Harvesting the Waters: Socio-Economic Status, Production Challenges, and Marketing Practices of Shellfish Workers in Koduvally Area, Thalassery, Kerala

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ABSTRACT

Global aquaculture markets, especially the shellfish industry, have experienced significant recent success, but growers remain vulnerable to risks such as seasonality, annual income variability, and environmental factors. As a result, many turn to alternative income sources and off-farm labor. This study focuses on the socio-economic conditions of shellfish workers harvesting clams, mussels, and oysters in the Koduvally area, Thalassery, Kerala, analyzing their economic and social circumstances and the challenges they face. It also presents an overview of issues related to promoting shellfish work in fisheries and aquaculture, based on available evidence, good practices, and case studies. However, data on employment relationships and livelihood strategies within fish value chains remain incomplete, likely underestimating the number of people engaged in the sector.

Key Words: Shellfish, Mollusks, Clams, Mussels, Oysters, Scallops, Fresh Shucked method

INTRODUCTION

Shellfish are highly nutritious and desirable foods, providing a significant source of animal protein with high biological value (Hany El-Said, 2004). These small, shell-covered creatures live primarily in the sea and lack a backbone. Shellfish are low in calories, fat, and sodium but rich in protein and essential vitamins such as A, B, and D. Alongside fish, shellfish are also excellent sources of minerals, including calcium, phosphorus, potassium, and iron—especially in mollusks. Fish provide a beneficial group of polyunsaturated fatty acids called omega-3s, which helps to reduce high cholesterol levels and may prevent heart diseases.

The composition of shellfish mainly includes water, protein, fat, and minerals. Fish flesh consists of short muscle fibers separated by delicate connective tissue. Fisheries and aquaculture play a vital role in providing nutritious food to billions globally and are an important source of employment and income, supporting the livelihoods of 10 to 12 percent of the world's population (FAO, 2014a). Enhancing working conditions in these sectors can improve business opportunities through better market access and exports. To alleviate poverty effectively, fisheries and aquaculture development must adopt a human right-based approach that promotes decent work and protects labour rights, focusing on resource access (FAO, 2014b).

Capture fisheries and shellfish production have remained relatively stable over the last three decades. The notable growth in fish supply is mainly due to the expansion of aquaculture (FAO, 2018). In 2016, global fish production peaked at 171 million tons, with aquaculture contributing 47% of the total. Marine aquaculture (mariculture) reached 28.664 million tons in 2016, with molluscs representing 58.8% of this weight, and Asia accounting for over 85% of mollusc production (Wijsman et al., 2019). Most cultured molluscs are filter-feeding bivalve shellfish such as clams, mussels, oysters, and scallops (FAO, 2018).

Globally, nearly 60 million people work in primary fishing sectors, with an additional 140 million employed along the value chain, from harvesting to distribution. Although many fisheries and aquaculture operations provide acceptable working conditions, income is often insufficient, and workers face hazardous environments.

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Labor rights protection is limited and poorly enforced, especially for small-scale fishers and workers in fish value chains. Illegal, unreported, and unregulated (IUU) fishing is linked to labour abuses, including exploitation of migrant workers. Promoting decent work conditions is essential for sustainable fisheries management, responsible aquaculture, and improved livelihoods and food security.

Commercial shellfish production traditionally has minimal impact on other coastal marine resources due to its reliance on clean water, absence of feed or chemicals, and low waste production. However, concerns remain because many farmed shellfish species are non-native, and the industry is expanding into new regions. Environmental risks include disruption of marine bird habitats, alteration of intertidal water movement, depletion of microorganisms, and reduced biodiversity from cultivating single species.

Marketing fish involves fishers, farmers, processors, and intermediaries who control pricing, transportation, and market access. Retail formats vary widely, from informal street vendors to large supermarkets controlling integrated value chains. Export-related employment includes jobs in fish export companies, certification, and transport (NORAD/FAO, 2011).

