J. Asiat. Soc. Bangladesh, Sci. **51**(1): 87-102, June 2025
DOI: http://doi.org/10:3329/jasbs.v51i1.82793

OCCUPATIONAL HEALTH HAZARDS AND TREATMENT SEEKING BEHAVIOR OF SALT PAN WORKERS IN KUTUBDIA AND MAHESHKHALI ISLANDS OF COX'S BAZAR, BANGLADESH

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Abstract

This study aimed to illuminate the prevailing occupational health issues faced by salt pan workers in Kutubdia and Maheshkhali Islands of Cox's Bazar, Bangladesh. Utilizing qualitative methodologies, the research conducted individual interviews, focus group discussions, and key informant interviews with salt farmers, and community leaders, and experts. Data were analyzed using thematic analysis method to explore demographic attributes, health status, challenges, and concerns of the workers. Findings revealed that salt farmers frequently encounter heat stresses, dehydration, respiratory health problems, musculoskeletal issues, dermatological problems, and vision-related complications. The study also highlighted the lack of access to protective equipment, inadequate medical facilities, and substantial treatment expenses faced by the workers. The study emphasizes the urgent need for multifaceted interventions, emphasizing access to protective gear, community awareness enhancement, collaborative efforts, and sustainable practices. Addressing the occupational health challenges faced by salt pan workers in Kutubdia and Maheshkhali Islands requires concerted efforts from stakeholders, policymakers, and community leaders.

Key words: Occupational health, Salt farming, salt pan workers, Health hazard.

Introduction

Occupational health plays a pivotal role in safeguarding the well-being of workers and ensuring a productive, sustainable work environment. The joint estimates of WHO/ILO shows that about 1.9 million people died from occupational health hazards in 2016 with 81% from diseases and 19% from injuries (WHO and ILO, 2021). The geographic variations of these occupational health risks and associated impacts are related to the economic development of the regions with workers in the developing nations suffering more. The Decent Work Agenda of International Labour Organization (ILO, 1999) and

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later incorporation of Decent work in the United Nations' 2030 Agenda for Sustainable Development (UN, 2015.), all emphasized the creation of safe and secure working environments and promoting occupational health and safety standards and reducing work-related injuries and illnesses.

Occupational hazards pose health and well-being risks inherent to specific professions with industrial and agricultural sectors face the greatest risks (WHO, 1983). Distinct work-related risks entailed in differential professions are associated with specific tasks, environments, and exposures associated with that profession. Construction workers face hazards like falls and machinery (Dong *et al*., 2017; Eom and Lee, 2020; Alateeq *et al*., 2023), while healthcare workers confront biological risks such as infections (Ali *et al*., 2020; Ayenew *et al*., 2022). Agricultural workers encounter dangers like pesticide exposure (Gilson *et al*., 2011; Shaik and Padma, 2017; Manwani and Pandey, 2016; Nguyen *et al*., 2018; Joshi *et al*., 2020; Tchir and Szafron, 2020) and miners face dust and underground risks (Azad, 2017; Agwa-Ejon and Pradhan, 2018; Son et. al., 2020; McCulloch and Miller, 2023). In such, salt pan workers confront unique challenges due to their specialized tasks and the distinctive environmental conditions they operate in.

Salt workers face challenges such as- direct contact with salt crystals, physical strain, and intense sunlight glare (Cherian *et al*., 2015). Breathing in salt particles can elevate blood pressure (Haldiya *et al*., 2005, Glad Mohesh and Sundaramurthy, 2016), and many exhibit increased oral health issues, indicating limited access to dental care (Sanadhya, 2013). Prolonged heat exposure in these agricultural settings can lead to kidney function decline and conditions like chronic kidney disease of unknown etiology (CKDu) (Luangwilai *et al*., 2021). Recent research from Thailand reveals this kidney function decline in workers during peak harvest periods (Luangwilai *et al*., 2022). A study in Rajasthan highlighted prevalent health issues among salt workers, including eye and skin problems and a 12.0% hypertension rate (Sachdev *et al*., 2006; Chavan *et al*., 2019). The challenging salt farm conditions, marked by heat-related risks and physical demands, also contribute to musculoskeletal disorders (Shengli, 2010).

