

Perception and prevalence of work-related health hazards among health care workers in public health facilities in southern India

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Background: Health care workers (HCWs) are exposed to occupational related health hazards. Measuring worker perception and the prevalence of these hazards can help facilitate better risk management for HCWs, as these workers are envisaged to be the first point of contact, especially in resource poor settings. **Objective:** To describe the perception of occupational health hazards and self-reported exposure prevalence among HCWs in Southern India.

Methods: We used cross sectional design with stratified random sampling of HCWs from different levels of health facilities and categories in a randomly selected district in Southern India. Data on perception and exposure prevalence were collected using a structured interview schedule developed by occupational health experts and administered by trained investigators.

Results: A total of 482 HCWs participated. Thirty nine percent did not recognize work-related health hazards, but reported exposure to at least one hazard upon further probing. Among the 81.5% who reported exposure to biological hazard, 93.9% had direct skin contact with infectious materials. Among HCWs reporting needle stick injury, 70.5% had at least one in the previous three months. Ergonomic hazards included lifting heavy objects (42%) and standing for long hours (37%). Psychological hazards included negative feelings (20.3%) and verbal or physical abuse during work (20.5%).

Conclusion: More than a third of HCWs failed to recognize work-related health hazards. Despite training in handling infectious materials, HCWs reported direct skin contact with infectious materials and needle stick injuries. Results indicate the need for training oriented toward behavioral change and provision of occupational health services.

Keywords: Health workers, Occupational health, India, Occupational hazards, Ergonomic

Introduction

India has a health care work force of over 4.3 million serving a population of over 1.2 billion.^{1,2} These health care workers (HCWs) are involved in health care provision at various levels ranging from tertiary to primary health services and community-based outreach services. Health care workers in the public sector comprise a major part of this workforce. Eighteen national health programs, along with various state run health programs, exist in urban, rural, and tribal areas in India, all of which actively involve public HCWs who may be exposed to a variety of

workplace hazards including biological, chemical, physical, radiological, safety, ergonomic, and psychosocial hazards.^{3,4}

Previous studies have documented the prevalence of occupational related diseases in hospital-based HCWs including tuberculosis, hepatitis C virus, hepatitis B virus, human immunodeficiency virus, occupational asthma, and contact dermatitis, finding an association between occupational hazards and disease prevalence.⁵⁻¹⁹ While the health effects of occupational hazards are known, their prevalence in Indian public health care facilities is unknown. A lack of hazard recognition is a major impediment to risk communication and risk management efforts. Health care workers diversity, in terms of education and exposure to hazards, coupled with severe

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resource constraints presents a challenge to the implementation of a uniform “risk management framework.” Hence, measuring the perception of HCWs regarding their exposure to workplace hazards has the potential to create awareness in recognizing occupational health hazards and to regulate and set standards to promote workplace safety and health.

However, without adequate support to recognize and manage occupational risks and consequent health impairments, there are limited possibilities to meet the increasing challenges in health care delivery, particularly in India where severe shortages in human resources for health are projected.^{20,21} The World Health Organization (WHO) in the 2007 World Health Assembly declared a global agenda for workers health, which explicitly recognized the need for member countries to improve occupational health.²² It is also envisaged that public health care personnel may be key actors in providing basic occupational health services for large section of the nation’s workforce, particularly the unorganized sector, micro- and small enterprises, for whom the public health systems offer the first line of medical support.²³ It is, therefore, imperative that public HCWs are included in the management of their occupational risks to allow them to better manage basic occupational health risks for the general workforce.

The aim of this WHO India funded study was to profile occupational health hazards in public health facilities. We present the findings of self-reported exposure prevalence to certain occupational health hazards among HCWs, with a focus on psychosocial hazards. These findings can inform policy interventions, assist in the development of tools to help HCWs recognize and understand occupational health issues, and to guide the implementation of workplace improvements.

Methods

In order to capture the health hazards of HCWs in public health care settings in a southern state of India, we used cross sectional study design with stratified random sampling to select a representative set of HCWs from multiple health facilities (primary to tertiary level health facilities) under the public sector. The sample population was from one randomly selected district in the state.