Although some commercial mariculture has reported negative environmental effects (Fachry et al., 2018; Mau and Jha, 2018), several types of mariculture offer positive socio-ecological impacts, including subsistence, recreational, restorative, scientific, and remediation efforts (Phillips, 2009). Restorative aquaculture aims to improve fisheries by restoring species ecology, biodiversity, and ecosystem services before harvesting (Fitzsimons et al., 2020).

Adopting labour standards to improve working and living conditions in fisheries aligns with human rights-based approaches, such as those outlined in the COFI-endorsed Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (FAO, 2014c). Restorative Shellfish Mariculture (RSM) is defined as a multidisciplinary approach involving human intervention during a species' life cycle to address negative socio-ecological impacts from unsustainable marine shellfish use. Sustainability focuses on the long-term maintenance or improvement of wild stocks and habitats.

This paper provides an overview of the socio-economic conditions of shellfish workers in the Koduvally area, covering habitat destruction, biological and ecological aspects, the demography of fishing families, and the harvesting, processing, and marketing of shellfish.

In the Koduvally area, Kannur district, Kerala, most residents are engaged in shellfish harvesting and fisheries, with fishing as their primary income source. Many fishermen live in joint families, often including parents and grandparents, though a small percentage belong to nuclear families. Most shellfish workers have been harvesting clams, mussels, and oysters for over 25 years. However, younger generations are showing less interest in this demanding occupation due to its physical hardships and relatively low income. Better education and alternative jobs offering higher earnings and social status attract many young people away from shellfish work. Some outsiders without other employment have recently joined the fishing workforce. Educational opportunities in clam fishing villages are limited, leading to low literacy rates.

Fishing families in Koduvally generally live near river shores with adequate but modest housing. While they earn enough for shelter, clothing, and basic food, luxuries like automobiles or entertainment are rare. Most families own homes with at least 200 sq. ft of living space, though some rent (Sathiadhas et al., 2004). Typically, fishermen begin harvesting at around 18 years old after limited schooling, learning the trade from older family members. Harvesting continues until about age 60. Black clam harvesting occurs year-round, about 20 days a month, except Sundays, stormy monsoon days, and occasional rest days. The primary method is diving underwater to collect clams by hand.

Aquaculture differs from capture fisheries by involving human intervention to enhance production, including stocking, feeding, and protection from predators (Tacon, 2003). It implies ownership of the cultivated stock by individuals or corporations. In Koduvally, clams, mussels, and oysters are the most important shellfish species harvested mainly by hand diving. After harvesting, fishermen and their families cook the clams, separate the meat using simple sieves, and sell the meat locally. Shells are sold through fishermen's societies to various

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industries. However, shellfish stocks appear to be declining, possibly due to fresher river water and a decreasing number of fishermen.

LITERATURE REVIEW

The literature on fisheries and aquaculture provides a multifaceted understanding of the sector's economic, social, and technological dimensions, emphasizing challenges and opportunities in both traditional and modern contexts.

Socio-economic Conditions of Fishing Communities

The socio-economic wellbeing of fishing communities is influenced by multiple factors related to market dynamics, social structure, and policy environments.

Sathiadhas (1992) analyzed consumer prices in the Madras region, focusing on the fish marketing chain. The study revealed significant marketing margins that disproportionately benefited middlemen over fishermen. This disparity highlights how fishermen often receive a smaller share of the final consumer price, limiting their income and economic advancement. The findings emphasize the critical role of marketing structures in shaping fishermen's livelihoods.

Rosa (2015) discussed the persistent poverty among fishing communities, attributing it to hereditary occupation patterns where fishing is passed down generations, often without opportunities for upward mobility. Low education levels and exploitation by middlemen exacerbate their economic vulnerability. Fishermen frequently end up selling high-value catches at low prices, unable to access financial support or grants that could improve their situation.

Salman et al. (2017) observed a worrying trend of youth migration away from fishing communities. The lack of social security, insecure livelihoods, and limited opportunities in the fishing sector push younger generations to seek alternative employment elsewhere. The study calls for government interventions aimed at improving social protection and creating viable economic opportunities within these communities to prevent further demographic decline.

