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Occupational Health Hazards among Women Fish Vendors in Thiruvananthapuram, Kerala

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HIGHLIGHTS

- A significant association was found between the number of dependents and working hours, indicating family responsibilities influence work duration.
- A potential link between occupational engagement and reproductive transitions was established.
- There was a significant link to reproductive status, indicating that hormonal or health changes during menopause may influence daily activity levels.

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ABSTRACT

The informal sector constitutes a significant source of employment for women in India, particularly in coastal regions such as Kerala, where fish vending serves as a primary livelihood, and women frequently encounter substantial occupational health risks stemming from extended working hours and inadequate ergonomic conditions. The study aims to examine the multifaceted occupational health hazards affecting women fish vendors in Thiruvananthapuram district, carried out during 2025, with a particular emphasis on physical, reproductive, and psychosocial health dimensions. Data were collected from a sample of 150 women fish vendors through structured interviews, observational checklists, and a quality of life rating scale. The findings revealed a high incidence of musculoskeletal disorders, fatigue, dermatological conditions, and reproductive health concerns among the women fish vendors. Significant correlations were observed between health status and factors such as education level, household dependency ratio, income, and housing type. The study underscores the critical need for targeted policy interventions, comprehensive health education, infrastructural enhancements, and gender-sensitive occupational safety protocols to safeguard the health and dignity of women engaged in the unorganised sector.

INTRODUCTION

Fisheries constitute a vital component of global food production, contributing significantly to nutrition, livelihoods, and economic growth in coastal regions. In India, and particularly in Kerala, fisheries play a central role in sustaining rural economies and providing employment opportunities across multiple stages of the value chain (FAO, 2022). The state's extensive coastline and rich marine resources have positioned it as one of the leading contributors to national fish production. However, the sustainability of this sector depends not only on ecological management but also on the recognition of the diverse actors engaged in post-harvest and marketing activities. Women occupy a critical position within the fisheries value chain, especially in small-scale and artisanal contexts. Their involvement spans from processing and vending to managing household-level resource allocation, thereby shaping both economic and social outcomes (Biswas, 2011; Gustavsson, 2020). Studies have shown that women's control over income from fisheries-related

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activities often translates into more equitable distribution of resources within households, benefiting children and vulnerable members (Bradshaw et al., 2013). Despite their indispensable contributions, women frequently encounter systemic barriers such as limited access to infrastructure, discriminatory practices in markets, and exclusion from policy frameworks (Rejula et al., 2023). These challenges amplify their economic insecurity and restrict their ability to fully benefit from fisheries development initiatives.

In Kerala, female fish vendors form the backbone of the coastal economy, particularly in districts such as Thiruvananthapuram. Their work involves long hours of physically demanding tasks, including carrying heavy loads, standing or walking for extended periods, and operating in roadside markets exposed to harsh weather and unsanitary conditions. Many lack access to clean drinking water, sanitation facilities, and adequate housing, which directly impacts their health and well-being. Occupational hazards such as musculoskeletal disorders, fatigue, and reproductive health issues are common among these women, yet their risks remain poorly documented (Yadav et al., 2020; Chambon, 2024). Furthermore, low educational attainment and limited awareness of health risks compound their vulnerability, while the absence of occupational health and social protection schemes leaves them without institutional support.

Although Kerala's fisheries sector has been widely studied, research focusing specifically on the occupational health of women fish vendors remains scarce. Existing literature has highlighted women's entrepreneurial potential in value addition and fish processing (Tanuja et al., 2022), but few studies have systematically examined the health hazards they face in daily vending activities. Addressing this gap is crucial, as the perishable nature of fish makes efficient handling and storage essential, and women vendors often lack access to such facilities. This study therefore seeks to identify and categorize occupational health hazards among women fish vendors in Thiruvananthapuram, Kerala, while also examining the influence of socio-demographic factors and assessing their quality of life.