There are three main health directorates in the sampling region: (1) the Directorate of Public and Preventive Medicine (DPH&PM), which provides primary health care through Primary Health Centers (PHCs) and Health Sub-Centers (HSCs); (2) the Directorate of Medical and Rural Health Service (DMRHS) that provides secondary and tertiary health care through Hospitals; and (3) the Directorate of

Medical Education (DME), which provides tertiary and specialty health care through Medical College Hospitals and Specialty Hospitals. Health care workers were recruited from all three types of health directorates.

Health facilities were selected using stratified random sampling method from list of health facilities in the selected district. In the each selected health facility, a sample of workers was selected to assess their perception and exposure to occupational health hazards. Data were collected from May to September 2009.

Selection of health facilities and HCWs

Health facilities were categorized according to size and type of service provision (medical college hospital, specialty hospital, and district head quarter hospital providing tertiary level care; taluk and non-taluk hospital providing secondary level care; PHC and HSC providing primary level care). For categories where only one facility was available, that health facility was selected. For categories with more than two health facilities, random selection was used to include at least 10% of the available health facilities. Five PHCs and 14 HSC were randomly selected from each Health Unit District (HUD) (the district is divided into two HUDs by the state government for the administrative purpose) to adequately represent different PHCs. There are two types of PHCs in the state, classified with respect to service provision: (1) PHCs that cater to rural population of approximately 30 000 and have six beds for inpatient services and (2) upgraded PHCs with 30 beds, a theater facility, and an on call obstetrician and anesthetist for provision of emergency obstetrics care. The later serves as a first referral unit. The HSCs are community level health centers that cater to populations of approximately 5 000 through a female multi-purpose health worker (MPHW), focusing on maternal and child health care and family welfare services. The study included all health care facility types in the public sector.

After the selection of health facilities, data regarding the number and category of HCWs were obtained. In health facilities where only one worker was available in a particular category, he/she was selected for inclusion. In facilities where more than one worker per category, 25% of available and on duty at the time of the investigating team visit were approached. Informed consent was obtained prior to administering the questionnaire.

Study instrument

A panel of experts including primary health care physicians, general and occupational physicians from medical colleges and select occupational disease centers, occupational hygienists, safety engineers, and

field level HCWs were consulted to develop a structured questionnaire about occupational health risks. Resources provided in the public domain of the WHO, ILO, and NIOSH websites on Occupational Health Risk Assessment for HCWs were used for guidance. To assess the psychosocial hazard at work place the WHO PRIMA framework was used. Questions that suited the Indian context, and in particular, the local health system were used. Questions were translated to local language and back translated to English. We then piloted the instrument with 23 HCWs in a public health facility. The findings were analyzed and modifications were made prior to administering to the study participants. A team of trained investigators administered the surveys. The Institutional Ethics Committee of Sri Ramachandra University, Chennai approved this study.

Results

Profile of selected health facilities

Health facilities included three tertiary level facilities, one medical college hospital, two specialty hospitals, three secondary level health facilities, one district head quarter hospital, one taluk and one non-taluk hospital (taluka are administrative divisions of town, the hospitals situated in taluk function as first referral unit for the PHCs, whereas non-taluk hospitals do not function as first referral unit and provide general outpatient and basic inpatient services), 10 PHCs, and 28 HSCs at the primary level. The tertiary and secondary level health facilities had more beds and increased manpower for service provision compared to the primary level health centers.

Study participant characteristics

The occupational health risk assessment questionnaires were administered to 482 participants including nurse and auxiliary nurse cum midwife (25%), sanitary and hospital workers (22%), MPHs (11%), doctors (10%), lab technicians (8%), male and female nursing assistants (6%), pharmacists, (6%) and radiographer and X-ray technicians (3%). The average response rate was 95% (482 participated out of 507 randomly

selected HCWs), ranging from 75 to 100% by health care facility. Doctors working in the medical college hospital had the lowest response rate. All categories were represented by at least 25% of workers in the respective facility except for doctors (21%) where the accessibility and response rates were lower.

Respondents were 67% female and 33% male with a mean age of 42.4 years (SD 9.67; range 22–59 years) and an average of 14.9 years of work experience (SD 10.6; range 1–39 years).