Salt production in Bangladesh primarily occurs along the coastal regions, notably in Cox's Bazar and Chittagong districts, where saline seawater is utilized. Recent data highlights a surge in salt production with increased land under salt cultivation. Reports from the Bangladesh Small and Cottage Industries Corporation (BSCIC) indicate that the country has witnessed historic highs in salt production, reaching around 2.233 million tonnes for 2022-2023 (BSCIC, 2023). During the season, salt cultivation expanded to cover 66,424 acres, marking a growth of 3,133 acres from the previous year. Despite this

achievement, challenges persist for marginal farmers. The production in Cox's Bazar alone saw a spike, with daily yields exceeding 36 thousand metric tons due to prevailing heat conditions (TBS, 2023). However, farmers face hurdles in direct sales to mill owners, often navigating through intermediaries who pocket the price difference.

Bangladesh introduced the National Salt Policy in 2022 with goals to boost salt production and establish a buffer stock of approximately 0.1 million metric tons. Additionally, the policy focuses on expanding the salt industry by designating new lands for cultivation and establishing Eco-friendly industrialized areas (MoI, 2022). So, it is expected that salt production in Bangladesh will increase in the coming years. However, little focus is given on the health of the salt pan workers, and this demands immediate scrutiny and intervention. Kutubdia and Maheshkhali Islands of Cox's Bazar district in Bangladesh have carved a distinctive identity as pivotal contributors to the nation's salt production sector. This study aims to shed light on the occupational health challenges faced by salt pan workers in Kutubdia and Maheshkhali Islands. The main objective of the study is to explore the occupational health hazards of salt farming and the treatment seeking behavior of the salt pan workers in Kutubdia and Maheshkhali Islands of Cox's Bazar of Bangladesh. The specific objectives of the study include:

- Identifying different types of health hazards commonly experienced by the salt pan workers of Kutubdia and Maheshkhali Islands of Cox's Bazar of Bangladesh and
- Exploring the treatment seeking behavior of the salt pan workers of Kutubdia and Maheshkhali Islands of Cox's Bazar of Bangladesh.

Materials and Methods

Study area: Kutubdia and Maheshkhali Islands of Cox's Bazar district are in the South-eastern part of Bangladesh (Fig. 1). There are eight Upazilas under the Cox's Bazar district, and Kutubdia and Maheshkhali are two of them. Kutubdia Island is created by tidal, supratidal and fluvial processes of river Ganges. The topography is particularly mudflat, sandy and gentle slope. Cyclone and storm surges are the most common and frequent disaster of Kutubdia Island which causes a lot of sufferings for the inhabitants. Kutubdia Island consists of six unions named- Ali Akbar Dail, North Dhurung, South Dhurung, Lemshikhali, Kaiarbil, Baraghope. It has 58,463 households and a total area of 215.8 square kilometers (83.3 sq mi). Kutubdia is rich in producing salt and dried fish. An Island off the coast of Cox's Bazar. It has an area of 268 square kilometers. Maheshkhali Island consists of eight unions named- Bara Maheshkhali, Chhota Maheshkhali, Dhalghata, Hoanak, Kalarmarchhara, Kutubjom, Matarbari, Saflapur.

Through the Centre of the Island and along the eastern coastline rises a range of low hills, 300 feet high.

