

ASSESSING THE EFFICACY OF TRAINING PROGRAM TO PROMOTE A POSITIVE OCCUPATIONAL HEALTH AND SAFETY CULTURE AMONG INFORMAL WORKERS AT OPEN DUMP SITE IN KHULNA USING INDUCTIVE THEMATIC ANALYSIS

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ABSTRACT

The importance of training in safety management practices has been acknowledged for a substantial period. However, there remains an absence of conclusive evidence indicating the sustained, long-term effectiveness of safety training interventions. In this study, informal waste workers operating at the Rajbandh open dump were extensively interviewed, and baseline data regarding their working conditions and associated health risks were collected. Occupational Health and Safety (OHS) training was designed and implemented based on the socio-demographic, behavioral, and occupational conditions of waste workers. The goal of the OHS training program was to enhance the knowledge and awareness among waste workers in several crucial areas which includes responsible waste handling practices, awareness of potential risks associated with waste collection, the importance of consistently using Personal Protective Equipment (PPE), and the significance of having a basic understanding of first-aid. To assess the effectiveness of training, key metrics were examined at six months post-training, incorporating a combination of both open-ended and closed-ended questions. This involved a comprehensive examination of various parameters, including participants' safety understanding, integration of new knowledge into daily practices, and attitude change. The mixed-method study was adopted to collect descriptive and numeric data using qualitative and quantitative methodologies. Transcribed data was coded using MAXQDA and codes were systemically developed leading to inductive thematic analysis. The research findings indicated a reduction in injuries and illness, chiefly attributable to an increase in the consistent use of proper PPE during work. Notable enhancement in the overall safety climate specifically, areas such as safety systems, and work environment conditions demonstrated substantial improvements after the training. The most substantial positive impact of the training was found in the realm of safety culture among the workers. Continuous and comprehensive training on occupational health and safety could also improve the attitude and behavior toward waste collection also elevate and enhance awareness among the informal waste workers.

Keywords: *Occupational Health & Safety Training, Safety culture, Informal Waste Worker, Risks and Hazards, Personal Protective Equipment (PPE), First-aid*

1. INTRODUCTION

Informal waste worker is characterized as an individual or collective of persons who are informally involved in the sorting, collection, and recovery of reusable and recyclable solid waste (Richa Singh, 2021; Muhammad & Manu, 2013; Kala et al., 2022). This group of people plays a pivotal role in the waste management sector, contributing significantly to the recycling chain by facilitating the recovery and trade of materials, thus promoting sustainable practice and resource circulation (Baral, 2018). However, they often work in a very unhealthy and unsafe work environment for a substantial period every day (Aweng and Fatt, C.C. & Aweng and Fatt E R, 2014; Rani et al., 2023). In addition to the challenging working environment, informal waste collectors or scavengers lack access to basic health and welfare services and social protection (Asim et al., 2012).

The informal sector encounters significant challenges all around the globe especially in developing countries like Bangladesh due to inadequate safety and health standards, coupled with prevalent environmental hazards, and often lacks the necessary knowledge, awareness, and resources to implement effective health and safety measures (Forastieri, 1999; Uddin et al., 2020). Informal waste collectors operating in open dump sites or non-sanitary landfills face countless occupational hazards, highlighting the pressing need for comprehensive Occupational Health and Safety (OHS) training. Training is a crucial component of occupational health and safety programs (Lingard, 2004) and it is also an aspect of positive safety culture (Cooper, 2001). The primary goal of OHS training is to foster awareness regarding the identification and assessment of hazardous waste among informal waste collectors as many accidents and injuries in work environments can be prevented through the identification and assessment of hazards (Pouya et al., 2019). There is an identified association between health and safety training and a lower incidence of workplace injuries and illness. People with first-aid training demonstrate a greater willingness to take personal responsibility for safety and an enhanced willingness to adopt safe behaviors (Ibelli-Bianco et al., 2022; Mckenna, 1982). First aid training seems to foster heightened awareness that their personal experience of occupational safety and health risks isn't beyond their influence (Lingard, 2004). Preventing occupational injuries and diseases in hazardous environments goes beyond just providing waste workers with protective equipment. Understanding workers' risk perceptions and attitudes towards such equipment is crucial and this understanding is vital for developing meaningful educational materials and implementing effective training programs.