Perception of work-related health hazards

For open-ended questions about the exposure to health hazards during routine work activities, 61% of the HCWs reported exposure to workplace health hazards, with exposure to biological hazards most common (81%). Upon further probing, 39% of workers who did not initially recognize workplace health hazards reported exposure to occupational hazards (Table 1). Nurses (24.1%) and hospital workers (29.9%) were most likely to not recognize the work-related health hazards.

Self-reported prevalence of work-related health hazards

Among all health care workers, 81.5% (95% CI: 77.9–84.8) reported exposure to biological hazards. Of these workers, 93.9% (95% CI: 91.2–96) reported direct skin contact with infectious materials. Although 85% of workers received training in handling infectious material, 49.1% (95% CI: 44.7–53.6) experienced occupational cut/needle stick injuries and 70.5% (95% CI: 64.4–76) had at least one such injury in the last 3 months. Of those reporting needle stick injury, only 34% (95% CI: 26.9–41.1) had access to post-exposure prophylaxis for HIV. Overall, 84% of the workers recognized needle stick injuries as a possible cause of HIV infection, 50% recognized them as a risk factor for Hepatitis B, and 23% as a risk factor for Hepatitis C. A total of 43% workers were immunized for Hepatitis B infection.

In relation to ergonomic hazards, 42% (95% CI: 37.6–46.4) of workers reported heavy lifting (more

Table 1 Work-related health hazards of health care worker (HCW) initially reporting “no hazard” (n=187)

Occupational hazard experienced	Frequency	Percent	95% CI
Handle infectious material*	131	70.1	63.2–76.3
Contact with infectious material (skin/clothing)	126	67.4	60.4–74
Cut/needle stick injury	78	41.7	34.8–48.9
Harassment ⁺	3	2	0.4–4.3
Discrimination	11	6	3.1–10
Abuse ⁺⁺	25	13.4	9–18.8
Negative feelings [#]	20	10.7	6.8–15.8
Standing >4 hours/day	62	52	26.7–40

*Handling refers to risk of direct skin contact as a result of lacking protective measures like safe storage/transport containers, glove, mask, and apron.

⁺Feeling of humiliation and torment, loss of self-esteem, due to behavior of the co-workers (including superiors and subordinates).

⁺⁺Threatened, use of derogatory word or remarks, ill treated, physically hit or pushed.

[#]feeling of anxiety, threat, anger, sadness, isolation, devalued, and conflict.

than 25 kg) during work (including carrying patients), with sanitary workers (43%) and nurses (16%) most exposed. Seventy-two percent (95% CI: 67.9–75.9) of workers reported standing as their most common working posture and of these, 37% reported standing for more than 4 hours (50% of working hours) per day. Forty four percent (95% CI: 39.6–48.4) reported use of seats with no backrest and 59% (95% CI: 54.5–63.3) reported repeated bending and twisting at work.

Sub-group analysis showed different patterns of hazard exposure by HCW categories, with hospital and sanitary workers, MPHWs, and staff nurses and auxiliary nurse cum midwife reporting more hazards (Table 2).

Prevalence of psychosocial hazard

Table 3 provides a description of psychosocial hazards assessed using the WHO PRIMA framework. The majority of workers were satisfied with support systems provided by their supervisors, but reported dissatisfaction with other aspects of work organization including high workloads, limited promotional opportunities, and the system to reports and address workplace grievances. Basic amenities were unavailable in the majority of work locations including drinking water, restrooms, separate dining areas, and hand-washing facilities.

Discussion

Despite finding a high prevalence of workplace hazards, we found limited knowledge about hazards among HCWs, with more than a third failing to recognize immediate health hazards. With probing many were able to identify hazardous workplace conditions. Overall, HCWs did not adequately recognize the serious health and safety implications of occupational exposures. This helps in explaining why despite receiving biological hazard training, workers neglect safe work practice, as evidenced by almost half of the respondents reporting cut/needle sticks injuries during work. These findings agree with other Indian studies that have found similar noncompliance by HCWs to standard health precautions and general lack of awareness about occupational safety.^{24,25} This study adds to the current literature by highlighting gaps between training, perceived importance, and actual practice of occupational risk control and management among HCWs. Although literature indicates that the attributable Hepatitis C (39%) and Hepatitis B (37%) viral infections through needle stick injury is higher than HIV (4%) for HCWs,¹⁵ workers were most likely to identify HIV as a consequence of needle stick injury. This may be a reflection of HIV transmission awareness campaigns in the state and a lack of awareness campaigns related to other occupational exposures.