Ganesh Kumar (2018) explored the auction system prevalent in India's fisheries sector, identifying inconsistent policies across different states. The limited knowledge of fishermen regarding auction procedures allows middlemen to dominate profits unfairly. The study advocates for a uniform auction policy that would empower fishermen to receive a more equitable share of the earnings from their catches.

Environmental Impacts on Shellfish

Shellfish populations and fisheries are impacted by environmental factors and fishing practices that have both ecological and food safety implications.

Pannikar (1998) examined how motorization transformed traditional fisheries, initially strengthening fishermen's bargaining power by improving access to landing sites and markets. However, this progress was tempered by increased operational costs associated with larger vessels and motorized gear. Additionally, the use of destructive fishing equipment threatens the sustainability and conservation of marine resources, illustrating the tension between economic growth and environmental stewardship.

Hudecova et al. (2010) raised concerns about food safety in fish and shellfish, identifying the potential presence of foodborne pathogens. This underscores the need for stringent monitoring and safety standards in seafood production and processing to protect consumer health.Coen (2010) emphasized the ecological importance of native bivalves, such as shellfish, beyond their economic value as food. These organisms provide essential ecosystem services, including creating habitat structures for other species, filtering water to improve quality, and stabilizing shorelines against erosion. Protecting shellfish populations thus supports broader environmental health.

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Radhakrishnan (2018) discussed challenges arising from policy implementation difficulties and trade conflicts that have affected India's seafood exports. Despite these hurdles, advancements in aquaculture technologies and production capacities have helped maintain sector growth, showing resilience amid external pressures.

Marketing and Value Chains

The fisheries sector's economic viability is closely linked to marketing efficiency, technological advancements, and supportive policies.

Sathiadhas (1992) highlighted how marketing margins and economic disparities in the fish supply chain affect fishermen's incomes, pointing to the need for more equitable marketing arrangements.

Pannikar (1998) described motorization's dual effect: enhancing fishermen's initial market power but introducing higher operational costs and sustainability concerns due to increased fishing pressure and gear impacts.

Venkataiah (2012) attributed recent growth in the fishing sector to the adoption of modern technologies such as reefer containers, which improve logistics for exports. Enhanced handling, processing, and testing facilities have raised product quality, positioning the sector for better access to international markets.

Manguts (2014) documented government stimulus programs in Kenya that revitalized aquaculture and shellfish production, expanding economic opportunities and increasing national production, which illustrates the positive impact of policy support.

Ganesh Kumar (2018) recommended establishing uniform auction policies to create a fairer distribution of profits between fishermen and middlemen, thus strengthening the value chain's equity.

Labor Rights and Workforce Issues

Labor conditions, inclusive participation, and social protections are critical for sustainable fisheries and aquaculture development.

Varghese (1998) highlighted significant barriers in exploiting deep-water fisheries due to the low economic value of resources and high operational costs for large vessels. This points to an urgent need for technological innovations that reduce costs and make deep-water fishing more viable.

Srinath Krishna (2000) brought attention to the important techno-economic role women play in coastal fisheries. Despite modernization reducing some traditional roles, women remain vital contributors, sometimes as skilled navigators. The study underscores the importance of supporting their continued participation without compromising their household responsibilities.

Vijay Kumaran (2001) proposed the use of social audits to assess aquaculture's social and environmental impacts. By quantifying social costs and benefits, these audits can help resolve conflicts, promote sustainability, and ensure the aquaculture sector's long-term viability.

Salman et al. (2017) emphasized the need for government interventions to enhance social security for fishing communities, which would help retain youth and stabilize fishing populations by providing safer and more secure livelihoods.

Collectively, these studies provide a comprehensive overview of the fisheries and aquaculture sectors, emphasizing the importance of improving technological capabilities, addressing socio-economic inequalities, enhancing market structures, and adopting sustainable environmental practices. The insights gained are particularly relevant for understanding and promoting the shellfish industry, as well as improving the livelihoods of workers dependent on these resources.

