

## Original Research Article

# Knowledge, attitude and practices regarding work related hazards among salt workers in Marakkanam, Tamil Nadu

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## ABSTRACT

**Background:** The salt pan workers are exposed to severe health hazards like extreme heat, intense manual labour, direct contact with salt, sunlight glare from salt crystals. This paper describes their knowledge, attitude and practices (KAP) regarding their work related hazards as well as availability and use of personal protective equipments (PPEs).

**Methods:** A community based cross sectional study was conducted in 4 randomly selected villages among the 10 salt worker villages in Marakkanam, Tamil Nadu. A house to house survey of the selected villages enrolled 331 salt workers. The data was collected using a pre designed and pre tested questionnaire.

**Results:** Majority of salt worker (78.5%) reported of being aware of one or more hazards like physical stress (70.7%), direct sunlight (38.7%) and glare from salt crystals (16%) in salt work that resulted in musculoskeletal problems, ophthalmic problems, headache and giddiness. 87% of the salt workers were aware of one or the other personal protective equipments. However, only less than 10% were using the conventional PPEs. The reasons for not using PPE were mainly inconvenience in using and PPE not provided by the employer.

**Conclusions:** Most of the study population is aware of the hazards as well as one or the other methods of protective equipment but actual use of PPE is very low because of non-availability and perception of inconvenience in using them. There is a large gap between awareness and practice regarding PPE usage among these salt workers.

**Keywords:** Occupational hazard, KAP, Salt workers, Personal protective equipments

## INTRODUCTION

After the home environment, the working people spend most of their time engaged in their occupations. Each occupation has its own specific as well as non-specific risk exposures, making workers to experience varied morbid conditions and worse fatal conditions too. The World Health Organization (WHO) estimates that each year, occupational exposure to risk factors contributed to 1.2 Million deaths and 73 million DALYs globally accounting for 2.1 percent of all deaths and 2.7 percent of global burden of disease.<sup>1</sup>

Common salt has an essential part in everyone's daily health requirement. However it causes uncommonly harsh travails for those who manufacture it. The salt pan workers suffer enormously from the saline environment in which they live and work. They are one of the most marginalized and vulnerable sections of the society.

The salt workers work under a pitiless scorching sun doing the toughest of manual jobs without having appropriate safety, health training, basic amenities like drinking water, shelter and education. Our assessment of the morbidity pattern among this targeted salt workers in Marakkanam showed that they suffered from morbidities

like musculoskeletal, ocular problems, headache and giddiness, respiratory and gastrointestinal problems.<sup>2</sup> The observed morbidities also included clinical pallor (44%), ocular morbidities (42%), caries teeth (41%), hypertension (23%), underweight (19%), goiter (19%), obesity (14%) and dermal conditions (9%).<sup>2</sup>

Assessment of knowledge, attitude and practices among salt workers is of much importance considering that they are exposed to severe health hazards like extreme heat, intense manual labor, and direct contact with salt, glare from reflection of sunlight from the salt crystals. It is also evident from the review of literature that there are very few studies on salt workers.<sup>3-6</sup> This paper is on knowledge, attitude and practices regarding their work related hazards as well as the availability and use of Personal protective equipments.

## METHODS

This study was conducted in Marakkanam, one of the 22 community development blocks in Villupuram district of Tamil Nadu located coastally around 130 kilometres south of Chennai. The major occupations in Marakkanam were agriculture, fishing and salt production. The salt pans spread over 2000 acres, is located in the northern most coastal part of the block, where the backwaters from the Bay of Bengal enter the land. Around 2000 salt workers were settled in 10 villages located closely around these salt pans. These salt worker villages were homogenous in nature. Of these 10 villages, four were randomly selected for a community based cross sectional study from April 2010 to March 2011. The study included individuals employed in salt work for at least 2 years. A house to house survey of the selected villages was done in the evening hours when the workers were available after the day's work. The survey in these 4 villages enlisted 389 eligible salt workers, who were employed in salt work for two years or more. Of these 389 salt workers, 331 workers who were available at the time of survey were included in this study. The salt workers were explained regarding purpose of the study. The consenting workers were included in the study. Confidentiality of all participants was maintained. Support of the village leaders, representatives was sought prior to the start of the survey in each of these villages. The data on the knowledge, attitude and practices towards occupational hazards and usage of personal protective equipments at work was collected using a pre designed and pre tested questionnaire. The data was compiled, analyzed and tabulated using SPSS Version 11.5.