Exposure to work place hazards is related to the availability of basic amenities such as ventilation, lighting, comfortable seating arrangement, restrooms, and drinking water facilities.^{4,26–28} The findings from this study highlight the inadequacy of such basic amenities in Southern India. Workers reported eating in their workplace due to lack of separate dining area, which may increase exposure to biological and chemical hazards through ingestion. Inadequate work conditions can also impact worker motivation and productivity within an organization.^{4,29–31} During the course of the interviews, some hospital and sanitary workers responsible for the house keeping of the facility expressed their anguish in cleaning the facility when water availability is inadequate. Consequently, they reported avoiding or reducing the frequency of performing these jobs. One physician said “I avoid touching patients for examination because I don’t have access to running water or soap for hand washing in the OP....examining patients without hand washing will not only harm me but also the other patients.”

Workplace violence and aggression was not as high as reported in other studies with HCWs in India, with 21% of workers reporting verbal or physical abuse at work.^{31–34} Underreporting is a possibility, especially since questions were administered at work with limited privacy. For health workers, abuse typically occurs in high stress or emotional situations such as deaths, trauma care, and/or antenatal care. Female workers recounted incidents of being attacked by patients or persons accompanying the patients, and were particularly at risk during night shifts. Health care workers attribute this to lack of security in the workplace. One respondent commented “Anybody can enter and leave as and when they please... there is only one watchman on duty ... how can he be available in every place.”

Although half of the workers reported experiencing work overloads and challenging work schedules in a difficult work environment and limited career development prospects, an overwhelming majority of workers were content with the work organization and reported a good interpersonal relationship with co-workers.

The sub-group analysis showed different patterns of hazard exposures by HCW category. The study also identified the category of HCWs reporting higher exposure to occupational hazards. We found the category of HCWs with higher reported exposures was associated with failure to initially recognize work-related health hazards.

Strengths and Limitations

A possible limitation of this study was sampling bias, as we aimed to include 25% of all available HCWs rather than following the traditional methods of

Table 2 Occupational hazards by health care worker (HCW) category (n=482)