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Decent Work and Sustainable Livelihoods Framework: Guiding Principles for Analysis

Decent Work Dimensions:

- Employment Opportunities: Assess whether fisheries and shellfish workers have access to stable, productive, and fairly remunerated jobs. Consider barriers such as seasonal work, informality, and limited access to deep-water resources.
- Labor Rights and Social Protection: Examine the extent to which workers enjoy labor rights, including safe working conditions, freedom from exploitation, social security, and gender equality. Highlight issues like hazardous working environments, lack of social protection, and limited female participation.
- Social Dialogue and Representation: Evaluate the presence and strength of worker organizations, unions, or cooperatives that enable collective bargaining and participation in decision-making processes affecting fisheries and aquaculture.
- Equality and Inclusion: Consider how policies and practices address inequalities related to gender, age, education, and social status, ensuring marginalized groups such as women and youth are included and empowered.

Sustainable Livelihoods Dimensions:

- Assets and Capabilities: Understand the human (skills, knowledge), natural (fish stocks, water quality), physical (boats, gear), financial (income, savings), and social (networks, institutions) assets available to fishing communities.
- Vulnerability Context: Analyze external shocks and trends like climate change, market fluctuations, policy changes, and environmental degradation that affect livelihoods' stability.
- Livelihood Strategies: Explore how fishing households diversify income sources, adapt fishing methods, or seek alternative employment to sustain their livelihoods.
- Transforming Structures and Processes: Assess the role of policies, governance, market systems, and social norms that shape access to resources and opportunities. Highlight gaps in regulatory frameworks, market inequities, and support mechanisms.

Integrating Decent Work with Sustainable Livelihoods in Fisheries Analysis:

- Enhancing Economic Security: Promote fair pricing, transparency in marketing, and improved access to markets to increase fishermen's income and reduce exploitation by intermediaries.
- Promoting Safe and Equitable Work Environments: Address occupational health hazards, ensure gender-sensitive policies, and support social protections like pensions and healthcare.
- Supporting Capacity Building and Access to Resources: Provide training, technology adoption (e.g., cost-effective vessels), and infrastructure improvements to build human and physical capital.
- Fostering Inclusive Governance and Policy Coherence: Encourage multi-stakeholder participation in fisheries management, harmonize employment and fisheries policies, and support ratification of international conventions protecting fishery workers.
- Building Resilience to Environmental and Economic Shocks: Facilitate sustainable fishing practices, diversification of livelihoods, and climate adaptation strategies.

OBJECTIVES OF THE STUDY

- To assess the socio-economic status and living conditions of shellfish workers.

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- To investigate the factors contributing to the decline in shellfish production.
- To analyze the marketing practices of shellfish in the Koduvally area, including the methods employed by workers for selling their catch.

METHODOLOGY

Research Design: This study adopts an empirical research design, utilizing a survey method to collect primary data from shellfish workers in the Koduvally area, located within Thalassery municipality. The approach is qualitative and quantitative, focused on gathering first-hand information to facilitate accurate and comprehensive analysis of the socio-economic conditions, production challenges, and marketing practices related to shellfish.

Sampling and Sample Size: The study population comprises individuals actively involved in shellfish harvesting, processing, or related activities within the Koduvally area. A "shellfish worker" is defined as any person engaged in these activities. Those not involved were excluded from the study to maintain relevance and focus. A sample of 60 shellfish workers was selected through snowball sampling, a non-probability technique that relies on community referrals and networks to identify respondents. This method was appropriate given the dispersed and hard-to-reach nature of the population. The sample size of 60 was determined based on resource availability and the need to balance depth of inquiry with practical constraints.

Data Collection Procedures: Data collection spanned four months, from November 2024 to February 2025. Both primary and secondary data sources were employed to enrich the study. Primary data were collected using a structured questionnaire consisting of 55 carefully designed questions, covering demographic details, occupational practices, economic conditions, marketing activities, and challenges faced by shellfish workers. The questionnaire was administered face-to-face in English, with explanations provided wherever necessary to ensure clear understanding and accurate responses. To enhance data quality, the questionnaire was pre-tested on a small group of shellfish workers outside the main sample. The pre-test assessed clarity, relevance, and comprehension of questions, allowing refinement prior to the full survey.

