

Waste-Pickers' Knowledge of Occupational Hazards and Utilisation of Personal Protective Equipment: A Case Study of Bauchi City, Nigeria

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Abstract

Waste picking plays an important role through resource recovery and also impoverished individuals to cope with poverty especially in less developed countries. The working condition of the waste pickers is a cause for concern as, in most cases; work without safety protective equipment while being exposed to numerous occupational hazards. To address these health and safety challenges, adequate understanding of the pickers' knowledge of the hazards associated with the occupation and their safety protection practices is required. This is the root upon which this study was conducted. It assessed the level of knowledge of waste pickers on occupational health and safety hazards and their safety practices in Bauchi city, northeastern Nigeria. A total of 322 waste pickers were selected from 80 dealers' depots across the study area for questionnaire administration and interview. The findings revealed that up to 74% of the pickers are aware of the health and safety risks associated with the occupation, and 52% are knowledgeable of the measures required to protect their health and safety. However, only a small fraction of the waste pickers was found to be using safety protective equipment regularly, such as boots 8.9%, gloves 3.8%, and nose masks 1.9%. These highlight the high degree of vulnerability to occupational hazards that waste pickers are exposed to. Provision of social interventions, regular medical check-ups, waste segregation from source and enforcement of employer and employee rights by law, between the waste scavengers and their masters were among the recommendations made towards pursuing better occupational health and safety conditions of the waste pickers.

Keywords: Knowledge, Personal Protective Equipment, Occupational Hazards, Waste pickers

INTRODUCTION

Today, in many cities, a lot of people sift through mountains of waste materials looking for recyclables to sell in order to earn living. This activity is called waste picking. According to Lembu (2016) the process of waste picking involves the collection, purchase, and recovery of

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materials for economic benefits. Waste picking plays an important role through resource recovery and diversion of significant amount of waste from dumpsites especially in less developed countries. The activity results in recycling rates of almost 50% for plastics across less developed world (Ali & Yusuf, 2021). This assertion is consistent with the findings of much research such as Ogwueleka (2009) that reported 40% of artisans and small-scale industries in Onitsha, Nigeria receive about half of their raw materials from pickers; and also saves the municipalities of Bangkok, Jakarta, Kanpur, Karachi, and Manila at least U.S \$23 million a year in lower imports of raw materials (Irabor & Oghenekohwiroro, 2017). In addition to employing over 15 million people worldwide (Bonini-rocha 2021), and about 1 million across Nigerian cities (Nzeadibe, 2019). This shows that waste pickers represent a vital resource recovery machine from solid waste stream in many parts of the less developed countries. Further to that, waste picking also plays an important role in the diversion of significant amounts of waste from disposal sites.

However, the working condition of the waste pickers is physically demanding. They trek for hours, often, in harsh weather conditions carrying heavy loads of recyclable materials without adequate rest. This could lead to the development of musculoskeletal problems among other ailments. Also, they are prone to several injuries including cuts from sharp objects such as pieces of glass, razor blades, scrap metals and pricks from piercing items like needles and nails, which eventually become the entry points for infections and diseases (Ali & Yusuf, 2021). Another significant issue is the situation where they, mostly without proper protection, walk on heaps of co-disposed waste materials in dumpsites and use their bare hands to search for recyclables. The dumpsites often contain clinical, harmful, and other hazardous waste materials. This practice is not sustainable and poses considerable amount of risk directly on the health and safety of the pickers and indirectly on wider public health system.

In spite their vulnerability to injury, a number of studies narrated how waste pickers attributed injuries and diseases to supernatural and God's will phenomena, rather than to work-related causes; for example Nzeadibe et al. (2012) reported that the majority of waste pickers in Aba do not believe that the health and safety problems they face are related to their job's activities, but rather to witchcraft from their communities. Chimere et al. (2017) found a similar result across Ibadan, Lagos, and also Aba (however, on e-waste informal workers). Chukwunonye et al. (2009) and Uthman et al. (2017) revealed that the waste pickers in Nigeria are not aware of the dangers of their occupation and are concerned only with the economic benefits of the occupation. The resultant effect of such negative beliefs intensify poor safety compliance among the waste pickers.

In order to address these health and safety issues, it is, important to adequately understand the level of awareness of this group of people on the potential hazards of their occupation and the safety protection measures they practice. This is the basis upon which this research was carried out in Bauchi city, northeastern Nigeria. The study evaluated the level of knowledge of waste pickers on occupational hazards and their health and safety practices at work.