This study aimed to evaluate the effectiveness of the occupational health and safety training provided to informal waste workers at the Rajbandh open dump site in Khulna, Bangladesh. The main goal of this training was to foster awareness among informal waste collectors and cultivate a positive safety culture and attitude toward waste management. Also, recognizing their roles in waste management is crucial, and the primary step is the active inclusion of their voices. Probing questions were incorporated in this study to voice and articulate the informal waste workers underlying problems, concerns, needs, and desires. Comprehensive and systematic evaluation was also conducted to gauge the impact and outcomes of the occupational health and safety (OHS) training program. This involved a comprehensive examination of various parameters, including the participants' comprehension of safety, the integration of newfound knowledge into their daily practices, and the overall transformation of attitudes. The findings of this study not only contribute to the body of knowledge in occupational health and safety but also serve as a valuable guide for future initiatives aimed at enhancing the well-being and safety of informal waste workers in similar settings.

2. METHODOLOGY

Rajbandh open dump is currently the only operative waste disposal site of Khulna city and informal waste workers regularly come to gather recyclable materials in this open dump. Rajbandh is not just an open dump site; it lacks the fundamental characteristics of a sanitary landfill, such as a lined bottom, leachate and gas collection system, and groundwater monitoring. This scenario presents significant risks & hazards to informal waste workers who work in the open dump over an extended period, which contributes to the rapid transmission of illnesses and the contamination of the environment.

Key concerns include:

- Exposure to contaminated medical waste and sharps.
- Risks of encountering landfill fires, leading to potentially deadly respiratory disorders.
- Exposure to various contaminants and hazardous materials, from fecal matter to toxic fumes and chemicals, with long-term health effects such as cancer.
- Risk of severe injury or fatality from moving waste-carrying trucks or bulldozers.
- Absence of proper sanitation facilities.
- Lack of adequate safety gear.
- Absence of accessible medical services.
- Insufficient knowledge of first aid.
- Lack of a designated resting place or shed.
- Vulnerability to mental health issues due to the challenging work environment.

Being aware of these risks and hazards associated with their work is crucial for informal waste workers for several reasons. These include: enhancing personal safety, recognizing potential dangers, injury prevention, health protection, environmental awareness, effective response, productivity, and efficiency.

2.1 Study Population

The decision to provide occupational health and safety (OHS) training exclusively to informal waste workers at the Rajbandh open dump site is based on their heightened vulnerability compared to other informal waste workers at secondary disposal points (SDP) or recycling shops. Formal waste workers appointed by the Khulna City Corporation (KCC) also undergo OHS training, a program facilitated by the KCC itself. However, due to the informal status, waste workers at the Rajbandh open dump site are unable to attend these essential training sessions. This targeted approach recognizes the challenges and risks faced by informal waste workers at the open dump site who are exposed to toxic and hazardous work environment aiming to address their specific needs and enhance overall workplace safety. Currently, there are 20 informal waste workers actively engaged at the Rajbandh site. All of them were invited to participate in the training, which was financially supported by the SCIP Plastics project. 15 out of the total workers participated in the training and successfully completed it.

2.2 Pre-assessment and Occupational Health & Safety Training Design

A structured questionnaire and observational checklist were developed for interviews conducted on the entire population which is 20 informal waste collectors in Rajbandh between May and June 2023. The study revealed a significant deficiency in knowledge and awareness regarding waste collection among informal waste workers, consequently exposing them to health and environmental hazards. The findings were used to create a tailored occupational health and safety (OHS) training program. **Figure 1** shows the assessment going on between municipal solid waste workers and medical waste workers in the Rajbandh open dump site.