METHODOLOGY

Kerala had a coastline over 590 km, covering nine coastal districts with 222 fishing villages and 187 landing centers. Thiruvananthapuram's coastal stretch is approximately 78 km, representing about 13% of the state's total of 590 km. In 2017-18, Kerala had 5,977 female fish vendors (approximately 35.8%), while Thiruvananthapuram district alone accounted for 1,060 female vendors about 70% of the total fish vendors in the district (Department of Fisheries, Government of Kerala, 2018). The study was conducted in Thiruvananthapuram district, located in Southern Kerala, which was purposively chosen due to its extensive 78 km coastal stretch and the significant concentration of female fish vendors. Out of the six taluks in the district, four taluks with coastal coverage Chirayinkeezhu, Varkala, Thiruvananthapuram, and Neyyattinkara were included to ensure representativeness. From the total of 138 coastal wards, 15 wards were selected to capture the geographic and socio-economic diversity of vending practices. This stratified approach ensured adequate representation of coastal, peri-urban, and urban roadside vending areas, thereby reflecting variations in occupational hazards linked to environmental exposure, infrastructure availability, and market conditions. Based on the data received from the fisheries department, a sample of 150 women was selected. This sample size provided a reasonable balance between statistical precision and logistical feasibility, corresponding to an estimated margin of error of about 7–8 percent at a 95 percent confidence level. The sample size was also justified on practical grounds, as it allowed for in-depth interviews and observations while ensuring coverage across diverse vending contexts within the district. A purposive sampling technique was adopted, with respondents selected based on specific inclusion criteria relevant to the research objectives. Women engaged in roadside fish vending were included, while those vending in sheltered marketplaces or engaged in door-to-door delivery were excluded. A structured interview schedule was designed to collect quantitative data from the selected respondents. The schedule consisted of close-ended questions to ensure uniformity in responses and covered aspects such as socio-demographic profile, working hours, reproductive health, working conditions, and occupational health issues. In addition, an observation checklist was prepared to identify and record visible occupational health hazards faced by the fish vending women. The checklist included items related to physical, chemical, psychosocial, biological, and ergonomic hazards. Data obtained from the checklist were systematically documented as field notes and later used for descriptive analysis. A five point Likert rating scale was developed and used to assess the quality of life of fish vending women, which includes Strongly agree, Strongly disagree, Agree, Disagree, Neutral with scores of 5,4,3,2 and 1 respectively. A total of ten statements were included in the rating scale and were all positive in nature. The sum of the total scores represents the total quality of life score of an individual. Thus the maximum score an individual can score is 50 and the minimum score is 10. Further the scores were categorized into low, medium and high. The scores ranging from 10 to 22 indicate a low level, 23 to 35 represent a medium level, and 36 to 50 indicate a high level of scores. The data were analysed using SPSS Version 27 and Microsoft Excel. The data were classified, tabulated, and interpreted using appropriate statistical methods to address the study objectives. Descriptive statistics were conducted on demographic, socio-economic, and other relevant variables to provide a clear overview of the data. As all variables other than the Quality of life (QoL) scale were categorical, frequency distributions were calculated and visualized using pie charts, column charts, and doughnut charts. Descriptive statistics and reliability analysis was done for the Quality of Life scale. To examine associations between variables, cross-tabulations were used and visualised using multiple bar diagrams. For comparative analysis between groups, the Chi-square test for association was applied. In cases where expected cell counts were less than 5, Fisher's Exact Test was used as an alternative to ensure accuracy and validity of the results. To compare between groups, non-parametric tests were used since the data is not normal. When there were two groups for comparison, Mann Whitney U test were used and for 2 or more groups Kruskal Wallis H test were done following post hoc multiple comparison test were done to find out the which group differs significantly. Statistical significance was determined using p-values, with a threshold of 0.05.