MATERIALS AND METHOD

Area of the Study

The study location is Bauchi city in north-eastern Nigeria (Figure 1), located at 10°18'57"N, 9°50'39"E of the greenwich meridian at an elevation of 616m above sea level. According to World population review the city has a population of almost 621, 000 inhabitants as at 2021. The city was chosen because it serves as safe zone for the residents of the neighbouring states

of Borno, Yobe, and Adamawa due to the recent Boko Haram insurgency and also the security instability of Plateau state. This led to increased dependency on informal activities (including waste picking).

Similarly, the state has about 1,080,150 out-of-school children, which is the second highest in Nigeria after Kano State (United Nations International Children's Emergency Fund [UNICEF], 2019).

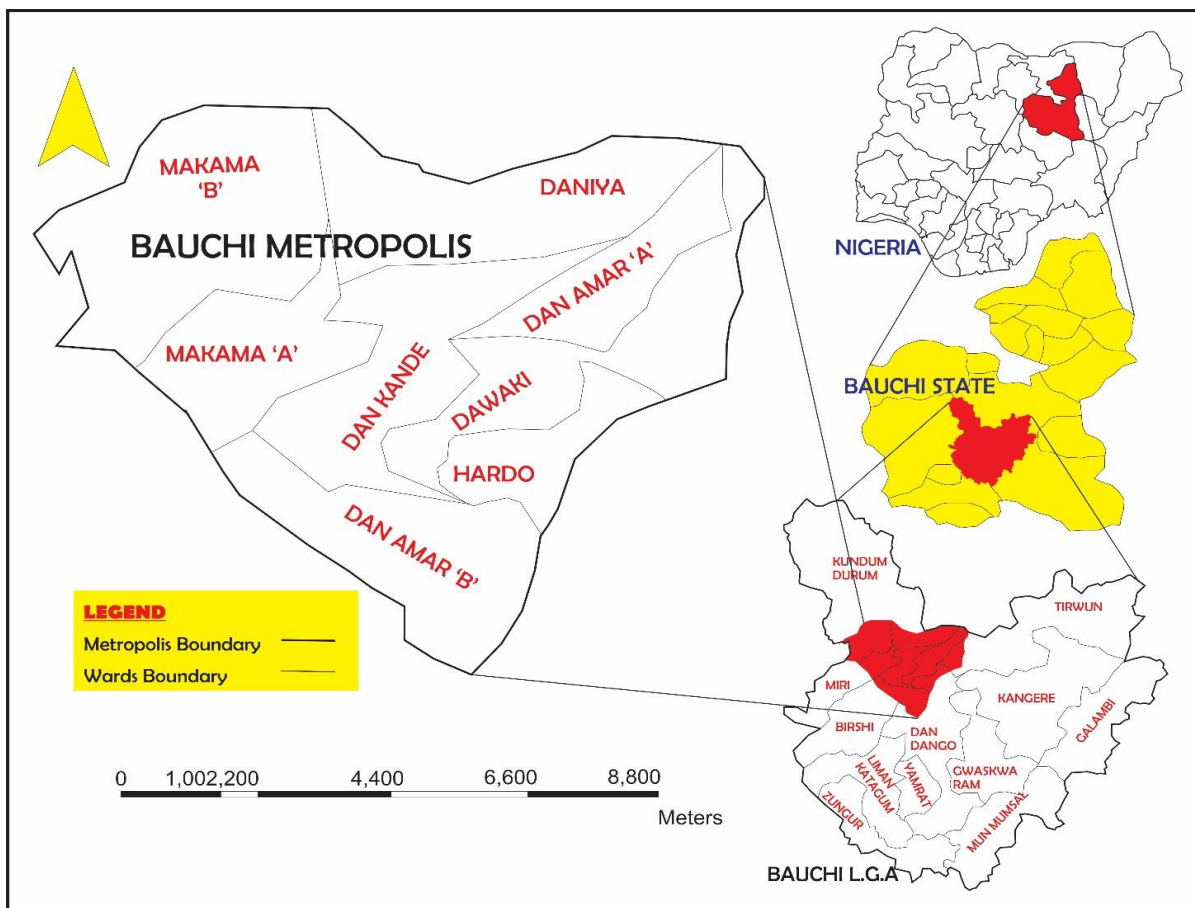


Figure 1: Map of the study area
Source: Modified from Immunization unit, Bauchi Local Government Secretariat (2019)

Study Design and Sampling Procedure

Mixed method design was adopted for this study due to the flexibility needed to accommodate the whole nature of the research objectives. The method was used to mix quantitative and qualitative data in the collection and analysis stages in a single study (Crowell & Plano, 2011). The result of the qualitative data will support the quantitative data and reflect the voice of the waste pickers and their masters where needed.

