

## Use of personal protective equipment among waste workers of Sisdol landfill site of Nepal

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### ABSTRACT

**Introduction:** Solid waste management is a major issue in Nepal with Kathmandu valley generating the highest amount of solid waste. After recovery, the solid waste generated in Kathmandu valley is transferred to the Sisdol landfill site. There are waste workers in Sisdol landfill site who sustain their livelihood by collecting recyclables from those wastes. Personal protective equipment (PPE) is necessary to protect the frontline waste workers against infection. In addition, the waste workers need to know the proper usage of PPE in order to protect themselves from contamination. This study aimed to assess the awareness and proper usage of PPE along with the challenges faced by the waste workers at Sisdol landfill site.

**Methods:** A descriptive cross-sectional study was conducted to collect data from landfill waste workers of Sisdol located at Kakani Rural Municipality in Nuwakot district of Nepal. A convenience sampling method was used based on the availability of landfill waste workers on that day and their willingness to participate. The data was collected using the structured questionnaire and personal interview of available waste workers.

**Results:** The study comprised of 65% female and 35% male waste workers. The highest percentage of waste workers belonged to 27-37 years age group occupying 43% of total respondents. Around 92% waste workers had participated in any orientation/training or session related to PPE and its usage. About 60% landfill waste workers were found only using mask and gloves.

**Conclusion:** There is small number of waste workers who wish to wear full set of PPE. Most of them only like to wear mask and gloves. The gender, age group and the education level of waste workers had no association with the usage of PPE during the work.

**Key words:** Landfill, Nepal, Occupational Risks, Personal Protective Equipment, Sisdol, Waste Worker

### Introduction

Solid waste management is a major issue in Nepal having unsanitary waste management and disposal practices.<sup>1,2</sup> Most of the studies have identified rapid population growth, urbanization and

poor management by municipalities as the major challenges for the effective solid waste management in Nepal.<sup>3-10</sup> In 2017, the projected waste generation of Nepal was about 3023 tons per day with average per capita waste generation rate of 0.223 kg/person/day.<sup>1,9</sup> Around 44% of municipal solid waste in Kathmandu valley are the reusable and recyclable materials.<sup>11</sup>

Kathmandu valley generates the highest amount of solid waste in Nepal with 87% waste collection rate.<sup>12</sup> The solid waste management has become a major challenge for Kathmandu leading most of the collected waste being dumped at the landfill site.<sup>13</sup> Due to inadequate collection services, the dumping of

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waste in public place has become a common practice in Nepal.<sup>14</sup> The waste collected from most areas of Kathmandu valley are transferred to Sisdol landfill site located in Nuwakot district. Landfill waste workers are poor and marginalized and sustain their livelihood by collecting recyclables.<sup>15,16</sup> Most of the waste workers at landfill sites are poor rural migrants shifted to urban settings in search of work and play major role in solid waste recycling in low-income countries.<sup>17,18</sup> The physical injuries and cuts during the work are the common occupational risks associated with the landfill waste workers at Sisdol.<sup>19,20</sup> The waste workers have less knowledge of occupational health risks and adopt less safety practices at their working site.<sup>21</sup> A study done in dumping sites of Thailand had recommended to incorporate the landfill workers into the formal sector program to reduce work related health hazards.<sup>22</sup>

Personal protective equipment (PPE) acts as a key component for protecting the frontline waste workers against infection.<sup>23</sup> However, there is very low use of PPE among waste workers in Nepal.<sup>24</sup> The proper usage of PPE is necessary to understand in order to protect an individual from contamination.<sup>25</sup> The PPE helps to protect the waste workers from adverse health hazards.<sup>20</sup> The protection of the waste workers can be achieved by wearing PPE such as mask, gloves, shoes, caps, dress, goggles and face shield.<sup>26</sup> Thus this study intends to assess the knowledge regarding the usage of PPE and challenges faced by waste workers for making this as habit for regular use at Sisdol landfill site.

## Methods

A descriptive cross-sectional study was conducted to collect data from landfill waste workers of Sisdol located in Nuwakot district of Nepal in February 2021. Sisdol is the biggest landfill site of Nepal. A convenience sampling method was used based on the availability of landfill waste workers on that day and their willingness to participate.<sup>27</sup> The waste workers at Sisdol landfill site were not engaged with any institution and working independently (informally) so there was no record of exact number of waste workers working at the Sisdol landfill site. Only 37 people agreed to participate in our survey conducted at the landfill site. The landfill waste workers giving consent were the part of this survey and had been considered as the sample. The data was collected using the structured questionnaire through face-to-face interview. The questionnaire consisted of

the demographic information of landfill waste workers, knowledge of PPE and its usage. Further, a Chi-square test was done to find the association between the variables. Analysis was done using statistical package for social sciences (SPSS) version 20. A consent (Yes/No) was filled up by researchers as most of the respondents were illiterate. Also the landfill waste workers of 16 years and above and those willing to answer the questions (chosen Yes in consent) were only included in this study.

