Musculoskeletal Disorders and Other Occupational Health Outcomes Among the Sanitation Workers in Nepal: A Community Based Cross-Sectional Survey Exploring the Risk Factors, Knowledge and Practice

Samip Khatri[1], Gita Shah[1], Pratibha Bhandari[1], Sweta Koirala[1], Kalidas Neupane[1], Sonam Magar[1], Monika Chaudhary[1], Bipan Bahadur Tiwari[1], Antra Kapar[1], Kurt Rasmussen[2] , Erik Jørs[3], Dinesh Neupane[1,3,4]

[1]**Nepal Development Society**, [2]Department of Occupational Medicine, Goedstrup Hospital, [3]University of Southern Denmark, [4]Johns Hopkins University

Presentation By:

Nepal Development Society

Gita Kumari Shah | Samip Khatri

Background

- Sanitation workers, particularly from low- and middle-income countries (LMICs), are particularly vulnerable due to unregulated or unenforced labor related policies, including lack of occupational health and safety measures [1-3].

- It is essential to recognize their rights, provide them with support, and improve their working conditions. This also reflects the agenda of Sustainable Development Goal of decent working conditions, as called for by Sustainable Development Goal 8 [4].

- Studies conducted in Nepal are mostly focused on specific geographical locations and have failed to capture the broader occupational health challenges faced by the sanitation workers in diverse settings across the country [5-8].

Objectives

- To assess work-related musculoskeletal disorders and other occupational health outcomes.
- To assess knowledge and practices pertaining to occupational health risks among sanitation workers in five metropolitan/sub-metropolitan of Nepal.
- To identify the factors associated with musculoskeletal disorders.

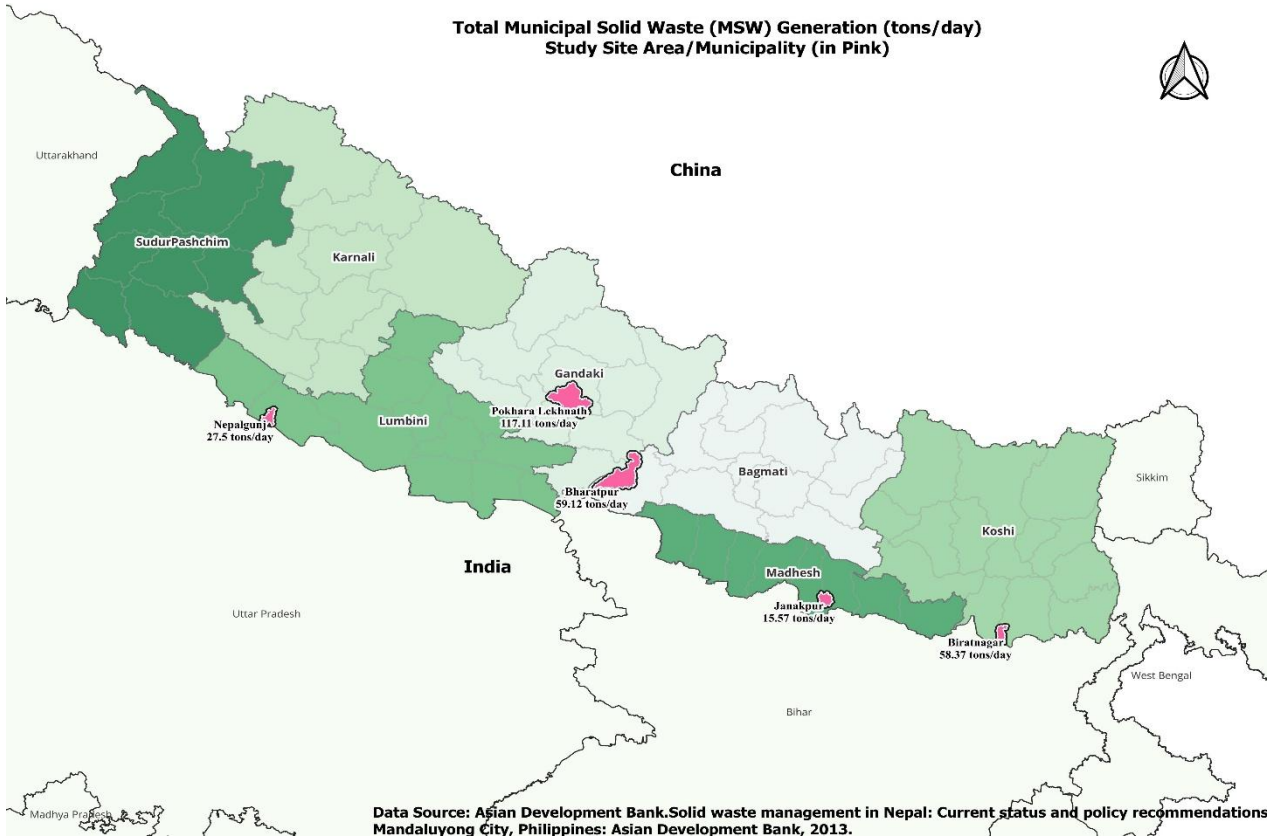
Methodology

Study Design:

Community-based quantitative cross-sectional survey.

