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Design Model Environmentally Friendly Smokeless Household Waste Burning Stoves: Reality And Perceptions

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Abstract. Garbage is one of the most common environmental issues in the neighbourhoods. This issue is not limited to villages or towns; even industrialized countries are not immune to it. Several issues, such as the requirement for land for landfills, which has a severe influence on local inhabitants' health owing to smoke from open garbage burning, but whose onset is extremely dangerous to one's health. However, these findings have not been included in global illness burden estimations. Household air pollution is a key environmental risk factor that leads to more fatalities across the world. A garbage incinerator is equipment or machine for burning rubbish using combustion technology that is supposed to be ecologically beneficial and smoke-free in order to reduce air pollution. The objectives of this paper are 1) assess the forms of trash that are discarded in the home, 2) investigate the public understanding of environmental awareness in order to predict dangerous air pollution, and 3) develop an environmental care education model and create a smokeless waste burner stove.). In this mixed-methods design research, the researcher gives priority to main data collection (quantitative) and supporting data collection (qualitative).

Key words: pollution from garbage burning, smokeless, health, environment.

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INTRODUCTION

Air pollution is becoming a global issue that poses a health risk in many countries. According to the World Health Organization (WHO), air pollution has a significant impact on the number of deaths worldwide each year. Everyone, especially those who live in metropolitan areas, should be prepared for this situation. According to the findings of recent research, air quality in metropolitan areas such as Jakarta is still significantly below WHO criteria, even up to 4.5 times worse (WHO, 2014). Air pollution can be found in a variety of settings, including households, industries/factories, transportation, and so on, according to Basri (2010). Air pollution is caused by the release of polluting compounds into the air from many sources in a variety of ways, one of which is by the combustion of waste or fuel combustion leftovers (Taheri et.al, 2015; Yudison & Driejana, 2015; Trieu et.al, 2020). Although biomass burning is a significant source of fine particulate matter, it also poses significant health hazards. The World Air Quality Index ranking update 2010 discovered the data below, which shows that the world's air quality or air pollution is updated every minute.

Household air pollution is a key environmental risk factor that causes more premature death and morbidity throughout the world than untreated water and sanitation, radon, and lead combined (Smith et.al, 2014; Lim et.al, 2012). The existing load of air pollution has an unintended consequence of numerous illnesses that are lethal. These findings, however, have been left out of global illness burden calculations (WHO, 2015; Burnett et al., 2014). Several recent studies have summarized the corpus of knowledge on the health effects of home air pollution, which are critical to consider and address. Garbage is one of the most common environmental issues in the neighbourhood. This issue is not limited to villages or towns; even industrialized countries are not immune to it. Some issues, such as the requirement for space for landfills, are common as a result of a lack of appropriate and efficient waste management, which has a severe influence on local inhabitants' health owing to smoke from open garbage burning (Permana & Muhammad, 2019). According to Trisyanti (2018)'s research, 69 percent of garbage in Indonesia reaches the final waste disposal location, resulting in a daily total of 65 million tons of waste, and illness is extremely likely to spread near open waste burning. This is extremely hazardous to us and the air we breathe on a daily basis.

The development of a low-smoke or smoke-free device is an urgently required alternative that can reduce air pollution caused by indiscriminate garbage burning and waste burning in ultimate disposal. The mud improved cook stove, according to Singh et al. (2012), is a popular home energy intervention in rural Nepal for reducing smoke during cooking. The national cooking stove program in Nepal promoted the mud stove design he developed, which is beneficial and effective for lowering indoor air pollution. The above problems must be handled with awareness of the family/household

environment first and are expected to have a positive impact on the surrounding environment by providing environmental care education with local residents. By creating a smokeless household waste/garbage burner stove whose size is also environmentally friendly, it can help the surrounding air to be cleaner and avoid air pollution due to burning smoke which is unhealthy for health and can be done alone in the home environment because it does not emit toxic fumes and does not require a place to work. where garbage is burned the remainder of the combustion may be utilized as natural plant fertilizer.

METODH

The research technique employed in this study was a mixed methods approach, or a blend of approaches. The researcher prioritizes major data collection (quantitative) and supporting data gathering in this mixed methods design study (qualitative). "A mixed methods design is a technique to gather, analyse, and blend quantitative and qualitative methodologies in one study or a series of studies to comprehend the research topic," according to Creswell & Clark (in Creswell, 2015: 1088). According to Creswell (2015: 1089), using quantitative and qualitative methodologies in the same unit offers a better grasp of study challenges than utilizing only one method. This study took place in Kaliurang, Yogyakarta. This study begins by paying attention to and examining the research topic, which is occurrences that occur in everyday life by caring for the environment by avoiding burning excess rubbish, which obstructs breathing and pollutes the air if done too frequently. This data source for community research is anticipated to set a positive example for all other communities. Most of the literature studies say that the most generally used data collecting approach for conducting surveys is a structured questionnaire survey, which was utilized to collect fieldwork data for this study. Furthermore, it provides a reasonably high level of result validity as well as a quick technique of conducting surveys. As a result, the researcher used this method. According to the literature research, multiple methodology and data gathering procedures were employed to attain the needed aims, goals, and objectives. Questionnaires, case study methodologies, interviews, focus groups, and document review are all examples of data collecting procedures. The researcher prioritizes the main data collection (quantitative) and the gathering of supporting data in this mixed methods design study's data analysis procedure (qualitative). According to Creswell (2015: 1089), using quantitative and qualitative methodologies in the same unit offers a better grasp of study challenges than utilizing only one way. In the research flow chart, you can observe what has been done and what will be done throughout the specified time period (Figure 2).