The study represents the entire population of waste pickers working in a 32 square kilometres of Bauchi urban area that covers eight administrative wards in one local government. The study comprised waste pickers engaged in picking plastic recyclables (*robobi*), rubber recyclables (*danko*), aluminium & metal recyclables (*dalma da karfe*), bottles and cable (*kwalba da waya*) and carton box (*kwali*).

Using stratified and simple random sampling, 80 middlemen shops were selected from 121

registered middlemen from their union. In order to ensure proper representation of the population of the study, the middlemen shops were selected based on the type of recyclables they purchase; i.e., from those who buy plastic bottles ("robobi"), rubber ("danko"), aluminium and metal ("dalma da karfe") bottles and cables ("kwalba da waya"), and carton boxes ("kwali"). A total of 322 waste pickers were sampled across the 80 middlemen shops; the selection was based on the numbers of waste pickers per middlemen shop. The sampled locations were visited mostly between 4pm and 6pm, when the waste pickers typically arrive at the Middlemen shops to sell their recyclable items. Questionnaires were used to capture data from the waste pickers, and interviews were conducted in the local language (Hausa) to complement the responses. The interview comprised two sections: one for the waste pickers, and one for the middlemen. This helped obtain sufficient information required for the study, and also elicited the co-operation of the middlemen in the sense that they felt involved and comfortable with the data gatherings. Field observation was also undertaken where pictures of injuries were taken, alongside other vital information related to waste picking activities.

Data Collection

Questionnaires were distributed to capture data from the sample and interviews were also conducted to complement the responses.

Data Analysis Tools

Frequencies and percentages were calculated in Microsoft Excel for clear view of Personal Protective Equipment usage in tabular form. 5-point Likert scale statements on risk and safety were analyzed using mean standard deviation in Microsoft Excel.

Method of Data Analysis

Mean standard deviation was used in evaluating knowledge of the waste pickers on health and safety risks of their occupation using SPSS. This was achieved using 5-point likert rating scale, where an item with the mean response of:

- 5.00 - 4.50 was considered as Strongly Agree
- 4.49 - 3.50 Agree,
- 3.49 - 2.50 Neutral,
- 2.49-1.50 Disagree and
- <1.50 Strongly Disagree

Subsequently, chi-square statistical tool was used at $p=0.05$ value to find the difference or gap between knowledge of the waste pickers on occupational risk and the use of PPE in the dumpsites; as well as difference between knowledge of waste pickers on occupational health and safety (OHS) measures and use of PPE.

RESULTS AND DISCUSSION

Seventy seven (77) out of eighty (80) sampled waste middlemen' depots were successfully visited where 313 out of 322 waste scavengers were reached. The short of 3 depots was due to the change of business' location by the owners, and all effort to trace the new locations failed

Demographic Characteristics of the Respondants

The findings presented in Table 1 indicate that all the respondents were male. This shows that waste picking is a male dominated occupation in the study area due to the culture of the area that discourage women from participating in some informal occupations. According to the Table, underaged children and teenagers form most of the waste picking workforce. This is a cause for concern as most of these children don't go to school at all and are continuously being

exposed to environmental and occupational hazards. It was observed that most of the waste pickers are uneducated and lack the basic skills to work in formal sectors, leaving them with no better alternative than to engage in waste picking for survival. Also, 44% of them work for more than 8 hours a day and 66% worked 7 days a week. This is hazardous and not in line with the international best practice and EU Directives that stipulates 48 hours as the ideal worktime per week with a maximum of 8 hours per day (Lee et al., 2007).