Study Setting:

- Biratnagar (Koshi)
- Janakpur (Madesh)
- Bharatpur (Bagmati)
- Pokhara (Gandaki)
- Nepalgunj (Lumbini)



Methodology

Sampling technique and Sample size:

- Nonprobability total enumerative sampling method (open invitation was sent).
- A total of **790 sanitation workers** attended the health camp and completed the survey.

Data Collection tools and procedure:

- Face to face interview and Doctor's Observation
- Closed-ended structured questionnaire and doctor observation sheet was employed for data collection
- All the occupational health outcomes including musculoskeletal disorder was assessed by medical doctor.
- Knowledge level of the sanitation workers was based on the Likert scaled 13 sub question which included different aspects on preventing occupational health risks such as alcohol/tobacco consumption, PPE usage, body postures and hygiene related knowledge.

Methodology

- Practices of sanitation workers were based on their daily habits of PPE usage, hygiene and eating habits.

- The blood pressure was measured using a digitally validated Omron device (model number HEM-7361T-EBK). Three separate readings were recorded (both systolic and diastolic readings) at least 60 seconds apart for the calculation of average blood pressure. Non-hypertensive (systolic<140 or diastolic < 90) and hypertensive (systolic >= 140 or diastolic >= 90).

- All the data were entered into the REDCap via mobile application.

Methodology

Statistical Analysis:

- Chi-Square test was performed for categorical-to-categorical analysis, whereas one-way ANOVA (working hours per day) and Kruskal-Wallis test (age, working days per week).

- Multiple logistic regression model (automated stepwise backward selection method) to assess the predictors of musculoskeletal disorder.

- Odds ratio and 95% CI were used to estimate the magnitude of the association. p-value less than 0.05 were considered significant.

Methodology

Ethical Clearance:

- Approval letters were obtained from each of the municipalities to conduct health camps.
- Ethical clearance was obtained from the Nepal Health Research Council (Reference number 1260) dated February 8, 2024.
- The objective of the study was clearly explained prior to obtaining the written consent from the study participants.
- Written consent was obtained from the legally authorized representatives of minors (those younger than 18 years old). A written assent was also obtained from the participating minor.

Results

Table 1: Socio-demographic characteristics of Sanitation Workers

Variables	Types of Sanitation Workers					p value
	N (%)	Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
No. of sanitation workers	685 (100)	305 (44.5)	169 (24.7)	154 (22.5)	57 (8.3)	
Age Med (Min, Max)	32 (15, 75)	34 (17, 68)	26 (15, 75)	35 (20,68)	27 (16,65)	<0.001
Sex						<0.001
Male	507 (73.3)	142 (46.6)	164 (97.0)	154 (100.0)	42 (73.7)	
Female	185 (26.7)	163 (53.4)	5 (3.0)	0 (0.0)	15 (26.3)	
Name of Municipality						<0.001
Bharatpur	108 (15.6)	19 (6.2)	31 (18.3)	23 (14.9)	34 (59.6)	
Janakpur	147 (21.2)	108 (35.4)	4 (2.4)	30 (19.5)	4 (7.0)	
Pokhara	118 (17.1)	16 (5.2)	55 (32.5)	45 (29.2)	1 (1.8)	
Biratnagar	179 (25.9)	82 (26.9)	44 (26.0)	34 (22.1)	17 (29.8)	
Nepalgunj	140 (20.2)	80 (26.2)	35 (20.7)	22 (14.3)	1 (1.8)	

Results

Table 1: Socio-demographic characteristics of Sanitation Workers

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Marital Status						<0.001
Married	572 (83.0)	260 (85.5)	123 (73.2)	140 (91.5)	43 (75.4)	
Unmarried	93 (13.5)	25 (8.2)	43 (25.6)	12 (7.8)	13 (22.8)	
Single after being married	24 (3.5)	19 (6.2)	2 (1.2)	1 (0.7)	1 (1.8)	
Education						<0.001
Illiterate	256 (37.0)	172 (56.4)	41 (24.3)	22 (14.4)	19 (33.3)	
Literate	61 (8.8)	23 (7.5)	16 (9.5)	15 (9.8)	7 (12.3)	
Grade 1-5	175 (25.3)	63 (20.7)	48 (28.4)	43 (28.1)	17 (29.8)	
Grade 6 or above	199 (28.8)	47 (15.4)	64 (37.9)	73 (47.7)	14 (24.6)	
Ethnicity						<0.001
Underprivileged Group	646 (93.4)	299 (98.0)	153 (90.5)	132 (85.7)	55 (96.5)	
Privileged Group	46 (6.6)	6 (2.0)	16 (9.5)	22 (14.3)	2 (3.5)	