HCW category	Skin contact with infectious material N (%) [95% CI]	Needle stick injury or cut (lifetime) N (%) [95% CI]	Recent needle stick injury or cut (preceding 3 months) N (%) [95% CI]	Working posture standing N (%) [95% CI]	Standing for >4 hours/day N (%) [95% CI]	Lift heavy load N (%) [95% CI]	Bending and twisting at work N (%) [95% CI]	Seated without backrest N (%) [95% CI]
Doctors	39 (83.0%) [70.2-91.8]	27 (57.4%) [43.2-71.2]	17 (36.2%) [23.4-50.6]	25 (53.2%) [38.9-71.1]	3 (6.4%) [1.6-16.4]	4 (8.5%) [2.8-19.3]	20 (42.6%) [29.1-60.9]	27 (57.4%) [43.1-70.9]
Staff nurse and ANM*	106 (89.1%) [82.5-93.8]	77 (64.7%) [55.8-72.9]	60 (50.4%) [41.5-59.3]	99 (83.2%) [75.7-89.1]	41 (34.5%) [26.3-43.7]	33 (27.7%) [20.3-36.3]	77 (64.7%) [55.8-72.9]	67 (56.3%) [47.3-65.0]
Pharmacist	4 (14.8%) [4.9-32.0]	2 (7.4%) [1.3-22.4]	2 (7.4%) [1.3-22.4]	24 (88.9%) [72.7-97.1]	8 (29.6%) [14.8-48.6]	9 (33.3%) [17.6-52.4]	13 (48.1%) [30.0-66.7]	11 (40.7%) [23.6-59.8]
Radiographer and X-ray Technician	4 (30.8%) [10.6-58.7]	1 (7.7%) [0.4-32.5]	0 (0%)	12 (92.3%) [67.5-99.6]	5 (38.5%) [15.7-65.9]	8 (61.5%) [34.1-84.3]	4 (30.8%) [10.6-58.7]	9 (69.2%) [41.3-89.4]
Lab technician	36 (92.3%) [80.5-98.0]	22 (56.4%) [40.7-71.2]	13 (33.3%) [20.0-49.1]	35 (89.7%) [77.1-96.7]	11 (28.2%) [15.8-43.7]	4 (10.3%) [3.3-22.9]	27 (69.2%) [53.6-82.1]	23 (59.0%) [43.2-73.5]
Nursing assistant (n=27)	22 (81.5%) [63.6-92.9]	10 (37.0%) [20.6-56.2]	7 (25.9%) [12.1-44.7]	18 (66.7%) [47.6-82.4]	8 (29.6%) [14.8-48.6]	17 (63.0%) [43.9-79.4]	15 (55.6%) [36.7-73.3]	2 (7.4%) [1.3-22.4]
Hospital and sanitary workers ⁺	93 (86.9%) [79.5-92.4]	55 (51.4%) [42.0-60.8]	31 (29.0%) [21.0-38.1]	79 (73.8%) [64.9-81.5]	33 (30.8%) [22.6-40.1]	87 (81.3%) [73.1-87.9]	69 (64.5%) [55.1-73.1]	11 (10.3%) [5.5-17.2]
Multipurpose health workers [#]	49 (90.7%) [80.7-96.5]	34 (63.0%) [49.6-75.0]	31 (57.4%) [44.0-70.0]	31 (57.4%) [44.0-70.0]	10 (18.5%) [9.8-30.5]	27 (50.0%) [36.8-63.2]	41 (75.9%) [63.2-85.9]	36 (66.7%) [53.4-78.2]
Others ⁺⁺	16 (32.7%) [20.7-46.6]	9 (18.4%) [9.3-31.0]	6 (12.2%) [5.1-23.7]	24 (49.0%) [35.2-62.8]	11 (22.4%) [12.4-35.7]	13 (26.5%) [15.6-40.1]	18 (36.7%) [24.2-50.8]	26 (53.1%) [39.1-66.7]
Total	369 (76.6%) [72.6-80.2]	237 (49.2%) [44.7-53.6]	167 (34.6%) [30.5-39.0]	347 (72.0%) [67.9-75.9]	130 (27.0%) [23.2-31.1]	202 (41.9%) [37.6-46.4]	284 (58.9%) [54.5-63.3]	212 (44.0%) [39.6-48.4]

*ANM – Auxiliary Nurse cum Midwife, their role is similar to nurses in hospitals and PHCs with specific thrust to maternal and child care and they assist the nurse in service provision.
⁺Hospital and sanitary workers are responsible for the housekeeping of the health facility. They handle wastes including biomedical wastes and help in shifting patients.
[#]Multipurpose health workers are field/outreach workers whose main activity is in the field (community). They have a varied role including provision of first level of health care at the community, refer patients in need of institutional care, register vital events in the community, and plan health related activities for the community in consultation with local bodies. Their thrust area of work (although not restricted to) is maternal and child care including family welfare.
⁺⁺Others include ambulance drivers, ECG technicians, ophthalmic assistants, theater assistant, data entry operators, patient counselors, etc.

Table 3 Psychosocial hazards of health care workers (HCWs) (n=482)