Table 1: Demographic characteristic of the respondents

| Characteristic | Frequency | Percentage | Characteristic | Frequency | Percentage |
|--------------------------|-----------|------------|---------------------------|-----------|------------|
| Sex | | | Working Experience | | |
| Male | 313 | 100 | 1year and below | 86 | 28 |
| Female | 00 | 00 | 2-5years | 120 | 38 |
| Total | 313 | 100 | 6-10 years | 60 | 19 |
| Age | | | 11 and above | 47 | 15 |
| 18 and below | 161 | 52 | Total | 313 | 100 |
| 19-29 | 121 | 38 | Working Season | | |
| 30-39 | 26 | 09 | All Seasons | 248 | 79 |
| 40 and above | 04 | 01 | Dry season | 62 | 21 |
| Total | 313 | 100 | Rainy Season | 00 | 00 |
| Educational Level | | | Total | 313 | 100 |
| None | 111 | 35 | Working Hours | | |
| Primary | 127 | 41 | 1-3 Hours | 38 | 12 |
| Secondary | 74 | 24 | 4-7 Hours | 135 | 44 |
| Tertiary | 00 | 00 | 8-10 hours | 134 | 43 |
| Total | 313 | 100 | 11+ Hours | 03 | 01 |

Knowledge of Waste pickers on Occupational Health and Safety

According to the results presented in Table 2, waste pickers in Bauchi were aware of the hazards associated with waste picking at 3.70 grand mean. This is equivalent to 74% of the total respondents. This result highlights greater awareness of waste pickers in Bauchi compared to what Uthman *et al.* (2017) found in Ilorin where only about 57% of the waste pickers were aware of the work-related hazards of the occupation.

Table 2: Risk Knowledge of waste pickers

| Risk Knowledge | Mean | STD |
|---|-------------|------|
| a. Blood transmissible diseases | 3.89 | 1.43 |
| b. Infectious diseases cause by insects and animals/reptiles | 3.94 | 1.27 |
| c. Contact with human and animal faeces | 4.08 | 1.22 |
| d. Lifting of heavy loads, alternate bending and trekking | 4.06 | 1.11 |
| e. Bites by insects, reptiles, dogs and mice | 3.42 | 0.91 |
| f. Exposure to chemicals through inhalation of waste smoke | 4.26 | 1.03 |
| g. Picking of poisonous containers mixed with solid waste | 4.00 | 1.07 |
| h. Eating food remnant from dumpsite | 3.73 | 1.51 |
| i. Risks of waste items which cause tetanus such as nails, needles, razor <i>etc.</i> | 3.85 | 1.56 |
| j. Accident cause by refuse truck and trolley | 3.21 | 1.17 |
| k. Long-term diseases like heart attack and cancer cause by exposure to waste materials | 1.65 | 1.36 |
| l. Attacks by mad people in the dumpsites and its legal implication | 4.26 | 1.12 |
| Grand Mean | 3.70 | |

Additionally, about 4 in 5 of the waste pickers were aware that getting contact with blood through cuts (especially from clinical waste) can cause diseases. Although most of them are not aware of the kind of diseases that can be transmitted through blood contact, they know that there is a possibility of contracting diseases. Similarly, most (78.8%) of them agree with

the fact that poisonous animals are often encountered in dumpsites and could bite and cause infections or poisoning that may be fatal. Likewise, 82% of the respondents are aware that contact with human excreta, animal remains, and sanitary pads could lead to deadly diseases such as cholera, hepatitis *etc.* A similar percentage are also aware that alternate bending and trekking with heavy loads cause musculoskeletal ailments. This is obvious as significant numbers of the waste pickers' complaint of joints pains.

It is confirmed by some of the respondents that they often get bottle container with remains of urine or other liquid substances. Most the respondents confirmed that they don't pick such bottles, which indicates that they are aware of the dangers behind it. It is discovered that 16% of the waste pickers eat food remnants in the dumpsites. One of these respondents narrated that:

'We occasionally eat leftover food that comes out from expensive hotels and houses of wealthier men, because the food at times looks fresh, we always remember to pray first before taking it to our mouths because of fear of socery. But if we discover that the food has fermented, we don't eat.'

Three quarter of them are not aware that people exposed to waste are likely to contract long term chronic diseases such as cancer. Some of them were shocked and frightened when they heard this. Moreover, 83% acknowledged that no legal action is taken against anyone in Nigeria when a scavenger is attacked or injured by violent mad men while working in dumpsites.

Table 3 shows that the grand mean of the safety measures knowledge is 2.77 (agree), which is equivalent to 55%. This implied that Bauchi waste pickers have a fair knowledge of the health and safety measures of picking. However, the result shows that they don't go for periodical medical check-ups. As a matter of fact, they seemed to not to care much about health conditions. Similarly, most of them have not attended any training on safety knowledge or induction regarding waste picking. They jumped into the occupation for livelihood without the basic knowledge of safety measures and the risks associated with the work.