The salt production in Marakkanam is by the traditional method of evaporation of brine (water with high concentration of salt) filled in the salt pans. The procedure is labour intensive with no modern equipments being used. At the start of the season, the salt workers are engaged in preparation of the salt pans. This includes cleaning the silt and vegetations accumulated in the salt pans as a result of the previous rains, stamping the floor

of the salt pan after sprinkling it with river sand to make it hard and smooth. The land is divided into squares of salt pans measuring 20-25 feet on its sides and is levelled with a slight slope towards one direction for the water to drain into successive pans. Once the salt pans are ready, the sea water or underground water with high concentration of sodium chloride (sub soil brine) or a mixture of both is pumped into it. The brine is collected into the first pan and kept for evaporation for three days. This concentrated brine is then let out into the second and subsequently into the third and fourth pans in the field. In the last pan where its concentration is high, sodium chloride separates into crystals. The crystals which separate lie on the earth and are collected by wooden shovels with long handles. This process is called 'scrapping of salt'. The salt thus formed is heaped in the corners of each pan. It is then carried overhead in baskets and stored in a central place or platform till they become dry. Later, the workers fill the salts in gunny bags, weigh them and load them into trucks for transport.

## RESULTS

Of the 331 salt workers enrolled in the study, 191 (57.7%) were females, nearly 50% were aged between 40 to 59 years with a mean age of 41.9±10.8 years. Majority (92%) were Hindus, rest Christians. Only 7% of them had been educated with high school and higher secondary education. Most (79.7%) of them belonged to Middle and Lower middle socio-economic strata as per B G Prasad scale for socioeconomic status (Table 1).

Among the 331 salt workers, 71 (21.5%) reported of being not aware of any hazard in salt work. Physical stress (70.7%), direct sunlight (38.7%) and glare from salt crystals (16%) were the major occupational hazards as reported by them. Majority (75.5%) of the salt workers considered musculoskeletal problems as morbidity related to salt work, followed by ocular morbidities (55.9%), giddiness and headache (18.4%) (Table 2).

Among 331 salt workers, 42 (12.6%) were not aware of any personal protective measure (PPE) used in salt pans. Majority (74.9%) of the salt workers were aware of unconventional PPE (turban on head) used in salt work, followed by goggles (69.4%). The awareness on boots, hat and gloves were very low (10% and below). In all of these PPEs, females workers were less aware than the male salt workers (Figure 1).

Regarding the attitude towards the hazards and morbidity in salt work, majority of the salt workers, 258 (77.9%) considered that salt work can adversely affect their health. However, 28 (8.5%) salt workers considered that their health is not affected by salt work; remaining 45 (13.6%) did not know whether their health is affected or not by salt work. Out of 331 salt workers, 117 (35.5%) opined that morbidities in salt work are preventable. However, 118 (35%) were of the opinion that morbidities in salt work are not preventable (Table 3).

Of the total 289 salt workers who were aware of PPEs, only 67 (23.2%) were willing to use them. 115 (39.8%) salt workers perceived some or the other benefit in using PPEs at work. 227 (78.6%) salt workers perceived difficulty in using PPEs at work. Males when compared to the female workers, were more willing to use PPE (31.5% versus 17%), they perceived more benefit in using in PPE (53.2% versus 29.7%) (Table 4).

Out of 331 salt workers, 220 (66.5%) were using one or more protective measure at work which include mainly the unconventional methods (62.8%). The conventional PPEs including hat, boots and goggles were used by very few numbers of salt workers (less than 10%). Of the 322 salt workers not using conventional PPE, maximum (77%) gave reasons that PPE was not provided to them by their employers, followed by inconvenience in using (57.1%). Sixty (18.6%) salt workers did not feel the need for using PPE (Table 5).