## Results

The demographic status of respondents have been presented in Table 1. A total of 37 waste workers at Sisdol landfill site were studied to determine the knowledge, proper usage and challenges of using PPE at the workplace. Comparatively more females were interested to take part in this study. The study comprised of 65% female and 35% male waste workers. The highest percentage (43%) of waste workers belong to 27-37 years age group. The least number (14%) of waste worker belong to 16-26 years age group. Around 54% of the respondents didn't have any formal education. Very less (8%) respondents had passed the secondary level.

All the respondents (100%) had heard about PPE and were aware of the benefits of its usage (Table 2). Three major sources of gaining information about PPE were identified during the study. Around 68% waste workers claimed that they have received information about PPE from media. Also 92% waste workers had participated in training or any session related to PPE and its usage. Out of 92% people who had participated in any training or program, around 91% said that the training on PPE was provided by NGO/INGOs.

Regarding the proper usage of PPE at workplace and challenges, five percent landfill waste workers only used gloves whereas maximum (60%) waste workers used both mask and gloves (Table 3). Majority (64%) of females declared using both mask and gloves as compared to males (36%). It was found that most of the waste workers were using the reusable rubber or fabric gloves. Only three percent were using full set of PPE including mask, gloves, shoes, cap, goggles, jacket and trouser (Table 3). Maximum (81%) waste workers have never used full set PPE at their workplace. From gender perspective, out of total respondents, 63% female had never used full set of PPE compared to male (37%) (Figure 1).

The major difficulty in using full set of PPE was uncomfartability (57%) during waste segregation (Table 3) while 40% found the PPE to be unsuitable for the summer season. Majority (86%) were using PPE due to mandatory notice from the local bodies.

The association between sociodemographic components with usage of full set of PPE have been

presented in Table 4. Gender, age groups and the education level were found to have no association with the usage of whole set of PPE during the work (p-value>0.05). It means usage of whole set of PPE during work is independent with gender, age group and education level.

**Table 1:** Demographic status of landfill waste workers (n=37)

Variables	Frequency (n =37)	Percentage (%)
<b>Sex</b>		
Male	13	35
Female	24	65
<b>Age group (yrs)</b>		
16-26	5	14
27-37	16	43
38-48	10	27
49-59	6	16
<b>Education Level</b>		
No formal education	20	54
Primary level	14	38
Secondary level	3	8

**Table 2:** Knowledge of PPE and source of information (n=37)

Variables	Frequency (n=37)	Percentage (%)
Have heard about PPE	Yes	37
	No	0
Source of information	Relatives	3
	Media	25
	Organization	6
	Other	3
Participated in training/ session on PPE	Yes	34
	No	3
Training provider	Governmental bodies	3
	NGO/INGO	31

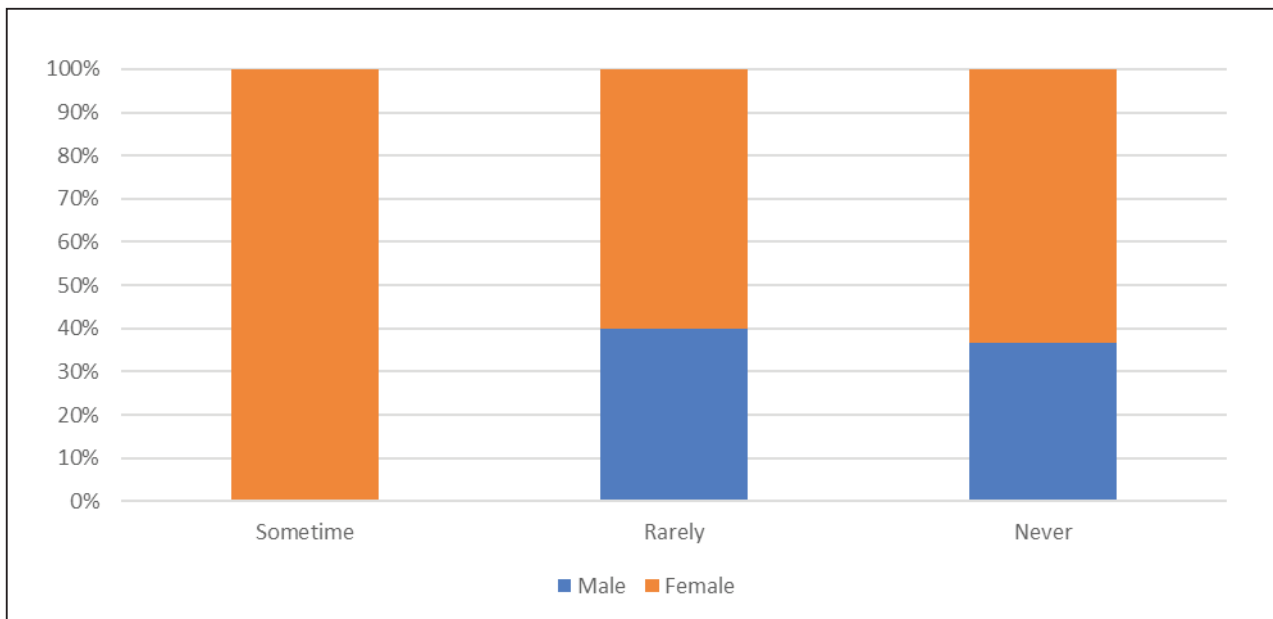
**Table 3:** Use of PPE and its challenges (n=37)