Table 3: Knowledge of waste pickers on health and safety measures

| Health and Safety Knowledge | Mean | STD |
|--|-------------|------------|
| a. Health implications of waste picking activity | 3.85 | 1.56 |
| b. Knowledge on importance of PPE | 4.40 | 1.25 |
| c. Willingness to pay for PPE | 1.83 | 1.64 |
| d. Practical use of PPE | 2.80 | 1.64 |
| e. Use of local protective such as leather, stick, rubber shoe <i>etc.</i> | 1.46 | 1.44 |
| f. Taking shower after work | 4.59 | 0.92 |
| g. Hand washing before having meal | 4.61 | 0.97 |
| h. Changing cloth after working hours | 2.51 | 1.32 |
| i. Avoiding recyclables that are dirty or amidst of hazardous waste | 2.02 | 1.13 |
| j. Avoiding contact with biological wastes | 2.04 | 1.18 |
| k. Taking periodical medical examinations and vaccines | 1.40 | 1.52 |
| l. Safety induction/training | 1.77 | 1.29 |
| Grand Mean | 2.77 | |

Use of Personal Protective Equipment (PPE) among Waste pickers

The result in Table 4 also shows that only 8.9% of the waste pickers regularly used safety boots at work, while 8.3% used them sometimes, 12.5% rarely used and the rest of 78.6% never used

them at all. As for hand gloves, only 3.8% were found to be using them regularly, while 7.6% and 12.5% did sometimes and rarely, respectively. The remaining 80% did not use them completely. Just 2.8% used pushcart sometimes and 1.3% rarely. The remaining 95.1% felt it was not important, as the recyclables were not heavy enough. Similarly, the result shows that only 1.9% wear nose-masks regularly, 2.9% and 5.1% did so sometimes and rarely and the remaining 92% never use masks.

Table 4: Use of personal protective equipment among waste pickers

| PPE | Regularly | | Sometimes | | Rarely | | Never | |
|------------------|-----------|-----|-----------|-----|--------|------|-------|------|
| | No. | % | No. | % | No. | % | No. | % |
| Boot | 28 | 8.9 | 26 | 8.3 | 39 | 12.5 | 237 | 78.6 |
| Hand gloves | 12 | 3.8 | 24 | 7.6 | 39 | 12.5 | 235 | 80.0 |
| Nose mask | 6 | 1.9 | 9 | 2.9 | 16 | 5.1 | 280 | 92.0 |
| Push cart | - | - | 9 | 2.8 | 4 | 1.3 | 297 | 95.1 |
| Protective cloth | - | - | - | - | - | - | 313 | 100 |
| Grabber-pooper | - | - | - | - | - | - | 313 | 100 |
| Sorting Fork | - | - | - | - | - | - | 313 | 100 |

It is worthy of note that none of the waste pickers was found to be using protective cloth, grabber pooper and sorting fork. This result differs from what Uthman *et al.* (2017) found in Ilorin and Black *et al.* (2019) found in Kathmandu that about 33.2% and 32.4% respectively were making use of PPEs. However, it was discovered that 19% of the waste pickers used local protective gear, such as light pipe and stick in place of sorting fork; rubber shoes (Plate 3) and tyre slippers (Plate 2) in place of safety boots; magnet (for metal waste pickers) in place of grabber pooper (Plate 1) and cotton socks (Plate 4) in place of gloves. Most of the interviewees responded that they could not afford the ideal PPE and so used local protective equipment to protect themselves from injuries and contracting diseases.



Plate 1: Magnet used as metal grabber-pooper



Plate 2: Tyre slippers used as safety-boot



Plate 3: Rubber sandal used as safety boot



Plate 4: Cotton gloves used as safety gloves

The Chi-square result shows that there is a significant association between educational qualification ($p=0.000$) with PPE utilization. While age ($p=0.051$), working experiences ($p=0.062$), working hours ($p=0.057$), working days ($p=0.076$) and working season ($p=0.099$) have not any association with PPE utilization. This is true as many adult waste pickers gave similar responses (regarding use of PPE) compared with children waste pickers. This proved that age and the years spent in the occupation do not determine the level of PPE utilization by the waste pickers.