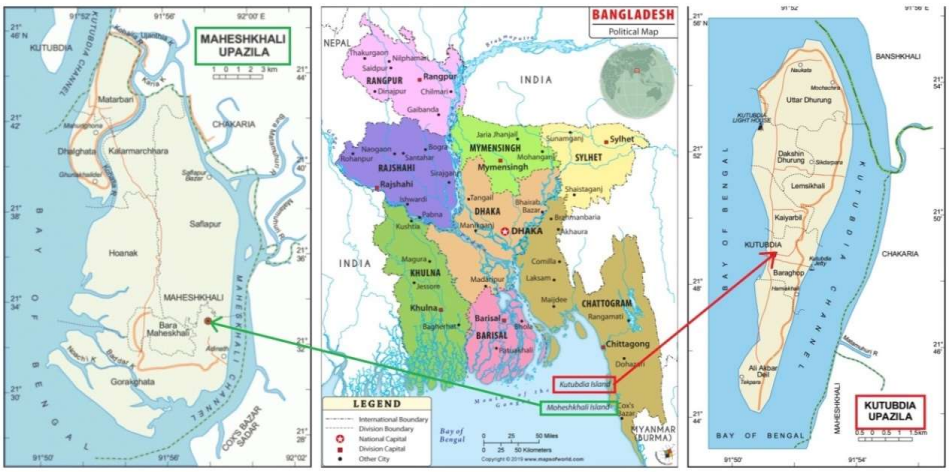

Fig. 1. Kutubdia and Maheshkhali Islands of Cox's Bazar, Bangladesh.

Research design: The research utilized qualitative research approach to gain insights into the experiences of salt pan workers. Qualitative approach provides no-numerical description of conditions with deeper comprehension. The approach is concerned with providing deeper insights into problems without quantification (Moser and Korstjens, 2017). Qualitative approach provides researcher clear and in-depth understandings of people experience in such analytical way that is easy and simple (Cleland, 2017). It is also useful for gathering perceptions, experience and behavior of the respondents (Moser and Korstjens, 2017). As this study is concerned with the experience of the salt pan workers and their behavior, qualitative is approach is chosen as an appropriate method of study. Qualitative research typically involves observation of characteristics, in-depth interview or focus group discussion (Cornel *et al*., 2019). This study involved individual interviews with the workers to delve deeper into their perspectives. Furthermore, the study organized focus group discussions (FGDs) to facilitate group interactions and gather collective viewpoints. Additionally, key informant interviews (KIIs) were undertaken with experts or community leaders to obtain specialized insights and expert opinions on the subject matter (Fig. 2).

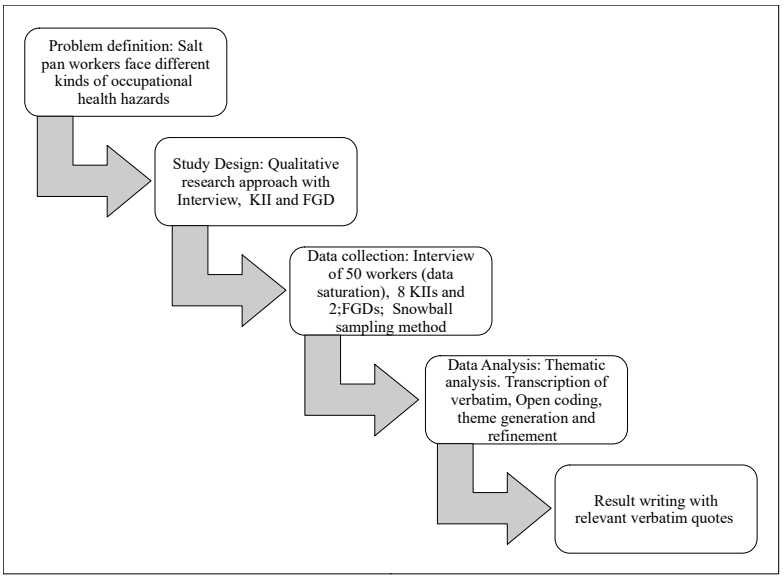

Fig. 2. Research process.

Sampling and Data collection: Qualitative interview generally involves open-ended and unstructured or semi-structure and guided questionnaire (Bryman, 2008; Bamberg, 2012). In this study, both semi-structured and unstructured interview were applied. Semi-structured questionnaire was used to collect data from salt pan workers and key informants while unstructured interviews were conducted in FGDs. A total 50 salt pan workers were interviewed to understand their experience with different health hazards due to their occupation and their preferences for seeking treatments. Each of the interviews lasted for around 30 minutes. The sample size is determined by theme (data) saturation method. Theme or data saturation method involves identification of a higher number of themes within a corpus of data (Wutich *et al*., 2024). When no new theme or information is produced from interviews, saturation point is achieved. Sample size in any qualitative and quantitative study is an important issue. The determination of sample size in qualitative research is rarely discussed and poorly understood (Wutich *et al*., 2024) with no clear rules (Lichtman, 2010; van Rijnsoever, 2017; Kindsiko and Poltimäe, 2019). But there is recent development in literature on minimum sample size also known as saturation (Wutich *et al*., 2024). Wutich *et al.* (2024) reviewed minimum sample size for saturation of data in different types of qualitative research. It is found that the minimum sample size required for theme saturation is nine for interview and four focus