Figure 1 : Pre-assessment on Informal Waste Collectors at Rajbandh Open Dump Site

2.3 Occupational Health & Safety Training

A training session on Occupational Health & Safety was conducted at the Awareness Centre for five hours in June specifically designed for informal waste workers involved in the Rajbandh open dump site and 15 informal waste workers among the 20 informal waste workers participated in the training program. The primary objective of this training program was to enhance the knowledge, awareness, and consciousness of waste workers regarding the following aspects:

- Identification and categorization of hazardous waste materials commonly found within waste piles in open dump sites or non-sanitary landfills.
- Acquisition of responsible waste handling techniques to ensure personal safety and well-being.
- Understanding the diverse risks associated with waste collection activities, including potential health hazards and environmental concerns.
- Appreciating the significance of using Personal Protective Equipment (PPE) and adhering to best practices.
- Gaining fundamental knowledge in administering basic first aid, enabling prompt response and assistance in emergencies.

Error! Reference source not found. shows the occupational health and safety training and practical demonstrations by the trainers. Following the completion of the Occupational Health and Safety (OHS) training, each informal waste worker was provided with essential safety equipment, including safety boot, safety vest, and umbrella. Additionally, a first-aid kit was also provided to ensure well-being and preparedness to address any potential health emergencies during waste collection activities. This proactive measure aimed to enhance the workers' safety awareness and empower them with the necessary tools to reduce risks and create a much safer working environment.

2.4 Post-Training Assessment and Data Collection

Semi-structured questionnaire was designed and comprehensive interviews were conducted with the entirety of the informal waste collector group which is 15 informal waste collectors, all of whom had previously undergone the OHS training. These interviews took place in December, precisely six months after the training, at the Rajbandh location, incorporating a combination of both open-ended and closed-ended questions. The incorporation of open-ended questions in the interviews was intentional, serving a crucial purpose. Beyond the act of just listening, these questions were designed to foster a deeper understanding of participants' underlying problems, needs, and desires. Probing questions were incorporated to delve deeper into participants' thoughts, views, and perceptions regarding the training. (Weidner et al., 1998) suggest that participants' 'stories' offer a valuable data source to assess the impact of a training intervention. With the consent from the participants, audio recordings were made during the interviews, and subsequently, these recordings were transcribed verbatim. The transcriptions were later translated from Bangla to English for thorough analysis.

2.5 Data Analysis

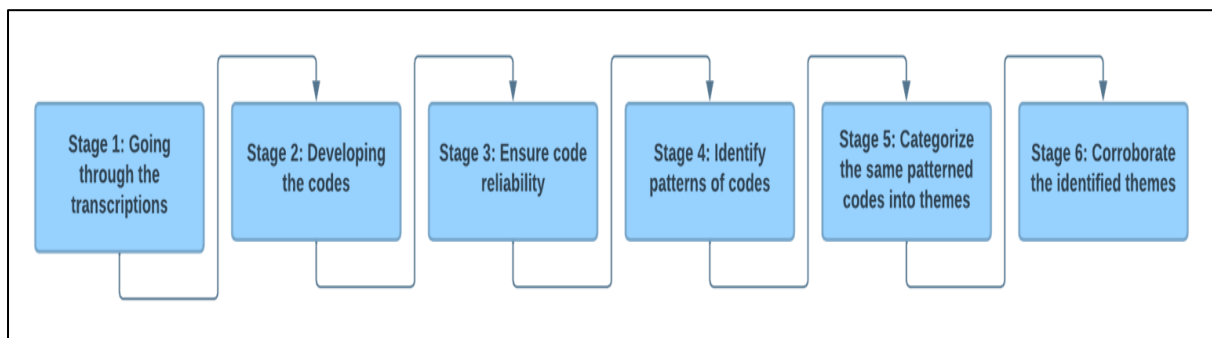


Figure 2: Inductive Thematic Analysis Process

The study adopted a mixed-method approach-both qualitative and quantitative methods to collect comprehensive descriptive and numeric data. Transcribed data underwent a rigorous coding process

3. FINDINGS

3.1 Demographics of the Participants

Table 1 illustrates the demographic characteristics of the informal waste workers who participated in the occupational health & safety training. This detailed investigation not only sheds light on the diversity within the participant group but also offers valuable insights that can inform future training initiatives and policies aimed at improving the occupational well-being of informal waste workers.

