately and incorrectly label a community as dirty and unhealthy. As we will show using data from the North Muara Angke informal settlement in Jakarta, Indonesia, environmental conditions can vary greatly in the same slum and researchers need to be attentive to the relative human deprivation within a city (Organization, 2002) when discussing environmental and health hazards.

Nonetheless, the United Nations Human Settlements Programme (UN-Habitat) has defined an informal settlement as an area with "inadequate access to safe water, inadequate access to sanitation and other infrastructures, poor structural quality of housing, overcrowding, and insecure residential status" (UN Habitat, 2007). The UN also defines a slum as a household or group of individuals in an urban area that lack the following: (1) Durable housing of a permanent nature that protects against extreme climate conditions. (2) Sufficient living space which means not more than three people sharing the same room. (3) Easy access to safe water in sufficient amounts at an affordable price. (4) Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people. (5) Security of tenure that prevents forced evictions.

Methodology:-

This study relied on multiple data sources. First, we reviewed the published literature on slum sanitation and women's health in cities of Jakarta specifically. Second, we utilized a household survey of six hundred and fifty residents of the Muara Angke informal settlement in North Jakarta, Indonesia, located about 6 km^2 from the city center. The survey asked questions about household living conditions, expenditures, safety, disease, and self-rated health. Self-rated health was measured by asking the following question: "Compared to other people your age, how would you assess your general health?" The options provided were in ranked order: (1) excellent, (2) very good, (3)

good, (4) fair, and (5) poor. In the binary logistic analysis, the categories (1), (2), and (3) were merged as good health, while (4) and (5) were merged as poor health. Therefore the final outcome variable was dichotomous with two levels, namely, "good health" and "poor health." The data were entered into an electronic database and analyzed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics for categorical and continuous variables were summarized using frequency distributions and percentages for categorical variables, and the mean, standard deviation, mode, and maximum and minimum values for continuous variables. In addition, the physical locations of environmental sanitation facilities, including water access points, latrines, ablution blocks, pipes, drainage canals, and dumpsites.

Results:-

Over sixty-eight percent of survey respondents in Muara Angke were women but only forty-five percent of women reported good health compared with sixty-three percent of male respondents (Table 1). Households earning less than IDR2 million per month reported good health (58%) less frequently than households earning more than IDR2 million per month (71%). Only 5% of households own their home, but 89% of structure owners reported good health compared to only 18% of renters. While the type of toilet access varied across, we found that 65% of households using a public flush toilet reported poor health compared to 78% of households relying on pit latrines and 89% of those forced to defecate in the open. Over 83% of households in report inadequate privacy or no privacy when using a toilet and of these only 7% reported good health.

Having reliable water, defined as twenty-four-hour access seven days a week, resulted in 72% of households reporting good health. Unreliable water access is the reality for over 84% of households and 88% of these reported poor health. We found that an average of 108 households shared one public water tap. We found that 86% of households dispose of wastewater into the street that drains into local rivers. Similarly, 88% of households did not have any organized solid waste collection. Eighty-three percent of households with organized solid waste collection reported good health. Close to three-quarters of Muara Angke households report not feeling safe in their community and 75% of those that do not feel safe reported having poor health.

Our mapping data highlights the distribution of toilets across the entire Muara Angke informal settlement and the area within a 30 meter radius of each toilet facility. We found that an average of eighty-five households shared one toilet and that the mean distance between a household and a functioning toilet was 52 meter. Ninety-three percent of households within 30 meters of a toilet reported good health but only 33% of households farther than 30 meters of a toilet reported good health.