groups (Guest *et al*., 2006; Hennink and Kaiser, 2022). These are minimum numbers among different theme saturation studies. So, the numbers of interview for saturation vary based on the context with recent web based work suggesting a number of 30-67 interviews for saturation (Squire *et al*., 2024). Thus, more case and context specific research is recommended for fully understanding the required interviews for saturation (Wutich *et al*., 2024). The saturation point sample size for the study was 24 and 26 for Kutubdia and Maheshkhali respectively. The result shows same patterns of health hazards and treatment seeking behavior for both the islands.

As the target population was salt pan workers of Kutubdia and Maheshkhali Islands, snowball sampling method was employed to identify relevant participants for the interview. In the method, participants were asked to assist in finding potential participants of the study interest.

Eight KIIs and two FGDs were also carried out. KIIs include Union Parishad Member, representative from Salt Farmers Association, Local administration- UNO, representative from BSIC and Local Medical Officer. FGDs were conducted with farmers, Salt Workers' Association and day labors involved in salt farming. In addition, published papers, reports of BSCIC, and newspapers have been consulted.

Data analysis and presentation: In qualitative research, analyzing and presenting qualitative data is one of the most confusing aspects (Burnard *et al*., 2008). Apart from that the process of analyzing data is also labor intensive and time consuming.

Kothari and Garg (2014) defined qualitative data analysis as the conversion to raw data to a form that is appropriate for researchers to make decisions. It is the process of ordering data and make sense out of it (Bryman, 2002). Data analysis is important in research so that both the readers and researchers can make sense out of it (Miles and Huberman, 1994). There are two fundamental approaches, namely deductive and inductive approach of qualitative data analysis (Spencer *et al*., 2004; Lathlean, 2006). While in deductive approach, a predetermined concepts, theories or research findings are used to set out expectations for data analysis and interpretations, actual data is used to derive the structure of analysis in inductive approach (Burnard *et al*., 2008). The later one is comprehensive and time-consuming (Burnard *et al*., 2008) and commonly used (Lathlean, 2006). In this study, inductive approach of data analysis is followed for analyzing data. Out of different inductive methods, thematic analysis was applied in this study to explore the qualitative dimensions of the workers' health status, challenges, and concerns in depth. It involved analyzing transcripts, identifying themes within data and gathering themes together.

Initially, workers' narratives about their health were transcribed, aiming to capture the authenticity and nuanced details of their experiences. Following this, a thorough immersion into the transcribed data allowed for the identification of preliminary patterns and potential themes. Through a methodical coding process, the data segments were systematically organized into coherent themes and sub-themes. Throughout the analysis, these themes were continually refined and elaborated upon, facilitating a collaborative approach to ensure they resonated with and accurately represented the workers' perspectives and lived experiences. The whole analysis has been performed in Microsoft Office.

In qualitative research, there are two main approaches to writing up the findings (Burnard, 2004). First approach, the traditional approach (Burnard, 2008) involves presenting the main findings under each major theme with relevant verbatim quotes to highlight the findings followed by separate discussion. The other approach combines the discussion with the findings integrating in the context of the research (Burnard, 2008). Here, findings and discussion are presented in different sections and the traditional approach is followed for presenting the findings.