Variables	Frequency (n=37)	Percentage (%)
Most commonly used PPE	Gloves only	2
	Mask and gloves	22
	Mask, gloves and shoes	12
	Full set (mask, gloves, shoes, cap, googles, coverall set)	1
Usage of full set PPE at work	Sometime	2
	Rarely	5
	Never	30
Difficulty using PPE	Uncomfortable during work	21
	Not suitable for this season	15
	Other	1

Reason of using PPE	Own safety	1	3
	Fear of COVID	3	8
	Forced by local bodies	32	86
	Other	1	3
Want to continue using PPE	Yes	34	92
	No	3	8

**Table 4:** Association of different characteristics with usage of whole set of PPE (n=37)

Characteristics	Usage of whole set PPE			Total n (%)	P value
	Sometime n (%)	Rarely n (%)	Never n (%)		
<b>Sex</b>					
Male	0 (0)	2 (15)	11 (85)	13 (35)	0.558
Female	2 (8)	3 (13)	19 (79)	24 (65)	
<b>Age Group (yrs)</b>					
16-26	1 (20)	1 (20)	3 (60)	5 (14)	0.166
27-37	0	1 (6)	15 (94)	16 (43)	
38-48	0	3 (30)	7 (70)	10 (27)	
49-59	1 (17)	0	5 (83)	6 (16)	
<b>Education level</b>					
No formal education	1 (5)	4 (20)	15 (75)	20 (54)	0.401
Primary level	1 (7)	0	13 (93)	14 (37)	
Secondary level	0	1 (33)	2 (67)	3 (8)	

**Figure 1:** Frequency of using PPE at work place based on gender

## Discussion

The study found that there were more females than males working as the landfill waste workers. Females were interested and ready to share the information regarding their work. It is similar to a study done in Nigeria which found women to be more active even in the household solid waste management.<sup>31</sup> Also

a study about gender concern on the environment revealed that though men had more knowledge about environmental issues but women were found to be more concerned about it.<sup>32</sup>

More than 50% landfill waste workers had never attended the school for formal education. Though education is considered as the major factor for

economic and social development of the country, Nepal still needs to work more on improving the educational inclusion for achieving the sustainable development goal four named quality education.<sup>33,34</sup> The literacy rate of Nepal was 69% in 2019.<sup>35</sup> A longitudinal study done in Nepal found gender discrimination in education with parents focusing more on male education.<sup>36</sup> This may be the reason that all the waste workers don't have multiple employment opportunities due to limited education and skills.<sup>37</sup> All the landfill workers had heard about PPE and were aware about the benefits of using it during the work. This is similar to an online survey about the precaution and importance of PPE which found that the majority of respondents had enough knowledge about the protective gears.<sup>38</sup> In another study, around 50% people claimed that they had received clear and complete information about the use of PPE.<sup>39</sup> This is less than what was found in the study done in Sisdol landfill site. Around 68% people said that the media played an important role in disseminating clear information about the benefits of using PPE.

Most of the people (60%) working at Sisdol landfill site were found using mask and gloves. This was similar to the study where face masks and gloves have been commonly used to protect from respiratory and other infections.<sup>40</sup> Talking about the usage of full set of PPE during work, 81% of the landfill waste workers were not using it. A cross-sectional survey of informal waste workers in Kathmandu found about 73% of workers considered their job as risky, however only 68% people weren't found using PPE.<sup>24</sup>

Most of the landfill workers (92%) would like to continue using PPE in the future. This was more compared to Iranian study in 2019 which claimed that only about 56% respondents had agreed to use full set of PPE in future.<sup>41</sup> Though the waste workers were aware about the health impact that might cause in absence of PPE, the affordability was also a concern. In most of the cases, the mask and gloves were widely used by waste workers without cleaning it properly. This need to be properly monitored by the landfill officials.

The major difficulty in using full set of PPE was identified as uncomfotability while doing work. This finding aligns with a study done in Egypt in 2020 which found discomfort and lack of knowledge using PPE as the main reasons of not using PPE.<sup>42</sup>

## Conclusion

The usage of PPE among waste workers at Sisdol landfill site in Nepal is not satisfactory. Despite all the landfill waste workers having proper information about PPE, very few respondents have been using full set of PPE while doing work. There is very less number of waste workers who wish to wear full set of PPE. Most of them only like to wear mask and gloves. The majority of the waste workers have discomfort while wearing PPE, yet, want to continue wearing it in future. There is necessity of proper monitoring mechanism to ensure that the landfill waste workers at Sisdol uses full set of PPE to protect from associated occupation health risk.

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