Table 1:-North Muara Angke household characteristics and self-rated health

Variable	Self-rated health	
	Good health frequency (%)	Poor health frequency (%)
Male	121 (63)	70 (37)
Female	185 (45)	228 (55)
Income:		
a. < 2,000, 000 IDR/month	207 (58)	147 (42)
b. > 2,000, 000 IDR/month	184 (73)	69 (27)
Housing:		
a. Renter/tenant	103 (18)	475 (82)
b. Structure owner	42 (89)	5 (11)
Toilet:		
a. Public flush (drains to street/river)	30 (35)	55 (65)
b. Pit latrine	83 (22)	300 (78)
c. Open defecation	19 (11)	149 (89)
d. Distance from home < 30m	298 (93)	24 (7)
e. Distance from home > 30m	103 (33)	211 (67)
f. Privacy (in home)	38 (37)	65 (63)
g. No privacy	36 (7)	499 (93)
Water:		
a. Reliable yard tap	71 (72)	27 (28)
b. Nonreliable yard tap	63 (12)	474 (88)

Solid waste:		
a. Organized collection	62 (83)	13 (17)
b. No organized collection	267 (47)	301 (53)
Security:		
a. Feel safe in community	90 (58)	65 (42)
b. Do not feel safe	119 (25)	360 (75)

We extracted self-reported physical complaints from women respondents (Table 2). The most frequently reported complaint was experience with violence (69%) followed by respiratory illness/cough (46%), diabetes (32%), diarrhea (29%), fever (20%), malaria (22%), typhoid (15%), skin rash (13%), and HIV (7%). Three hundred and twelve (48%) of households reported that a child household member had been ill with one of five diseases (diarrhea, malaria, typhoid, skin infections, or respiratory tract infection) in the past six months.

Table 2:-Physical complaints reported by Muara Angke women in North Jakarta

Women's physical complaints (n = 413)	Frequency (%)
Violence	286 (69)
Respiratory illness (cough)	191 (46)
Diabetes	133 (32)
Diarrhea	121 (29)
Fever	85 (20)
Malaria	91 (22)
Typhoid	64 (15)
Skin rash	55 (13)
HIV	29 (7)

Our focus group discussions and literature review help explain some of the social conditions that drive the survey responses.

Our survey found that 29% of women reported at least one episode of diarrheal disease within the previous month. Diarrheal disease was also mentioned as the most frequently reported illness for children. According to WHO, more than 1.4 million children below the age of five worldwide die from preventable diarrheal diseases and it is estimated that 88% of these cases are related to unsafe water or poor sanitation (Cheng, Schuster-Wallace, Watt, Newbold, & Mente, 2012). Fecal contamination in urban slums contributes to high rates of cholera, typhoid fever, dysentery, and intestinal parasites (Muoki, Tumuti, & Rombo, 2008; Niehaus et al., 2002).

We heard in focus groups with Muara Angke residents that inadequate slum sanitation contributes to human waste frequently draining into streets and walkways and is suspected of increasing exposure to food borne pathogens and contributing to childhood diarrhea. One woman noted the following:

"The children are often playing in the streets where the waste (human) drains from toilets. There is no sewer here that works. There is no place for hand washing and clean water is another cost. The cost of each toilet use (about IDR2 thousand) means our children cannot use them. I have four children and I can't pay for each to use a toilet a few times a day. They come home and touch food, and me, and I worry this is spreading disease."

Children in Muara Angke slums experiencing chronic diarrhea often fail to absorb nutrients from food, contributing to malnutrition and stunting. (Niehaus et al., 2002), sustained or long-term exposure to excreta-related pathogens including helminths or worms in early life limits cognitive or brain development and lowers long-term disease immunity.

Our focus groups suggested that women in Muara Angke bear a greater burden of managing HIV than men, which has also been documented in other slums. In Muara Angke, 7% of slum residents are infected with HIV. Inadequate sanitation and chronic diarrhea can be particularly dangerous for people living with HIV since they are at increased susceptibility to other infectious diseases and opportunistic infections. Slum dwellers living with HIV require an additional 20–80 liters of water daily and frequent access to clean and secure sanitation facilities (West, Hirsch, & El-Sadr, 2013). WHO estimates that rates of diarrhea are 2–6 times higher among PLWH compared to those who are

not infected, and rates of persistent diarrhea are twice as high for people living with HIV/AIDS (PLWH) as those in uninfected populations (Njuguna, 2015; Peletz et al., 2013). Furthermore, diarrhea can reduce the absorption of antiretroviral drugs and can speed the progression from HIV to AIDS.