Results and Discussion

Respondents details: A total of 50 salt pan workers from both Kutubdia and Maheshkhali Islands were interviewed using a semi-structured questionnaire. Table 1 shows the demographic characteristics of respondents and the duration of the working in the occupation. In Kutubdia, 6 respondents were under the age of 30, whereas 13 fall within the 30-40 age range, and the remaining 5 were above 40. Conversely, in Maheshkhali, 8 respondents are below 30, 12 fall within the 30-40 age range, and 6 are above 40. Thus, the majority of the respondents, accounting for around 50% of the total, are between 30 and 40 years old. Educationally, Kutubdia shows that 4 are illiterate, 11 have primary education, 7 possess secondary education, and a smaller 2 have higher secondary qualifications. On the other hand, in Maheshkhali, 4 are illiterate, 8 have primary education, a significant 13 have secondary education, and 1 holds higher secondary credentials. Majority of the workers were engaged in salt farming for 15-25 years and representing around 50% of the total respondents.

Health hazards

Dehydration and Heat-Related illnesses: The salt farmers emphasized the prevalence of dehydration, especially when they work during the blistering summer months. The period

of salt farming is from November to May which includes winter (November- February) and summer (Pre-monsoon) seasons of Bangladesh. The months of summer (pre-monsoon) have prevailing higher temperatures. The workers work around 10-12 hours under the sun which left them exposed to scorching sun. This leads to dehydration of the workers. One of the respondents illustrated the situation as:

One of the primary health problems we face during salt farming is dehydration, especially during the scorching summer months.

Table 1 Participant detail.

Characteristics	Category	Kutubdia	Maheshkhali	Total
Age	Less than 30	6	8	14
	30-40	13	12	25
	More than 40	5	6	11
Education	Illiterate	4	4	8
	Primary	11	8	19
	Secondary	7	13	20
	Higher Secondary	2	1	3
Duration of work	Less than 15	6	5	11
	15-25	12	13	25
	More than 25	6	8	14

Despite their efforts to stay hydrated, the intense heat often leads to fatigue, dizziness, and an overall sense of exhaustion. The environmental conditions amplify the challenge, with farmers continuously losing fluids and battling the unforgiving sun, which underscores the urgent need for effective preventive measures. One of them also added:

Summers are harsh here, and despite our efforts to stay hydrated, there are moments when dizziness and fatigue become overwhelming.

Respiratory health problems: The salt farmers frequently encounter symptoms such as persistent coughs, chest heaviness, and over time, the emergence of chronic respiratory conditions. One respondent has shared his view as:

A persistent cough is almost a given among us, and I've observed many of my colleagues developing chronic respiratory conditions over time.

Farmers perceive that they inhale a significant amount of salt and dust during their work. They believe that although they cannot see these particles with the bared eye, the particles exist in the air and enter their lungs during the inhalation process, thereby having a detrimental impact on their respiratory health. As one respondent reported:

Continuously breathing in the salty mist and dust really takes a toll on my respiratory health. Over time, I've noticed that this constant exposure leads to discomfort, breathing difficulties, and other related health issues. It's challenging, as I can feel the effects on my lungs, making it harder to breathe freely and comfortably.

Musculoskeletal issues: The physical demands inherent in salt farming manifest in various musculoskeletal issues among the community. Tasks such as lifting heavy salt bags and engaging in repetitive motions contribute to widespread backaches, joint pains, and muscle strains. These physical ailments not only affect individual farmers' mobility and productivity but also emphasize the need for ergonomic considerations and support mechanisms.

Lifting heavy salt bags and constantly bending over the pans has taken a toll on my back and joints. I have experienced persistent backaches and joint pains because of these repetitive tasks. It is not just me; many of us in the community feel the strain and discomfort from these physical demands.

Dermatological concerns: Among salt pan workers, there is a common occurrence of skin-related issues ranging from mild to severe. Most of the workers frequently experience skin dryness, which can be quite uncomfortable and often leads to irritation. Beyond the initial dryness and irritation, some workers face more severe dermatological conditions. These conditions include rashes, blistering, or other skin ailments that require medical attention.

I have observed that just months of working in the salt pan results in skin dryness, which can feel tight and uncomfortable. Beyond just dryness, I frequently experience irritation, making my skin feel sensitive and sometimes even painful to touch. Unfortunately, the challenges do not stop there. There have been occasions when persistent rashes and redness develops.