**Table 1: Socio-demographic characteristics of the surveyed salt worker (n=331).**

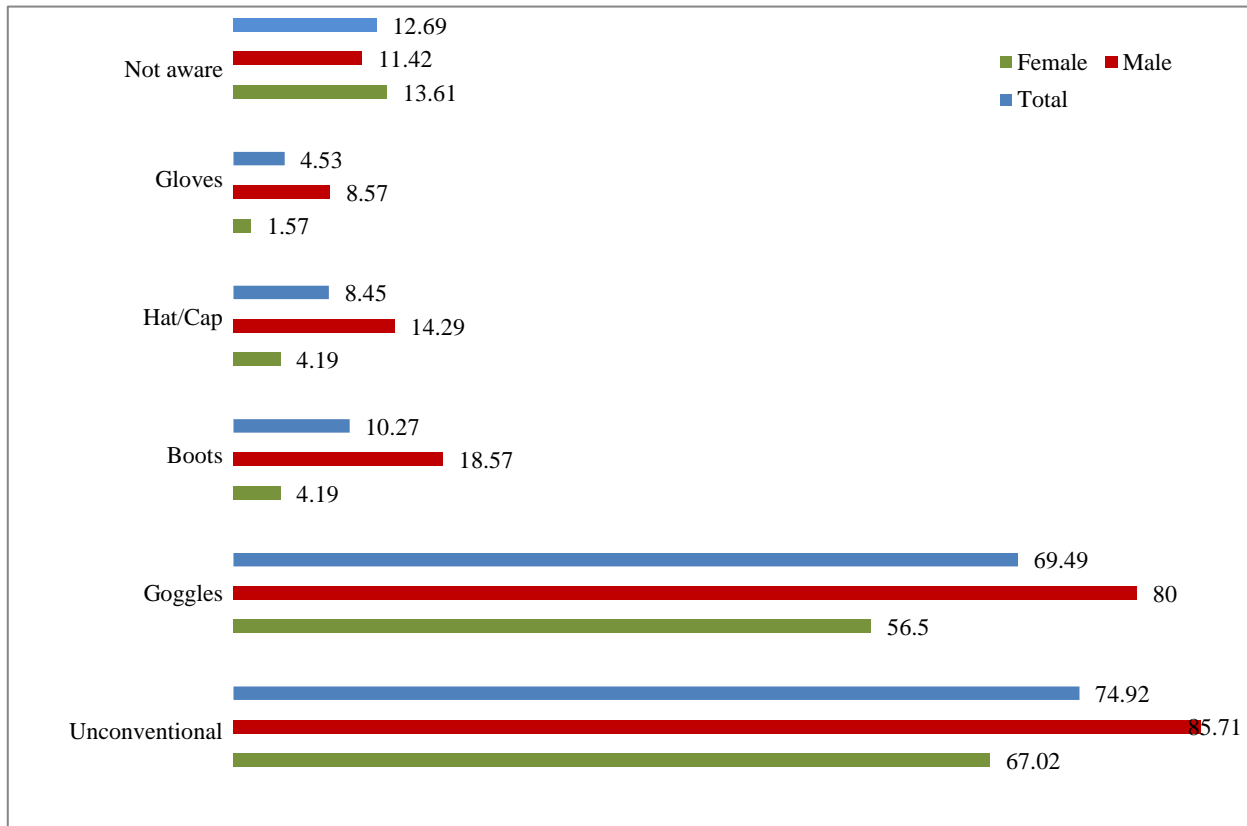
Socio-demographic characteristics		Frequency	Percentage (%)
<b>Gender</b>	Male	140	42.3
	Female	191	57.7
<b>Age (years)</b>	20-39	144	43.5
	40-59	164	49.5
	≥60	23	7.0
<b>Religion</b>	Hindu	305	92.1
	Christian	26	7.9
<b>Educational Status</b>	Illiterate	161	48.6
	Less than high school	147	44.4
	High school and higher secondary	23	7.0
<b>SES</b>	I (Upper)	11	3.3
	II (Upper middle)	24	7.3
	III (Middle)	120	36.2
	IV (Lower middle)	144	43.5
	V (Lower)	32	9.7

**Table 2: Awareness among respondents towards occupational hazards and morbidity due to salt work (multiple response).**

	Frequency	Percentage (%)
<b>Awareness of occupational hazards</b>		
Physical stress	234	70.7
Direct sunlight	128	38.7
Glare from salt crystals	53	16.0
Contact with salt and brine	10	3.0
Injury from salt crystals	3	0.9
Injury from spade	2	0.6
Not aware	71	21.5
<b>Awareness of occupational morbidity</b>		
Musculoskeletal	250	75.5
Ocular morbidities	185	55.9
Giddiness and Headache	61	18.4
Chest pain	31	9.4
Gastro-intestinal	30	9.1
Dermal	23	7.0
Breathlessness	19	5.7
Hypertension	10	3.0
Injury	7	2.1
Not aware	51	15.4