Results

Table 1: Socio-demographic characteristics of Sanitation Workers

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Religion						<0.001
Hindu	637 (92.9)	296 (98.3)	156 (92.3)	133 (87.5)	48 (84.2)	
Non-Hindu	49 (7.1)	5 (1.7)	13 (7.7)	19 (12.5)	9 (15.8)	
Living Circumstances						<0.001
Live alone	44 (6.4)	8 (2.6)	22 (13.0)	9 (5.9)	4 (7.0)	
Live with family	644 (93.6)	294 (97.4)	147 (87.0)	144 (94.1)	53 (93.0)	
Nature of Employment						<0.001
Permanent	119 (17.5)	74 (24.7)	14 (8.4)	26 (17.1)	3 (5.4)	
Temporary/contract	563 (82.6)	226 (75.3)	153 (91.6)	126 (82.9)	53 (94.6)	
Working days per week[a] Median (Min, Max)	7 (2, 7)	7 (6, 7)	7 (5, 7)	7 (2, 7)	7 (4, 7)	0.18
Working hours per day[b] Mean (SD)	8.0 (2.3)	6.9 (2.0)	9.0 (1.9)	9.3 (1.8)	8.1 (2.3)	<0.001

Results

Table 2: Health status of Sanitation Workers

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Wound and Cuts in Skin						0.01
No	643 (93.2)	289 (95.1)	150 (89.3)	148 (96.1)	49 (86.0)	
Yes	47 (6.8)	15 (4.9)	18 (10.7)	6 (3.9)	8 (14.0)	
Needle Stick Injury						<0.001
No	666 (96.8)	301 (99.0)	155 (92.8)	150 (98.0)	53 (93.0)	
Yes	22 (3.2)	3 (1.0)	12 (7.2)	3 (2.0)	4 (7.0)	
Wound Infection in Skin						-
No	681 (98.8)	298 (98.0)	166 (98.8)	154 (100.0)	56 (100.0)	
Yes	8 (1.2)	6 (2.0)	2 (1.2)	0 (0.0)	0 (0.0)	
Skin Problem						0.43
No	612 (89.2)	275 (91.4)	147 (87.0)	133 (87.5)	51 (89.5)	
Yes	74 (10.8)	26 (8.6)	22 (13.0)	19 (12.5)	6 (10.5)	

Results

Table 2: Health status of Sanitation Workers

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Musculoskeletal disorder						0.09
No	442 (64.0)	186 (61.2)	114 (67.5)	95 (61.7)	44 (77.2)	
Yes	249 (36.0)	118 (38.8)	55 (32.5)	59 (38.3)	13 (22.8)	
Gastro-intestinal Problem						0.46
No	623 (90.2)	272 (89.2)	157 (92.9)	136 (88.9)	53 (93.0)	
Yes	68 (9.8)	33 (10.8)	12 (7.1)	17 (11.1)	4 (7.0)	
Respiratory Problem						0.23
No	640 (92.6)	275 (90.5)	160 (94.7)	143 (92.9)	55 (96.5)	
Yes	51 (7.4)	29 (9.5)	9 (5.3)	11 (7.1)	2 (3.5)	
Chronic Disease						0.02
No	619 (89.7)	262 (85.9)	158 (94.0)	140 (90.9)	53 (94.6)	
Yes	71 (10.3)	43 (14.1)	10 (6.0)	14 (9.1)	3 (5.4)	

Results

Table 2: Health status of Sanitation Workers

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Hypertension Stage						0.02
Non-Hypertension	487 (70.4)	210 (68.9)	134 (79.3)	98 (63.6)	39 (68.4)	
Hypertension	205 (29.6)	95 (31.1)	35 (20.7)	56 (36.4)	18 (31.6)	
Body Mass Index						<0.001
Underweight (BMI < 18.5)	67 (9.7)	35 (11.5)	10 (5.9)	9 (5.8)	12 (21.1)	
Normal (BMI 18.5 – 22.9)	282 (40.8)	109 (35.7)	93 (55.0)	54 (35.1)	25 (43.9)	
Overweight (BMI 23.0 – 27.4)	199 (28.8)	81 (26.6)	52 (30.8)	51 (33.1)	11 (19.3)	
Obese (BMI >= 27.5)	144 (20.8)	80 (26.2)	14 (8.3)	40 (26.0)	9 (15.8)	