Vision and eye health: Many farmers report frequent eye irritations, increased sensitivity to light, and blurred vision, emphasizing the need for protective eyewear and interventions to mitigate long-term vision-related complications. The reflective nature of salt pans and the intense glare expose salt farmers to heightened risks related to vision and eye health. Following an illustration from a respondent:

I work for long hours in the salt pan. After just a few hours into my shift, I begin to experience issues related to vision glare. This glare not only makes it challenging to see clearly but also contributes to a range of other problems that persist even after I have completed my work for the day. Many of my colleagues and I frequently encounter symptoms such as eye irritations, episodes of blurred vision, and heightened sensitivity to light. It is concerning how this constant exposure affects our eyesight.

Exposure to injury and diseases: Salt farmers frequently operate without the benefit of essential protective measures. Despite the inherent risks associated with their occupation, such as direct exposure to salt, contaminants, and airborne particles, there is a notable absence of safeguards. This absence extends across various facets of their work, from the initial preparation of salt beds to the intensive processes of raking, harvesting, and subsequent packaging. One of the respondents revealed as follows:

We utilize basic tools necessary for tasks like preparing the pans and other activities in the salt-making process. However, we do not employ protective measures such as gloves, sunglasses, or masks. Instead, we rely on our hands and legs, directly exposing ourselves to the salts.

Farmers forgo protective measures due to longstanding familiarity with their challenging work environment. Years of exposure have made them accustomed to the risks of salt and contaminants. Moreover, traditional practices and a lack of awareness about modern safety protocols contribute to this mindset. As a result, while dangers persist, cultural norms and immediate productivity often overshadow the adoption of essential safety precautions. In response to the question why workers don’t use protective measures came as follows:

We work in this manner because we are accustomed to it, and it's a tradition that has been passed down through generations.

This quote certainly indicates their lack of awareness. Not only do they work without adequate protective measures due to tradition and familiarity with the environment, but they also grapple with financial constraints. Middlemen often dictate low prices for their produce, leaving farmers with limited resources to invest in safer production methods. This economic pressure further hampers their ability to prioritize safety over immediate financial concerns. The worker further added:

We also cannot invest more money since we don't receive a fair price for our produce, while middlemen reap significant profits.

Treatment seeking behavior: In both study regions, most respondents primarily rely on local pharmacies and nearby doctors for medical treatment. Surprisingly, less than 15% of participants from these areas utilize the upazila healthcare facilities. Few of them seek medical care outside their islands for better services. Furthermore, only a small fraction of respondents turns to Homeopathic treatments. The data underscores a notable trend: a predominant dependence on local pharmacies and individual practitioners, rather than more extensive healthcare facilities or alternative therapies. As respondents asserted:

Our local pharmacies and nearby doctors are our main sources for medical treatments.

While a few seek medical care outside our islands for better services, their number is too low.

Treatment cost: During the salt cultivation period, farmers typically incur expenses ranging between 6000 to 8000 Taka on medical treatment. Expenses include mainly cost of medicines. This specific financial commitment during this phase highlights the health challenges and risks associated with salt farming, necessitating significant expenditure on healthcare services to address related ailments and concerns.

The research provides an in-depth exploration of the working conditions, health challenges faced by salt pan workers in Kutubdia and Maheshkhali, Bangladesh. The findings illuminate critical areas of concern, shedding light on both the occupational hazards inherent to salt farming and the broader systemic challenges that these communities confront. One striking observation is the longevity of service among salt farmers in both regions. In Kutubdia, a majority (75%) of the respondents have been engaged in this labor-intensive occupation for over 15 years, with nearly a quarter dedicated for more than 25 years. Similarly, in Maheshkhali, half of the respondents have committed over a quarter-century to salt farming. Such extended tenures suggest a deep-rooted cultural and economic reliance on this traditional livelihood, underscoring the need for sustainable practices and welfare initiatives to support these seasoned workers.

Solar salt production process involves the physical demands and environmental exposures that farmers navigate daily. While the method is time-honored and central to the local economy, the absence of modern safety and sustainability measures poses significant risks to farmers' health and the ecosystem. As global conversations around sustainable agriculture gain momentum, integrating eco-friendly practices in salt farming could mitigate environmental degradation and enhance worker safety.