Complementing the questionnaire, field surveys, direct personal investigations, and general observations were conducted to contextualize responses and validate data. Secondary data were gathered from diverse sources including academic books, journals, government publications, articles, newspapers, and credible online platforms. These sources provided background information and supplemented primary data insights.

Questionnaire Design and Reliability: The questionnaire design was informed by a thorough review of related literature and consultation with subject matter experts to ensure it accurately captured the intended information. Questions included both closed and open-ended formats to balance quantitative analysis with qualitative insights. Reliability was ensured through consistent administration procedures, including standardized explanations and interviewer training. The use of pre-tested questions further contributed to the reliability by reducing ambiguity and misinterpretation.

Validity and Ethical Considerations: To uphold validity, the questionnaire items were aligned with established theoretical frameworks and empirical studies in fisheries and socio-economic research. Expert review reinforced the content validity of the instrument. Ethical considerations were paramount throughout the study. Participants were informed about the study's objectives, assured of confidentiality, and gave informed consent before participation. Respondents were free to withdraw at any time without penalty. The study-maintained sensitivity to cultural and social norms of the community.

Data Analysis: Data analysis primarily involved descriptive statistical methods. Responses were tabulated and analyzed using percentages, averages, and graphical representations such as bar diagrams and pie charts to illustrate key trends and patterns. No inferential statistical tests were applied, as the study aimed to provide descriptive insights rather than test hypotheses. The analysis focused on summarizing the socio-economic status, production challenges, and marketing behaviors of shellfish workers.

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RESULTS

The basic profile of shellfish workers includes socio-economic and demographic characteristics such as age, education, and economic status. Primary data allowed for a comparative analysis of shellfish workers and their living conditions. Among those surveyed, 85% possessed a pink card, and the sample was weighted according to the number of fishing vessels and processing factories in each location. Data were collected randomly from 60 shellfish workers and analyzed, with the results organized into tables and figures for clarity.

The gender-wise classification of respondents shows that 73.4% were male, with half of the shellfish workers identified as having irregular status. The remaining 26.6% were female respondents. Among the female shellfish homeworkers, all were aged 40 years or older. These workers process seafood either at home or outside the factory.

Table 1 Daily wages

Sl. NO	Category	No of Respondents	Percentage
1	250-500	27	45
2	500-750	20	33.3
3	750-1000	10	16.7
4	1000-1250	3	5
	Total	**60**	**100**

Source: primary data

Table 1 presents the daily wages of shellfish workers, a key indicator of their financial well-being and economic condition. This income directly impacts their daily living standards. 45% of shellfish workers earn between ₹250 to ₹500 per day. 33.3% earn between ₹500 to ₹750 per day. 16.7% earn between ₹750 to ₹1000 per day. 5% earn between ₹1000 to ₹1250 or more daily. Workers earning above ₹1000 are identified as shellfish agents.

Table 2 Number of workers catching different shellfish

Sl.NO	Category	No of respondents	Percentage
1	Clam	27	45
2	Mussel	23	38.3
3	Oyster	8	13.3
4	Scallop	2	3.3
	Total	**60**	**100**

Source: primary data

Table 2 shows the percentage of workers catching different types of shellfish in the Koduvally area. The main types of shellfish available are clams, mussels, oysters, and scallops. 45 percent of the respondents catch clams, which are found only by the riverside. 38.3 percent catch mussels, which are available only on the sea shore. 13.3 percent catch oysters, and only 3.3 percent catch scallops. 60 percent of the shellfish workers operate on the sea shore, while the remaining 40 percent work by the river.

Since backwaters and streams are limited in this area, the sea and river shores are the only sources available for shellfish extraction. The respondents work as fishermen, self-employed fish retailers, and entrepreneurs. They use different methods to collect shellfish from the sea and river. 61.7 percent of the workers use canoes to collect shellfish, while 36.7 percent collect shellfish by walking. Only 1.6 percent use boats for collection. From this data, it can be concluded that using a canoe is the most common and effective method for collecting shellfish.