Table 1: Demographic Characteristics of the Occupational Health & Safety Training Participants (n=15)

<i>Characteristics</i>		Frequency
<i>Gender</i>	Male	3
	Female	12
<i>Age</i>	19-49	10
	≥50	5
<i>Education Level</i>	Not literate	12
	Primary	3
<i>Income</i>	300-400 taka	8
	≥400 taka	7
<i>Experience</i>	≤2 year	2
	2-5 year	5
	≥5 year	8

3.2 Categories of the Codes

During coding the transcription, patterns emerged which led to the formation of six overarching themes, and all the codes were categorized into these six themes, providing a structured framework for analysis.

The themes that were identified while coding the transcription are the following:

1. Health & safety training experience
2. Appreciation for training content
3. Empowerment and awareness through knowledge
4. Impact of training on safety practices
5. Perceived value of PPE
6. Importance of first-aid training

3.2.1 Health & Safety Training Experience

Health and safety training experiences highlight the importance of ensuring the well-being of informal waste collectors in this challenging profession where they work without any safety knowledge or equipment. After the training, the training participants were content and satisfied with the training. One participant stated:

“It was quite the experience. Learning about health and safety in our line of work was eye-opening. Before the training, I didn't realize how important it is to take care of ourselves while doing this job. The trainers went through things like identifying potential hazards at the landfill, understanding the importance of using protective gear, and even some basic first aid. It was a bit overwhelming at first, but as we got into it, I started to see how crucial it is for our well-being.”

3.2.2 Appreciation For Training Content

The OHS training content was meticulously designed to enhance the knowledge and working conditions of the target audience, specifically the informal waste workers. The theme was carefully chosen to assess the extent to which the training content is perceived as both relevant and applicable to the daily tasks and challenges and risks encountered by the waste collectors. One study participant stated when interviewed:

“Absolutely! The training content was precise and directly related to what I do every day in waste collection and sorting. They covered everything from the types of waste we encounter to the best ways to handle them without putting ourselves at risk.”

Another participant agreed to it and said:

“The training was super relevant to our daily work. It was like connecting the dots between the job I do and the reasons behind certain safety practices. I mean, we're dealing with all sorts of stuff out there, from metals to sharp glass, so having a solid understanding of how to handle them safely is crucial. The trainers did a really good job making it relevant to our work, and I found a lot of similarities between what I do on the field and what they were teaching.”

3.2.3 Empowerment and Awareness Through Knowledge

The OHS training brings about a sense of empowerment, awareness, and well-being among the informal waste workers. It also provides valuable insights and the potential to catalyze positive transformations in the lives of these waste workers. The participants felt confident and secure post-training and one stated:

“The training gave me a real sense of empowerment and awareness. Before, I was doing my job kind of on instinct, you know, just trying to get by, just for the money to live my life. But now, with the knowledge I gained from the training, I know how to protect myself from certain risks and hazards and I'm way more aware of what I'm dealing with. The training didn't just teach me the do's and don'ts; it gave me a sense of control over my work, and that's pretty empowering.”

Another participant elaborated on this topic:

“The training opened my eyes to the potential dangers lurking in the landfill. Before, I kind of just did my thing without giving much thought to the risks, we were doing the waste collection for the money, just to get by with our life. But now, I'm way more aware while doing waste sorting and collection. The trainers broke down the different hazards like sharp objects, hazardous materials, and the risks of exposure to harmful stuff.”

3.2.4 Impact of Training on Safety Practices

The training program was aimed to enhance the work practices of the informal waste workers by imparting crucial knowledge and safety gear. This theme includes the changes in the way the waste workers handle waste materials, navigate workspaces, and utilize safety equipment. The training participants all agreed that the training has some positive impacts on their daily work and one participant stated during the interview:

“First off, I'm way more aware of what I'm dealing with. Before, when a dump truck came to Rajbandh and dumped the waste, I'd dive into the waste pile without thinking twice. Now, I take a moment to assess the scene. I look out for anything that seems trouble – sharp objects, glass or metals, weird chemicals. I also use the safety gear now. Before the training, I used boots that I found in the landfill but now I use the PPE that is provided after the training. I am more aware of my hygiene as well. Now after waste collection, I wash my hands and feet. I also shower afterward.”