RESULTS

Health Problems of the Respondents

The association between perceived causes of health problems and selected socio-demographic and economic characteristics, such as age, income, education, number of dependents, residence area, and family type, was examined. The physical and occupational health problems were identified in most of the respondents, who suffer from various musculoskeletal problems such as back pain, joint pain, shoulder stiffness and knee discomfort, primarily due to prolonged standing, sitting, walking, and lifting of heavy loads. Many women experienced headaches and dizziness, often associated with long hours of exposure to direct sunlight. Skin infections were also noticed (Table 1). The lack of access to proper sanitation facilities contributed to urinary health issues among several respondents. Improper working postures, such as extended squatting or sitting on low stools, led to joint swelling and pain. Additionally, repeated handling of fish without protective gloves resulted in minor cuts, wounds and infections. A few respondents also reported respiratory issues.

Table 1. Health Problems Currently faced by the Respondents

Variables	Percentage
Type of health problems experienced	
Respiratory issues	0.70
Musculoskeletal problems	36.00
Gastrointestinal issues	0.70
Infections or wounds	2.00
All of the above	59.30
Other	1.30
Perceived causes of health problems	
Work environment	76.7
Lack of access to healthcare	2.00
Financial instability	10.00
Social and family pressure	0.70
Physical strain	10.70
Reason for not using protective equipment	
Not available	16.00
Too expensive	14.70
Lack of awareness	34.00
Not comfortable/practical	35.30

Based on the medical records available from the respondents, a substantial proportion, 59.3% experienced a combination of multiple health problems, particularly musculoskeletal issues 36 percent, and very few reported only a single health issue. The majority 76.7% attributed these health problems to poor working conditions, while others cited physical strain 10% and financial or systemic barriers. Notably, none of the participants reported using any protective gear during work. The main reasons included lack of comfort or practicality 35.3%, lack of awareness 34%, unavailability 16%, and cost constraints 14.7%. This indicates a significant gap in workplace safety practices and access to basic occupational health resources. These findings are in alignment with the study carried out by Tripati et al. (2017), on Occupational health and role of gender, a study in informal sector fisheries of Udupi, India.

The study also examined the reproductive health status of the respondents, as it is closely linked to overall health, productivity and well-being of fish vending women. Their work involves "long hours in uncomfortable and unhygienic conditions, often without access to toilets, clean water and proper shelter". These factors can lead to serious reproductive health problems. This study examines crucial reproductive health indicators, which provide valuable insights into their biological health (Table 2). Most respondents reported that about 70% had attained menarche between 10–12 years of age. Regarding their current reproductive stage, two-thirds 66% were postmenopausal, and 21.3% had reached menopause. Among those, the majority had experienced natural or biological menopause 70.4%, while 28.9% reported surgical menopause. In terms of menstrual characteristics, 59.3% reported

Table 2. Association between working hours and socio-demographic and economic characteristics

Variables		Working hours per day				p-value
		Less than 4 hours n (%)	4- 6 hours n (%)	6-8 hours n (%)	More than 8 hours n (%)	
Age	50 and below	2 (50.0)	5 (13.2)	11 (11.0)	2 (25.0)	0.378
	51-60	1 (25.0)	15 (39.5)	37 (37.0)	2 (25.0)	
	60 above	1 (25.0)	18 (47.4)	52 (52.0)	4 (50.0)	
Education	Illiterate	2 (50.0)	11 (28.9)	45 (45.0)	1 (12.5)	0.033*
	Primary	1 (25.0)	20 (52.6)	49 (49.0)	4 (50.0)	
	Secondary	1 (25.0)	7 (18.4)	6 (6.0)	3 (37.5)	
Residence area	Urban	2 (50.0)	0 (0.0)	11 (11.0)	0 (0.0)	0.003**
	Coastal area	2 (50.0)	38 (100)	89 (89.0)	8 (100)	
Income	Below 5000	3 (75.0)	27 (71.1)	82 (82.0)	6 (75.0)	0.558
	5000-7000	1 (25.0)	11 (28.9)	18 (18.0)	2 (25.0)	
No. of dependents	None	0 (0.0)	3 (7.9)	3 (3.0)	1 (12.5)	0.031*
	1-2	0 (0.0)	6 (15.8)	9 (9.0)	0 (0.0)	
	3-4	3 (75.0)	4 (10.5)	15 (15.0)	3 (37.5)	
	More than 4	1 (25.0)	25 (65.8)	73 (73.0)	4 (50.0)	