Results

Table 3: Knowledge and Practices of study participants on personal protective equipment (PPE) usage and hygiene

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Knowledge Level						<0.001
Low	81 (12.4)	36 (12.2)	17 (10.8)	15 (10.5)	11 (21.6)	
Moderate	463 (70.7)	235 (79.4)	100 (63.3)	92 (64.3)	32 (62.7)	
High	111 (16.9)	25 (8.4)	41 (25.9)	36 (25.2)	8 (15.7)	
PPE usage during work time						<0.001
No	206 (29.9)	82 (27.0)	39 (23.2)	58 (37.7)	25 (43.9)	
Yes	484 (70.1)	222 (73.0)	129 (76.8)	96 (62.3)	32 (56.1)	
Frequency of PPE usage during work time						0.22
Consistent Use	359 (76.1)	157 (74.1)	95 (74.2)	73 (76.8)	29 (90.6)	
Inconsistent Use	113 (23.9)	55 (25.9)	33 (25.8)	22 (23.2)	3 (9.4)	
Bathing/Showering after work						<0.001
No	111 (16.1)	31 (10.2)	35 (21.0)	36 (23.5)	7 (12.5)	
Yes	577 (83.9)	274 (89.8)	132 (79.0)	117 (76.5)	49 (87.5)	

Results

Table 3: Knowledge and Practices of study participants on personal protective equipment (PPE) usage and hygiene

Variables	N (%)	Types of Sanitation Workers				p value
		Sweeper	Waste Collectors	Transporter	Pickers of dumping site	
Practices of eating at workplace						0.04
No	384 (56.0)	175 (57.6)	96 (57.1)	88 (57.5)	20 (37.0)	
Yes	302 (44.0)	129 (42.4)	72 (42.9)	65 (42.5)	34 (63.0)	
Washing hand before eating anything						<0.001
No	75 (10.9)	31 (10.2)	15 (9.0)	12 (7.8)	16 (28.6)	
Yes	611 (89.1)	272 (89.8)	152 (91.0)	141 (92.2)	40 (71.4)	
Preference for hand washing						0.14
No Soap Use	63 (9.2)	28 (9.2)	16 (9.6)	9 (5.8)	9 (16.4)	
Soap Use	623 (90.8)	275 (90.8)	151 (90.4)	145 (94.2)	46 (83.6)	
Using instrument for waste handling						<0.001
No	263 (41.9)	65 (23.7)	77 (47.8)	91 (65.0)	25 (54.3)	
Yes	364 (58.1)	209 (76.3)	84 (52.2)	49 (35.0)	21 (45.7)	

Results

Table 4: Logistic regression Analysis with Musculoskeletal Disorder (n=655)				
Independent Variables	**Odds ratio**	**Standard Error**	**p value**	**95% CI**
Age	1.02	0.01	0.03	1.00-1.03
Ethnicity				
Underprivileged Group	2.14	0.82	0.04	1.01-4.53
Types of Sanitation worker				
Pickers of dumping Site	0.52	0.17	0.04	0.27-0.99
Municipality				
Pokhara	1.43	0.31	0.09	0.94-2.18
Education level				
Grade 1-5	1.49	0.28	0.03	1.03-2.16
Constant	0.14	0.07	0.00	0.05-0.36
Pseudo R^2= 0.0218, p=0.0022, LR Chi2 (5) =18.67				

Conclusion

- The prevalence of musculoskeletal disorder among the sanitation workers, particularly sweepers and transporters, was high.
- Socio-demographic factors such as age, ethnicity (underprivileged group), types of job role as sanitation workers (pickers of dumping sites), and education level (being in grade 1-5) showed significant association with musculoskeletal disorder.
- The study suggests the need for the targeted training program to enhance the knowledge and practices pertaining to musculoskeletal disorder prevention and safe waste handling.

Conclusion

- Strict enforcement of safety regulatory requirements for high-risk job roles must be ensured by municipalities.

- Routine health screening should be conducted to monitor the occupational risks along with the risk factors for the non-communicable disease.

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- We would like to thank municipal government officials for letting us conduct the health camp.

- We are very indebted to the study participants, without whom this study wouldn't have been possible.

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Bio

- Gita Shah is a public health professional and Project Director for the SOLID HEALTH project at Nepal Development Society, focusing on solid waste management and environmental health.
- With experience working in multiple organization, she has expertise in project leadership, health system strengthening, and monitoring and evaluation.
- Holding a master's degree in public health and sociology, she is multilingual and committed to improving public health and environmental sustainability in Nepal.