Work-related psychosocial hazards*		Percent	95% CI
Job content	Job does not match skills	16.6	13.5–20.1
Workload	Experiences work overload	52.7	48.2–57.1
Work schedule	Night shift	63.9	59.5–68.1
	Shift duty ⁺	52.9	48.4–57.3
Control	Night work harming health ⁺⁺	48.7	44.3–53.2
	Shift duty affecting social life	27	23.2–31.1
	Lack of decision making	32.1	28.1–36.4
Work environment	Lack of safe drinking water	74.9	70.9–78.6
	Lack of toilet access	40.9	36.5–45.3
	Lack of canteen facility	67.4	63.1–71.5
	Lack of separate dining area	68.2	64–72.3
Organizational culture and function	No recognition of work	18.7	15.4–22.3
	Superiors do not treat with respect	2.9	1.7–4.7
	Superior does not understand work-related issues	7.3	5.2–9.8
	Superiors not approachable	7.9	5.7–10.6
	Unsatisfactory conflict management	11.4	8.8–14.5
	Ineffective leadership	8.1	5.9–10.8
	Lack of positive feedback	15.8	12.7–19.2
	Commute is stressful	35.3	31.1–39.6
	No mechanism to file grievances	83.6	80.1–86.7
	Interpersonal relationship at work	Poor interpersonal relationships with colleague(s)	8.5
Strained relationship with superiors		7.3	5.2–9.8
Lack of social support from co-workers		12.8	10.1–16.1
Lack of camaraderie with peers		10.4	7.9–13.3
Lack of positive feeling within group		6.4	4.5–8.9
Role in organization	Unclear occupational roles and responsibilities	1.9	0.9–3.4
Career development	Lack of job orientation	57.1	52.6–61.4
	No training when job requirement changes	37.3	33.1–41.7
	No continued learning opportunities	22.4	18.9–26.3
	No promotional prospects	50.6	46.2–55.1
Violence, bullying, and harassment	Dissatisfaction with monetary compensation	44	39.6–48.4
	Victim of discrimination	4.4	2.8–6.5
	Victim of harassment	2.7	1.5–4.5
Impact of poor psychosocial environment	Verbal or physically abuse	20.5	17.1–24.3
	Experiences negative feeling at work	20.3	16.9–24.1
	Sleeplessness	27.2	23.4–31.3

* The PRIMA framework, adapted from Leka *et al.* (2003).³⁵

⁺ Refers to work schedule. There are three shifts in which HCWs work. Morning (8.00 a.m. to 2.00 p.m.), afternoon (2.00–8.00 pm), and night (8.00 p.m. to 8.00 a.m.). Health care workers are typically assigned one shift per week. When changing from one shift to another it is usually recommended to move from morning to afternoon to night and then again morning, in line with the bio-rhythm. In practice, this is not always the case and other shift orders may adversely affect health.

⁺⁺ Fatigue, mental stress, missing medication, and medical appointments, e.g. diabetic and hypertensive, symptoms of gastritis – heartburn, epigastric pain.

sample size calculation due to difficulty in accessing government records and information on available staff. The study was also limited in the sample selection. Workers on leave or absent were not included, possibly influencing the reporting of exposure to occupational hazards. Although the study identified the category of HCWs with higher exposure prevalence, it was limited in showing the strength of such association due to sample size for exposure and category of worker.

This study addressed the perception of work-related health hazards and measured the self-reported prevalence of select occupational hazards among health care workers in southern India. Results regarding the prevalence of other hazards such as exposure to chemicals, physical, fire, and safety were also observed and will be reported in a follow-up manuscript. We were also limited to self-reported prevalence rather than quantitative measurements and job hazard analysis for workers employed in similar

jobs, which are highly resource intensive techniques. We also noted some hesitation among health workers in reporting negative responses. Many workers repeatedly expressed fear of disclosure of their names. Future research should consider administering questions outside of their place of work to improve privacy.

A strength of this study was the representative sample of the health care workforce representing different health care settings, interviews questions designed by qualified experts, and the administration of the instrument by trained investigators. We were able to answer the primary objectives of the study: to measure the perception of work-related health hazards among HCWs and quantify the self-reported prevalence of certain important workplace hazards for the HCWs.

In conclusion, we found a high prevalence of health hazards among HCWs in public health facilities in Southern India. Health care workers' awareness of

these hazards was limited, which may impede the implementation of workplace risk control measures. It is, therefore, essential that workers be retrained with modules focused on occupational safety for HCWs. Training should be delivered by experienced occupational health specialists and they should teach HCWs to recognize occupational health hazards in their workplaces. Training should also motivate HCWs to adopt sustained safe work practices. It is evident that there is a need for implementation of occupational health program for HCWs in the state with a built-in supportive supervision along with provision of basic amenities including drinking water, water for washing, clean toilets, separate dining area, and security to improve the work environment.

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Contributors All contributors were involved in designing, conducting, analysis, and writing of this manuscript.

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Conflicts of interest There are no conflicts-of-interest for this study.

Ethics approval The study was approved by Sri Ramachandra University Institutional Ethics Committee prior to data collection and informed consent was obtained from respondents.

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