**Table 3: Attitude towards effect of salt work on health and its prevention.**

	Male (n=140) N (%)	Female (n=191) N (%)	Total (n=331) N (%)
<b>Attitude towards salt work affecting their health</b>			
Adversely affects health	117 (83.6)	141 (73.8)	258 (77.9)
Does not adversely health	15 (10.7)	13 (6.8)	28 (8.5)
Don't know	8 (5.7)	37 (19.4)	45 (13.6)
Total	140 (52.3)	191 (52.7)	331 (100)
<b>Attitude towards prevention of morbidities in salt work</b>			
Preventable	69 (49.3)	48 (25.1)	117 (35.4)
Not preventable	42 (30.0)	76 (39.8)	118 (35.6)
Don't know	29 (20.7)	67 (35.1)	96 (29.0)
Total	140 (52.3)	191 (52.7)	331 (100)



**Figure 1: Awareness of personal protective equipment among salt workers.**

**Table 4: Attitude among salt workers towards use of conventional PPEs.**

	Male (n=124) N (%)	Female (n=165) N (%)	Total (n=289) N (%)
<b>Willing to use PPE at work</b>			
Willing	39 (31.5)	28 (17.0)	67 (23.2)
Not willing	85 (68.6)	137 (83.0)	222 (76.8)
<b>Any perceived benefits of using PPE at work</b>			
Yes	66 (53.2)	49 (29.7)	115 (39.8)
No	58 (46.8)	116 (70.3)	174 (60.2)
<b>Any perceived difficulty in using PPE at work</b>			
Yes	93 (75.0)	134 (81.2)	227 (78.6)
No	31 (25.0)	31 (18.8)	62 (21.5)

**Table 5: Usage of PPE among salt workers**

	Male (n=140) N (%)	Female (n=191) N (%)	Total (n=331) N (%)
<b>Usage of PPE</b>			
Yes	124 (88.6)	96 (50.3)	220 (66.5)
No	16 (11.4)	95 (49.7)	111 (33.5)
<b>Type of PPE used</b>			
Unconventional (turban on head)	112 (80.0)	96 (50.3)	208 (62.8)
Hat/Cap	12 (8.6)	0	12 (3.6)
Boots	5 (3.6)	4 (2.1)	9 (2.7)
Goggles	3 (2.1)	4 (2.1)	7 (2.1)
Gloves	3 (2.1)	0	3 (0.9)
<b>Reasons for not using PPE</b>			
Not provided by employer	105 (77.8)	143 (76.5)	248 (77.0)
Inconvenience in using	86 (63.7)	98 (52.4)	184 (57.1)
No felt need	20 (14.8)	40 (21.4)	60 (18.6)
Shy, no one using	12 (8.9)	29 (15.5)	41 (12.7)
Not able to buy	15 (11.1)	7 (3.7)	22 (6.8)
Not aware of any PPE	16 (11.9)	26 (13.9)	42 (13.0)

## DISCUSSION

The objective of occupational health and safety is to assure as far as possible that every working man and woman in the nation has a safe and healthy working environment so as to preserve human resources. Though this objective has been achieved to a great extent in the developed countries, developing countries still have far to go in satisfying this requirement. One of the main reasons for this is lack of awareness among workers with reference to health and safety measures.<sup>7</sup>

It is also well known that labour from low socio-economic families have to do unskilled jobs and jobs that no one else takes up because of the associated hazards related to poor environmental conditions, and therefore are exposed to more illness.<sup>8</sup> Salt work is no exception to this, as a lot of occupational hazards exist and the morbidity is also high in Marakkanam as reported by us previously.<sup>2</sup> Only few studies have been conducted to assess the health status and KAP among salt workers.<sup>2-6</sup>

In a study involving 205 salt workers in Rajasthan, it was found that the brine (concentrated salt water) workers had a fair knowledge of occupational health problems (98.7%) and protective measures (100%) as compared to non-brine workers for whom these figures were 89% and 85.8% respectively.<sup>4</sup> In our study, both brine and non-brine workers were taken together as all of them were involved in both brine and non-brine work of salt production. We found that the salt workers in Marakkanam were aware of the hazards at salt work like Physical stress (70.7%), direct sunlight (38.7%) and glare from salt crystals (16%). This was lesser than the Rajasthan study probably because the sample in that study was from voluntary health camps and probably included the more health aware or actually health affected

workers. A study in similar coastal areas of southern Tamil Nadu involving 598 salt workers also documented hazards similar to our study like physical stress, glare from sunlight reflected by salt crystals.<sup>5</sup> Despite this, the salt workers still pursued to be in this occupation ignoring the hazards involved because getting work and a livelihood is more important for the workers in the unorganised sector.<sup>9</sup>