*Highly significant at 1%level; ** Significant at 5% level

bleeding lasting 6–7 days, while 19.3 percent experienced longer durations. Irregular menstrual cycles were common 38.7%, followed by 21–28 day cycles in 32% of the respondents. These findings reflect both the reproductive transitions and possible gynaecological health concerns among women fish vendors, emphasising the need for targeted health interventions in this group.

Since the study findings clearly emphasizes about the continuous working hours involved by the respondents, an attempt was made to understand the relationship between hours of working and associated variables.

The association between daily working hours and selected socio-demographic and economic variables was analyzed using Fisher's exact tests. Among the observed variables, education level, residence area, and number of dependents showed statistically significant associations with daily working hours ($p < 0.05$ and < 0.01). On the other hand, age and income did not show significant associations with working hours ($p > 0.05$), though a higher proportion of older individuals (60+) were working 6–8 hours daily. Similarly, participants earning below Rs. 5000 mostly worked 6–8 hours, but the association was not statistically significant. Education, residence area, and number of dependents are hence can be treated as key factors influencing daily working hours. These findings highlight the role of social and economic context in shaping labor patterns. To further contextualize the occupational and socio-economic challenges faced by women fish vendors, studies from other coastal regions of India offer valuable insights. Kumaran et al. (2021) conducted an exploratory study on the socio-economic and livelihood status of coastal fishers in Puducherry, revealing that income diversification was common due to the stagnation in capture fisheries, with many women engaging in non-fisheries occupations to supplement household income. This aligns with the current study's findings on economic vulnerability and limited occupational mobility.

As expected, reproductive status shifts with age (Table 3). Though it is a known fact, reproductive health issues can significantly impact women's economic productivity and livelihoods. Studying the association between these two variables may be vital to policymakers for supporting programmes for women's economic empowerment. Women aged 51–60 are more likely to be menopausal, while those above 60 are predominantly postmenopausal. Perimenopause is concentrated in the early 50s. Women in different reproductive stages tend to work similar hours, with most working 6–8 hours daily. However, the distribution varies slightly, and the association is statistically significant, suggesting reproductive status may influence work capacity or patterns. Hence it can be concluded that age is strongly associated with reproductive status, confirming biological expectations. The working hours also show a significant link to reproductive status, indicating that hormonal or health changes during menopause may influence daily activity levels.

Table 3. Association between Reproductive health and related variables

Variables		χ^2 / F	p-value
Age	50 & above 51-60 60 above	f	0.001*
Working hours per day	4-6 hours 6-8 hours Less than 4 hours More than 8 hours	21.32	0.011*

*Significant at .01%

Quality of Life enjoyed by the Respondents

A five-point Likert rating scale was developed and used to assess the quality of life of fish vending women. The scale was self-structured by the researcher (Table 4). The 5 points include strongly disagree, Disagree, Neutral, Agree, Strongly Agree with scores of 1,2,3,4 and 5 respectively. A total of ten statements were included in the rating scale and were all positive in nature. The sum of the total scores represents the total quality of life score of an individual. Thus, the maximum score an individual can score is 50 and the minimum score is 10. Further, the scores were categorized in to low, medium and high. The scores ranging from 10 to 22 indicates a low level, 23 to 35% a medium level and 36 to 50 indicates a high level of scores. Results showed that the majority of the respondents; 74 percent experienced a low level of Quality of life, followed by 26 percent in the medium category. None of the respondents reported a high Quality of life, indicating significant concerns regarding the overall well-being of the respondents. The low quality of life among the respondents is mainly due to poor working condition, long hours of physical labour, low and unstable income and lack of basic facilities.