In focus groups with Muara Angke women and girls, participants mentioned inadequate sanitation during menstrual bleeding as a leading contributor to school absenteeism for girls. In Muara Angke, less than a quarter of primary and secondary schools met the national standards for the minimal number of latrines per pupil and separate facilities for boys and girls. Inadequate school sanitation in slums can force adolescent girls to miss school to avoid the indignity of public bleeding, finding a private place to change a sanitary napkin, and ridicule by peers when forced to share toilets with boys. One Muara Angke girl described her situation as follows:
"As girls, when we lack enough toilets we have a lot of problems. For example, if our schools do not have toilets where will we dump our pads after using them? This causes girls to stay with one pad for a whole day without changing until she arrives home."

An average of 3.5 million learning days are missed by Muara Angke girls per month due to inadequate facilities to manage their menses. Missed school can exacerbate gender inequities and can contribute to greater health vulnerability later in life.

Inadequate sanitation in Muara Angke results in economic burdens that include pay-per-use toilets, increased health care/medical costs (i.e., oral rehydration therapy), and decreased wages for women forced to miss work to care for the sick. Most Muara Angke residents pay IDR2 thousand per use, which can present a significant economic burden on slum residents. However, during an episode of diarrhea, focus group participants reported that increased toilet use combined with treatment expenses and lost wages from missed work can frequently add up to 10% of monthly expenditures. One woman in Muara Angke noted the following.

"My child has it (diarrhea) at least once every two months (which) lasts maybe four or six days. I have to pay for transportation to clinic, medicines, and doctor fees. We need extra fuel to boil more water during these days and I try to get him to use the toilet, but maybe not pay so many times. I usually can't sell my wares at the market on those days, so I lose 40–50 shillings maybe.

The World Bank's Water and Sanitation Program found that inadequate sanitation costs Kenya an estimated USD2.7 million annually from lost productivity due to sanitation related illness and that USD51 million is spent on healthcare related to inadequate sanitation (Njuguna, 2015).

Insecurity and indignity related to inadequate sanitation are key concerns for women and girls in Muara Angke. Women in our focus groups expressed feeling vulnerable when using public toilets that are far from their homes and that do not have locks on doors or proper lighting at night. Fear of rape, especially at night, can lead to women not drinking fluids, chronic constipationn, and using a bucket in their home as a toilet. A young woman in Muara Angke explained the following:

"I always underestimated the threat of violence when regularly using the latrine which all 12 families who live on the plot where I live use. I would go to the latrine at any time provided it

was not too late. This was until two months ago when I almost became a victim of rape. . . You have to walk for about ten minutes to use the latrine. I did not report the incident because one of the four men [who tried to rape me] was well known later told me if I reported the incident to official authorities of the police they would look for and deal with me."

A preponderance of evidence suggests that majority of sexual violence in slums occurs in the context of using a toilet, bathing, and/or menstrual hygiene, and in addition to the physical assault, it also leads to increased anxiety, sense of powerlessness and hopelessness, marginalization, and stigmatization. Women in Muara Angke feel less safe than men, and the ensuing reductions in women's mobility may restrict their personal freedom and access to employment, health, and education and limit their participation in political and recreational activities. Since gender-based violence in Muara Angke usually goes unpunished, this too can significantly contribute to making and keeping women vulnerable.

Conclusions:-

While the links between sanitation and human health are well documented, the disproportionate and overlapping disease, care giving, education, and economic, social, and dignity impacts are rarely captured together for women and girls living in urban informal settlements. Yet, improving slum sanitation can enhance child and maternal well-being, which is particularly important to global urban health since more people are living in cities and women are often primary care givers and household money managers.

We have shown how self-rated health varies by different environmental conditions in Muara Angke and the spatial distribution of toilet facilities. While additional research is needed to specify the causal links between inadequate sanitation and some of the health outcomes discussed here, we have highlighted that the physical and social environments in urban slums likely interact to coproduce poor health for women. This paper has highlighted the importance of and need for further research to detail the multiple ways women's health can be compromised from a manageable environmental issue, namely, inadequate sanitation. We have also highlighted that the health risks from inadequate sanitation are not unique to the Muara Angke slum. Environmental engineers and planners in cities of the global south can combine our findings with those from other urban slums to help justify the costs of sanitary improvements that are attentive to the specific needs of women and girls.

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