We found that the musculoskeletal problems (75.5%) followed by ophthalmic (55.9%), giddiness and headache (18.4%) were major health problems perceived. The other studies from Tamil Nadu documented the ophthalmic and dermatological problems as major morbidities.<sup>5,6</sup> In Rajasthan, the most common problems reported were ulcerated feet (71.8%), calloused palms (66.7%) and irritation to the eyes (61.5%).<sup>4</sup>

All the 205 salt workers in Rajasthan study had some knowledge of protective measures but only 29.5% workers were using some type of unconventional safety measures such as ordinary shoes or polythene bags as compared to 66.5% using in our study.<sup>4</sup> The reasons for not using personal protective equipments (PPEs) were financial, non-availability of devices and devices not provided by the salt manufacturers. A study<sup>6</sup> conducted to document the felt needs, reported that none of the 56 salt workers used PPE and perceived that it was uncomfortable to use boots and gloves due to sweating during work. In our study, the awareness and use of boots and gloves were very low at less than 10%. The major reasons given by the workers for non-use of PPE include PPE not being provided by their employers, followed by inconvenience in using them. Both studies study found a large gap between their knowledge and practice with protective devices.

## CONCLUSION

The extreme weather and hard labour conditions in the salt pans cause lot of morbidities among the salt workers. These morbidities are aggravated if the salt workers do not protect themselves with personal protective measures. Though most of the study population is aware of one or the other methods of protective equipment against adverse effects of working in salt pans, the actual use of PPE is very low because of non-availability and inconvenience in using them. There is a large gap between awareness and practice regarding PPE usage among these salt workers

## Recommendations

Intensive IEC campaigns are needed to educate the salt workers about the adverse effects from adverse environmental conditions. Provision of adequate and safe protective equipment and devices by the employers should be ensured along with training of salt workers in adopting and proper use of personal protective equipment such as hats/caps, eye goggles, light and loose clothing, gloves and gum boots.

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## REFERENCES

1. World Health Organization. Global Health Risks: Mortality and burden of disease attributable to selected major risks. Available at: [https://www.who.int/healthinfo/global\\_burden\\_disease/GlobalHealthRisks\\_report\\_full.pdf](https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf). Accessed on 20th September 2019.
2. Cherian J, Singh Z, Bazroy J, Purty A, Natesan M, Chavada V. Study of Morbidity Pattern Among Salt Workers in Marakkanam, Tamil Nadu, India. J Clin Diag Res. 2015;9(4):LC01-03.
3. Sachdeva R, Mathur ML, Haldiya KR, Saiyed HN. Work-related health problems in salt workers of Rajasthan, India. IJOEM. 2006;10:62-4.
4. Haldiya KR, Sachdeva R, Mathur ML, Saiyed HN. Knowledge, attitude and
5. practices related to occupational health problems among salt workers working in
6. dessert of rajasthan, India. J Occup Health. 2005;47:85-8.
7. Durairaj D, Murugan S. A study on health hazards of salt workers in Tamil Nadu coastal areas. Int J Pharm Sci Rev Res. 2016;40(2):137-41.
8. Vasudevan J, Vaithiyalingam S, Anandan V, Mishra AK, Purty AJ. Common morbidities and felt needs of salt pan workers in a coastal area of Tamil Nadu, India. Int J Res Med Sci. 2019;7:805-9.
9. Parimalam P, Kamalamma N, Ganguli AK. Knowledge, attitude and practices
10. related to occupational health problems among garment workers in Tamil Nadu,
11. India. J Occup Health. 2007;49:528-34.
12. Mandal AK. Strategies and policies deteriorate occupational health situation in India: A review based on social determinants framework. IJOEM. 2009;(13):113-20.
13. Jaiswal A, Patro BK, Pandav CS. Occupational health and safety: Role of academic institutions. IJOEM. 2006;10(3):97-101.

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