3.2.5 Perceived Value of Safety Gear/PPE

The training focused on the importance of the usage of safety gear in work practices among informal waste workers. The thematic analysis can offer insights into the adoption of safety gear and the development of more effective OHS interventions. One participant stated:

“After the training, we got to know the importance of wearing safety gear or else we can come across hazardous materials and we can get sick also have cuts and infections. Before the training, I did not

use any safety gear and I would have cuts every other day while waste collection. But now I use safety shoes, a safety vest, and waste sorting stick while waste collection and I can say after the training I haven't had any injuries till now.”

Another participant said during the interview:

“For workers like us getting cuts and scratches are quite a common everyday occurrence. The training showed me that safety equipments isn't just accessories, they're quite essential for our work. PPE is necessary for us as it will save us from injuries and also the toxic environment around us. We are exposed to toxic substances all day so wearing the safety gear will protect us from it.”

3.2.5.1 PPE Usage & Preference

Table 2 demonstrates a significant increase in the adoption of safety gear among informal waste collectors following occupational health and safety training. Following the training, the waste workers are using various PPE that is been provided, including safety boots, safety vests, waste sorting sticks, and umbrellas during their work activities. However, during observation, some informal waste workers were found to be not using hand gloves or face masks during waste collection. Upon inquiry, it was revealed that they find gloves and face masks are quite uncomfortable during their waste sorting and collection activity.

Table 2: PPE Usage Pre-training and Post-training

Personal Protective Equipment	Pre-training	Post-training
SAFETY BOOTS	0	15
GLOVES	0	3
SAFETY VESTS	0	15
WASTE SORTING STICK/HOOKS	15	15
FACE MASKS	0	6
UMBRELLA	0	15

This feedback provides valuable insight into the challenges faced by the informal waste worker. Given the prolonged exposure to extreme heat in landfills, wearing masks and gloves could be a significant obstacle for them. It is suggested to explore alternative glove and mask options that are made of different materials and that would prioritize both safety and comfort.



Figure 5: PPE Usage among the informal workers in Rajbandh (a) Pre-training and (b) Post-training

In (a) (b)

Figure 5 the contrast is evident, as prior to the OHS training the informal waste workers in Rajbandh were observed working without wearing any safety equipment. They were found to be standing on waste piles without safety boots and collecting recyclables with bare hands. However, post-training, a significant transformation is observed, with waste workers sorting and collecting waste while equipped with Personal Protective Equipment (PPE) like safety boots, safety vests, and waste sorting sticks.

3.2.6 Importance of First-Aid Training

The first-aid training was integrated into the OHS training to improve prevention, and response and foster an overall safety culture among the informal waste collectors. The practical demonstration made a heightened awareness of potential risks and hazards. One participant said during the interview:

“I think First-aid training was the most important among the training. We get to learn from first-aid trainers how to deal with cuts and burns. We were also provided with a first-aid kit that would be available for us in the open dump site. It was really important for us as it made us feel safe knowing we can give us primary first-aid if any accidents occur during waste collection.”

Another participant expressed his feelings about the first-aid training:

“The training made me more aware of preventive measures. The first-aid trainer showed us everything about what we should do if there were any accidents and injuries while working in Rajbandh. Before if someone got a cut or something, it was kind of a panic moment. Now, I know what to do. Simple stuff like cleaning and dressing a wound can make a huge difference to us. After the first-aid training, I feel like I am more confident with my work and I can collect the plastics without being scared of injuries like cuts and scratches. Also, now we have a safety kit in Rajbandh, so even if something happens, we can take care of ourselves.”