The mean total QoL score was 18.5 with a standard deviation of 5.09, indicating moderate variability in the responses (Table 5). The median score was 15, with an interquartile range of 14 to 24, suggesting that 50 percent of the participants scored between these values. Overall the Quality of life of fish vending women is less. The scale comprised 10 items, and the mean item score was 3.71 ± 0.55. The internal consistency of the scale was found to be high, with a Cronbach's alpha of 0.846, indicating good reliability. Respondents working fewer hours per day reported significantly better QoL, with median scores declining steadily as working hours increased ($H=10.3$, $p=0.016$), highlighting QoL is better for women who works less than 4 hours compared to women working for 6-8 hours per day ($p=0.037$). The reason for entering fish vending also had a strong association ($p<0.001$), where women engaged due to tradition had higher QoL scores compared to those who entered due to lack of employment or difficulty in finding other work. Also, those facing multiple occupational challenges such as unhygienic conditions, weather hardships, and physical strain had significantly

Table 4. Quality of life of the Respondents

Descriptive				Scale Reliability		
Mean ± SD	Median (Q_1, Q_3)	Min	Max	N of Items	Mean ± SD	Cronbach's α
18.5 ± 5.09	15 (14, 24)	14	30	10	3.71 ± 0.55	0.846

Table 5. Comparison of QoL Scores with Reproductive Health Variables

Variables	H	p-value	MC (p-value)
Current reproductive status			
Reproductive age	21.5	<0.001	3–4 (0.002)
Perimenopause			1–4 (0.008)
Menopause			
Post menopause			
Days of menstrual bleeding			
Less than 3 days	11.7	0.008	2–3 (0.008)
3-5 days			2–4 (0.031)
6-7 days			
More than 7 days			

lower QoL, especially those reporting all challenges together (H=27.3, p<0.001). This underscores the need for improved occupational environments to support the health and dignity of these workers. Perceived causes of health issues showed a statistically significant impact on QoL (H=33, p<0.001). Women attributing health concerns to work environments had lower QoL scores than those identifying physical strain or financial instability as major contributors. Transport mode also mattered, those carrying fish via vehicles reported lower QoL than those using bicycles or head loads (H=21.5, p<0.001), possibly reflecting ergonomic strain or lack of transportation access.

Fish vending women's reproductive health and quality of life are impacted by their work environment. Poor sanitation, hygiene facilities, prolonged standing, lifting, and physical strain can increase the risk of reproductive tract infections and other health issues. Women in the reproductive age group reported higher median QoL scores (23), compared to those in the perimenopause (14) and postmenopausal (15) stages, with the association being statistically significant (H=21.5, p<0.001). Pairwise comparisons indicated that QoL is lower in women who are in post menopause stage than those who are in reproductive age (p=0.008) and those who are in menopause (p=0.002). Menstrual characteristics also impacted QoL. Participants with typical menstrual duration of 3–5 days reported the highest median QoL (22), while those with shorter (<3 days) or longer durations (6+ days) had lower scores (H=11.7, p=0.008). Post-hoc tests revealed that women with 3–5 days of bleeding had significantly better QoL compared to those with irregular patterns.

DISCUSSION

The present study highlights the occupational health hazards faced by women fish vendors in Thiruvananthapuram, Kerala, with a particular emphasis on demographic vulnerabilities, work-related health issues, and quality of life outcomes. The demographic data reveal that the majority of women fish vendors belong to an older age group, possess low levels of formal education, and bear significant family responsibilities within inter-generational living arrangements. These findings are consistent with earlier studies conducted in South Kerala, where 38% of women fish vendors had no formal schooling and most were aged above 30 years (John & Diwakar, 2014). Similar trends of illiteracy among women in informal sectors have been reported by Aparnaroy et al. (2017), underscoring the persistent educational disadvantage in this occupational group.