The health challenges articulated by respondents shows a concerning picture. From dehydration and heat-related illnesses during the grueling summer months to chronic

respiratory conditions due to salt and dust inhalation, farmers confront a myriad of health risks. Furthermore, musculoskeletal issues, dermatological concerns, and vision-related complications compound their vulnerabilities. These health implications not only impact individual well-being but also signify broader public health implications that warrant immediate attention (Fig. 3).

The revelation that farmers operate without essential protective measures is alarming. While cultural norms and economic constraints perpetuate this practice, the resultant health repercussions are undeniable. The absence of protective gear, coupled with direct exposure to salts, contaminants, and airborne particles, underscores the urgent need for awareness campaigns, training, and policy interventions to safeguard farmers' well-being.

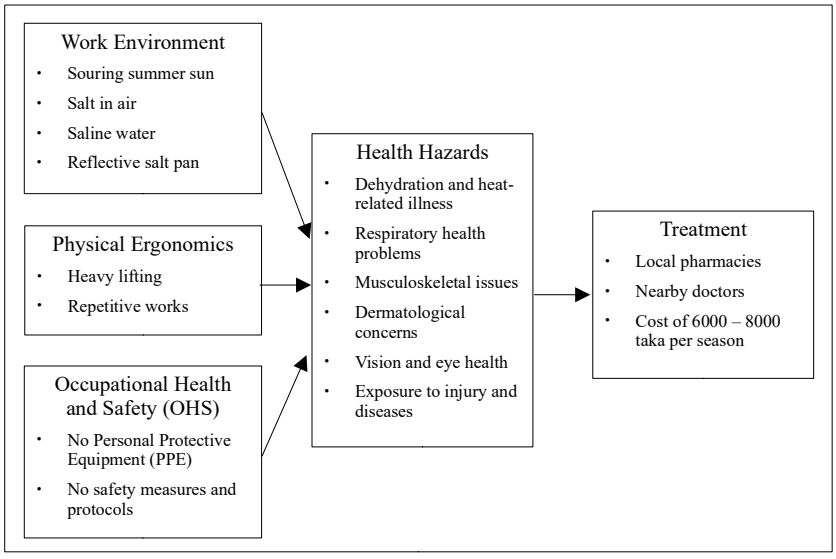

Fig. 3. Occupational health hazards and treatment seeking behavior of salt pan workers in Kutubdia and Maheshkhali Islands of Cox's Bazar, Bangladesh.

The predominant reliance on local pharmacies and nearby doctors highlights potential gaps in healthcare accessibility and quality. The limited utilization of centralized healthcare facilities suggests a need for infrastructure development, capacity building, and awareness initiatives to enhance medical service delivery. Additionally, the financial burden of medical treatment, with farmers incurring substantial expenses during the cultivation period, underscores the economic implications of health challenges and the imperative for comprehensive support mechanisms.

Conclusion

The present study found that salt pan workers in Kutubdia and Maheshkhali face different types of health hazards due to the working environment and lack of protective equipment in the process of salt farming. The environment poses significant health risk as the environment has great amount of salt in air and water which affects both inner and outer organs of the workers. Exposed to salt causes different health issues like chronic respiratory and dermatological conditions. The solar salt production method requires the workers to work under scouring heat conditions which causes dehydration and heat-related illnesses. Workers are also exposed to other health hazards like musculoskeletal problems, glare sensitivity, injury etc. Most of the people take medication from local pharmacies and thus local pharmacies and doctors play a crucial role in providing treatment to most of the people. This reflects their reliance on local medication than modern treatment facilities. In the face of current situation, priority must be given on the health and well-being of the salt pan workers. Several measures should be put in place to deal with the prevailing health and treatment facility issues. Implementing comprehensive health and safety programs, providing access to medical care, and ensuring proper use of protective equipment can help overcome health issues in salt farming. Apart from these, safety seminars, educational and awareness campaigns can also be recommended.

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(Revised copy received on 03/03/2025)