DISCUSSION

Household Air Pollution

Household air pollution, as a result, is the third leading cause of mortality and morbidity worldwide, accounting for roughly 3.9 million premature deaths and 110 million disability-adjusted life years (Lim et al, 2012). Incomplete combustion products such as particulate matter, gases, and semi volatile chemicals emerge from inefficient burning of solid fuels such as biomass and coal in residential stoves, which we collectively refer to as Household Air Pollution. Despite the fact that the chemical and physical features of household air pollution vary depending on the kind of fuel and combustion circumstances, it contains a number of poisons (McCracken, 2012; Lee, 2012; Brook, 2010). Plastics' future uses are expanding, and their use in emerging and developing countries is rising (Global Industry Analyst, 2011). The rise in plastic garbage will add to the current plastic waste log if adequate waste management is not implemented. The time it takes for plastic to degrade is unknown, although it might take hundreds or thousands of years (Kershaw et al., 2011). Current techniques for using and disposing of heat in landfills - Involves the permanent loss of valuable raw materials and energy when garbage is disposed of in landfills. The National Environmental Engineering Research Institute (NEERI) published a report in 2010. Plastic garbage is found in rivers, lakes, streams, railways, and beaches (MoEF, 2011).

Modern Environmental Health Risks

Modern environmental health concerns from industry, urbanization, cars and agricultural modernization tend to rise in the early stages of development, then peak and diminish as income and education levels rise. Again, preventative strategies have a big role in determining the height of these hazards and the point at which they decline (Smith et al, 2013; Pansuk et al, 2018; etc.). Information and communication techniques in the public health sector, such as those to encourage safe driving habits like the usage of seat belts and helmets, can be successfully communicated through the media. Such techniques seldom operate in isolation; instead, they are most successful when accompanied with good law and enforcement. As with many violence prevention measures, information and communication tactics can be offered in smaller groups and individually. These global risks do not currently dominate the environmental health burden, but unless strong action is taken, they may come to dominate the future health burden (Smith et al., 2013; Olson, 2017; all environmental risk factors taken together) Reduced incineration in the home and landfills both decreased in a similar way. Traditional dangers are most commonly encountered at the home level in low-income nations, when behavioural adjustments are

necessary to modify habits and resources are limited. Intervention is hampered by power, because modern dangers stem from larger-scale social institutions, such as industrialisation and urban architecture, they are typically perceived at the community level. To help limit the danger of deteriorating fresh air quality and the accumulation of land for ultimate waste incineration, environmental awareness management and education should be socialized in order to predict hazardous air pollution (Watkins et.al, 2017; Lelieveld, 2015; Malla, 2011).

Garbage Burning

Landfilling or landfilling is the worst waste management solution from an environmental standpoint. It makes advantage of available space while also fostering future environmental stewardship. This is a waste of time and money. High regulations for landfills have been established in European legislation to avoid soil and groundwater degradation, as well as to decrease air emissions of methane and other pollutants. The regulations are not always well enforced, and thousands of unmanaged and illegal landfills nevertheless exist across member nations. Wind, ambient temperature, composition and moisture content of burning trash, and pile compactness all influence emissions to the atmosphere from open burning at ground level. The low temperatures associated with open combustion, in general, increase particulate matter, carbon monoxide, and hydrocarbon emissions while suppressing nitrogen oxide emissions. Sulphur oxide emissions are proportional to the amount of sulphur in the composted material (Verma et.al, 2016; Vivek, 2014; Mudagal, 2011).

Field crops, timber, and leaves are among the organic wastes that are burned, and emissions are mostly determined by the moisture level of the waste. When it comes to field plants, the emission level is determined by whether the trash is burnt in a huge fire or backfired. Enormous flames begin on the downwind side of a field and are allowed to spread downwind, burning large expanses of land, whereas boomerang fires begin on the upwind side and are pushed to spread upwind (Cogut, 2016; Naryono, 2016). Open garbage burning discharges a variety of hazardous chemicals into the air, as well as aggravating soil, water, and food contamination. Large volumes of greenhouse gases are released into the environment when garbage is burned openly. Carbon dioxide, methane, and particulate matter are examples of such substances, which are usually connected with air pollution and can cause serious respiratory sickness. The persistent release of organic pollutants is mostly linked to open garbage burning. Polycyclic aromatic hydrocarbons, dioxins, and furans, for example, are all carcinogenic and have been related to a variety of disorders. To counteract this, it is also a good idea to employ a conservation movement based on hydrology and soil conservation to ensure that there is no long-term harm and that nature is protected (Nawiyanto and Wasino, 2018).

CONCLUSION

The stove for burning home waste/garbage is a basic waste-burning equipment designed to reduce the negative environmental impact of waste-burning. A device that prevents combustion gases from polluting the environment. Waste/household trash incineration stoves can handle local and on-site waste, emit no toxic compounds from burning, do not release smoke (smokeless), and have lower operating costs than factory-made stoves. While there are several benefits for added value to the community, the problem of waste in the community can be resolved, reducing the habit of people throwing garbage in sewers, rivers, and on the road, there is no garbage that builds up, resulting in a healthier environment for residents, and the local environment can be self-sufficient in the waste management process. so that they do not rely on garbage trucks, improve branding as a waste-free environment, the environment becomes cleaner, healthier, more beautiful, and conducive because there is no garbage piling up those smells and serves as a breeding ground for disease, joint group business opportunities, and labour needs.

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