The economic instability inherent in marine fisheries, marked by seasonal fluctuations and income instability, exacerbates the vulnerability of fisherwomen. This economic uncertainty, as noted by Rajkumar et al. (2024), reinforces their marginalization within the socio-economic hierarchy. Educational attainment or the lack thereof emerges as a critical determinant in shaping occupational trajectories. Limited education restricts access to alternative employment opportunities, curtails labour mobility, and diminishes awareness of occupational rights and health hazards. The occupational continuity observed among women fish vendors suggests a generational pattern with minimal avenues for occupational transition. Hadaye and Dey (2024) observed that a significant proportion of women in this sector had over 15 years of experience, often without viable alternatives for livelihood.

Health-related findings from the present study further validates the existing literature. Over half (55%) of the respondents reported musculoskeletal pain, with a statistically significant association between pain and the method of carrying fish boxes. A notable proportion (61.1%) had sustained injuries, predominantly incisional wounds. Additionally, 55% of participants experienced skin infections, with itching and redness of the extremities being the most common symptoms (12.4%).

The intersection of age, working hours, and reproductive health also warrants attention. Chen et al. (2023), in a study published in BMC Women's Health, emphasized that age significantly influences reproductive outcomes, including infertility and hormonal transitions. Their findings support the present study's observation that reproductive status is closely linked to age and work-related stressors. Yarger and Brauner-Otto (2024), through a longitudinal analysis, demonstrated that work characteristics such as part-time status and autonomy over working hours significantly affect fertility expectations and reproductive planning. These insights are echoed in Sanjay et al. (2023), who found that menstrual irregularities were associated with extended or inconsistent working hours, suggesting a physiological impact of occupational stress on reproductive health.

A salient contribution of this study lies in establishing the relationship between occupational patterns, health challenges, and quality of life. The findings align with broader evidence indicating that prolonged working hours, poor ergonomic conditions, and inadequate workplace infrastructure adversely affect well-being. Notably, the study highlights that the motivation behind entering the occupation influences one's quality of life. Women who adopted fish vending as a traditional occupation reported a relatively better quality of life, possibly due to greater social acceptance and role familiarity. In contrast, those compelled by unemployment exhibited a lower quality of life, reflecting the psychosocial costs of constrained occupational choices. This observation aligns with the literature on informal employment, where the dichotomy between "choice" and "constraint" significantly influences job satisfaction and psychological well-being. Furthermore, the cumulative impact of multiple occupational stressors physical, environmental, and ergonomic was evident in the diminished quality of life among affected respondents. These findings underscore the need for targeted interventions that

address the multifaceted nature of occupational health hazards faced by women in the fish vending sector.

CONCLUSION

The study provides a clear overview of the socio-economic conditions, occupational challenges, and quality of life (QoL) of women fish vendors. Fish vending, often pursued due to tradition or economic necessity, exposes them to multiple occupational health risks such as physical strain, musculoskeletal problems, and poor reproductive health. These risks are intensified by inadequate infrastructure, lack of permanent shelter, unsafe transportation, and absence of protective gear and health awareness. The study finds significant variation in QoL based on income, education, family structure, working hours, and health status, demonstrating a strong link between socio-demographic and occupational factors. Women with higher income, better education, fewer dependents, and shorter working hours report better QoL, while postmenopausal women and those facing multiple hazards experience poorer outcomes. Overall, the findings highlight the urgent need for gender-sensitive policies, improved workplace infrastructure, health education, and social support systems to improve the well-being of women fish vendors.

DECLARATIONS

Ethics approval and informed consent: Informed consent was sought from the respondents for the study.

Competing Interest: The authors have no competing interests.

Conflict of interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The authors declare that during the preparation of this work, they thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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