4. FIGURES AND GRAPHS

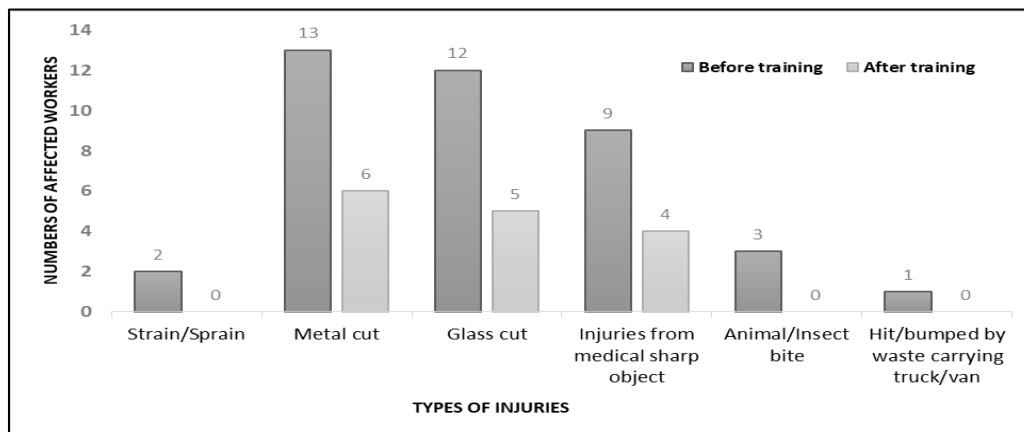


Figure 6: Comparison Between Injuries Sustained Before and After OHS Training

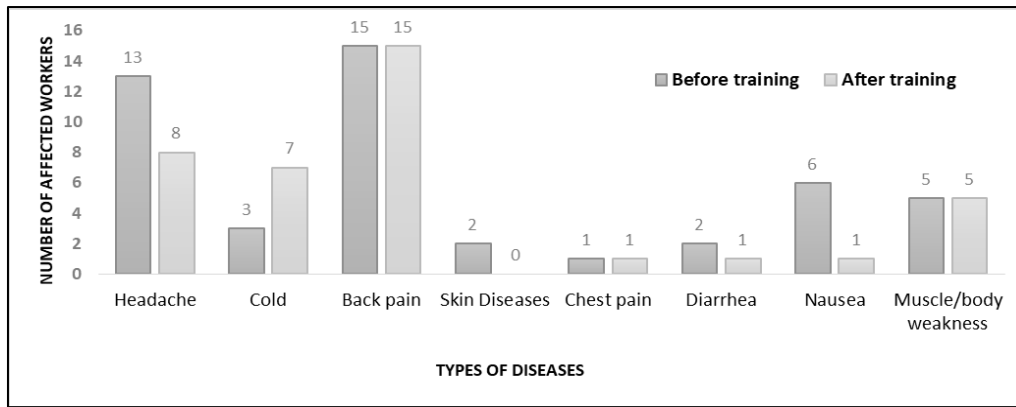


Figure 7: Comparison Between Illnesses Experienced Before and After OHS Training

Figure 6 and **Figure 7** revealed a significant decrease in the number of injuries sustained and the number of illnesses experienced by informal waste workers following occupational health and safety training. It serves as an indicator of the training's effectiveness in making changes in the work and safety practices.

5. DISCUSSION

The findings suggest that Occupational health and safety training have a positive effect on the informal waste worker's attitude and safety behavior, making them more aware of the relevance of their behavior in the avoidance of occupational injury or disease. The training also appears to enhance awareness of the risk of infectious diseases and develop their understanding of the need to treat minor wounds. Prior to the OHS training, the study exposed a substantial knowledge and awareness gap related to waste collection among informal waste workers. This gap puts them at an increased risk of health hazards. However, post-training, there was a notable improvement in awareness among the workers. It is crucial to emphasize that this awareness-building process should be continuous and comprehensive. Hence, there is a pressing need for intervention by local authorities such as KCC to take proactive measures and ensure the sustainability of these improvements in worker safety.

6. CONCLUSIONS

Despite the completion of the occupational health and safety training, residual risks still remains. However, these risks and hazards can be effectively managed by promoting self-protective behaviors among the informal waste workers, emphasizing the importance of wearing all safety gear, not just specific items. Acknowledging that hazards cannot be eliminated from open dump sites, the focus shifts to controlling and minimizing worker exposure as much as possible. A single session of occupational health and safety training session may not suffice to instigate habitual change among informal waste workers. To foster long-term sustainable transformation, a continuous and preferably recurring training approach, ideally facilitated by KCC every few months, is essential. Continuous and comprehensive training on occupational health and safety could also improve the attitude and behavior toward waste collection and enhance awareness among informal waste workers.

To address this ongoing challenge, it is recommended that the KCC continues to provide regular and ongoing training for informal waste workers alongside the formal waste workers' OHS training. These sessions should go beyond imparting knowledge and include fostering a positive attitude towards safety and improving safety practices.

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