Table 5: Summary of chi-square test for association of occupational characteristics

| Variables | X ² | d.f | p value |
|---------------------------|----------------|-----|---------|
| Age | 264.82 | 2 | 0.051 |
| Educational qualification | 120.34 | 1 | 0.000 |
| Working Experiences | 265.11 | 2 | 0.062 |
| Working Hours | 217.83 | 2 | 0.057 |
| Working Days | 626.21 | 1 | 0.076 |
| Working Season | 681.24 | 1 | 0.099 |

*0.05 p-value

Discussion of the Results

Considering the level of PPE utilization as shown in Table 4, it is obvious that waste pickers' attitude towards safety measures is poor despite their fair knowledge of the importance of observing safety measures in dumpsites. Poverty, negligence, beliefs and wrong perceptions might be among the factors that hinder the use of PPE. Furthermore, there may be lack of concern by the pickers' masters (i.e., waste dealers), who gains more benefit from the occupation.

According to Table 2, about 3 in 4 of the waste pickers had fair knowledge of the hazards associated with waste picking. This level of knowledge, however, is not matched with the level of using PPE regularly at work. As presented in Table 4, as few as only 8.9% of the respondents were found to be using protective boots, 3.8% uses protective gloves and only 1.9% use nose masks for protection at work regularly. However, interviewing a number of those not using PPEs regularly revealed that most of them would be glad to use the PPEs properly if they are provided and trained on using them. Some of the pickers confessed that they want to protect themselves from the threats involved but can't afford to buy the ideal PPEs. Another group of the pickers appears to have a fair knowledge of the dangers of the occupation, but they don't care to use PPEs regularly. For example, one of them confessed that he didn't use PPE and when asked why? He replied:

"I feel discomfort whenever I wear such things in my body, so I just take care of myself in the dumpsites. For example, I don't pick any dirty waste item and I keep myself off from human faeces and other biological wastes, that's all."

Among the other reasons cited by the waste pickers are:

"I'm aware of the dangers of my job, but I prefer to work without PPE for better handling of object"; "It feels hot when I wear PPEs, it hurts my body parts"; "I'm struggling to meet my daily meal not PPE".

This, therefore, indicates that even if they consider picking as dangerous, it doesn't seem to go along with greater caution in terms of using PPE. This is similar to findings of Ohajinwa *et al.* (2017), which reported that majority of informal workers in Nigeria did not think that picking

jobs pose any risk; they mainly work for economic benefits. Based on the above discussion, the waste pickers in Bauchi city are categorized into three groups in terms of knowledge of occupational risks and safety; viz. those that have knowledge of occupational risks and use PPEs; those that have knowledge and don't use PPE and those that don't have knowledge and don't use PPEs as well.

CONCLUSION

The study revealed majority of Bauchi waste pickers (74%) were aware of the risks associated with waste; and 55% have fair knowledge on OHS, however only small fraction of them were using PPE. This implies that they do not adhere to safety rules while in the dumpsites. If this attitude persists, will intensify the occurrences of injury and eventually lead to loss of lives and the transmission of diseases to the general public. The study also found a significant difference between knowledge of the waste pickers on occupational risks and PPE utilization. The result implies that despite the knowledge of waste pickers on occupational risks and the importance of safety practice; the knowledge exceeded their practical use of PPEs in the dumpsites. This, therefore, indicates that even if waste pickers consider picking job's activity as dangerous, it doesn't seem to go along with greater cautions in terms of safety practices. The study recommended awareness campaign by NGOs and other environmental agencies to educate waste pickers on the necessity of using PPEs in the dumpsites. This will be met by involving waste pickers' masters to monitor their boys (waste pickers) to ensure the effective use of PPEs. By so doing, maximum safety compliance will be realized and thus reduce the potential risks present in the picking activity. Ease access to regular medical check-ups and immunization against tetanus, typhoid, and hepatitis viral infections should also help to prevent waste pickers from contracting diseases. Waste segregation from source, as well as designating sites for clinical and other hazardous waste dump should minimize the occurrence of injuries among the waste pickers. Finally, NLC and ILO should also ensure the employer and employee rights are maintained according to the laws, between the waste scavengers and their masters. This is because waste pickers become victims of labour exploitation by intermediaries and waste recyclers to the extent that they work from sun rise to sun set without break and yet cannot afford personal protective equipment.

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