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Table 3 Form in which Shellfish sold

Sl. N o	Category	No of respondents	Percentage
1	Fresh Shell Stoke	30	50
2	Fried	3	5
3	Steamed	17	28.4
4	Fresh Shucked	10	16.6
	Total	**60**	**100**

Source: primary data

Table 3 shows the forms in which shellfish are sold in the market. Fifty percent of the respondents sell fresh shellfish, while 5% sell fried shellfish. Among the respondents, 28.4% sell shellfish using the steamed method, primarily distributing to hotels, toddy shops, and similar establishments. Additionally, 16.6% of the respondents use the fresh shucked method, which involves carefully removing oyster meat from its shell with a knife.

Table 4 Problems in work place

SL N o	Problems	No of respondents	Percentage
1	Health Problem	5	8.4
2	Low Payment	16	26.6
3	Climate	12	20
4	Heavy Work	27	45
	Total	**60**	**100**

Source: primary data

Table 4 presents the various challenges experienced by the respondents in their workplaces. According to the data, a significant portion of the respondents, accounting for 45 percent, indicated that they face the issue of heavy workloads. This suggests that nearly half of the sample find their work demands to be strenuous or excessive. Additionally, 26.6 percent of the respondents expressed concerns about low payment, highlighting financial dissatisfaction or inadequate compensation as a notable problem within their work environment. Furthermore, 20 percent of the respondents reported that climate variation adversely affects their work. This could imply that changes in weather or environmental conditions pose difficulties or disruptions in their daily tasks. Lastly, a smaller segment, 8.4 percent, shared that they are experiencing health problems related to their work, which could be a result of workplace conditions or stress factors. Overall, these findings reveal a range of issues from workload and compensation to environmental and health concerns impacting the respondents at their workplaces.

Table 5 Reasons for the reduction in Shellfish Production

Sl. N o	Category	No of respondents	Percentage
1	Shrimp Farming	29	48.4
2	Chemicals	0	0
3	Sewage form Flat	17	28.3
4	Waste form hospital	14	23.3
	Total	**60**	**100**

Source: primary data

Table 5 highlights the key reasons behind the reduction in shellfish production, as reported by the respondents. The most significant factor, according to 48.4 percent of the respondents, is shrimp farming. They explained that in shrimp farms, workers use large quantities of bleach. This excessive use of bleach eventually flows through rainwater into rivers and the sea, leading to the destruction of shellfish populations. In addition to this, 28.3

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percent of the respondents pointed to the dumping of waste from residential flats into the river as another major cause contributing to the decline in shellfish production. This waste pollution negatively impacts the aquatic environment, affecting the shellfish habitats. Furthermore, 23.3 percent of the respondents identified the dumping of hospital waste into the river as a reason for the decreasing shellfish numbers. Hospital waste likely introduces harmful substances and contaminants into the water, further threatening shellfish survival.

Table 6 Preference to shellfish work

Sl. N o	Benefits	No of respondents	Percentage
1	Low Cost	14	23.3
2	No previous knowledge is	19	31.7
3	No age limit	23	38.4
4	All the above	4	6.6
	Total	**60**	**100**

Source: primary data

Table 6 provides insights into the reasons why people prefer to engage in shellfish farming. According to the data, 23.3 percent of the respondents believe that the low initial cost required to start shellfish farming is a major advantage. They pointed out that this occupation does not demand significant financial investment, making it accessible to many. A larger proportion, 38.4 percent, indicated that the absence of an age limit for this work is a key factor in their preference. This means that individuals of any age can easily enter this field, making it an inclusive opportunity for a wide range of people. Additionally, 31.7 percent of the respondents mentioned that no prior knowledge or specialized skills are necessary to begin working in shellfish farming. This ease of entry likely encourages many to choose this occupation without barriers related to training or education. Lastly, a smaller group, 6.6 percent, acknowledged that they personally experienced the combined benefits of low cost, no requirement for previous knowledge, and no age restrictions. These factors collectively influence their decision to prefer shellfish farming as a livelihood.

The workers have adopted various methods for selling shellfish. According to the data, 40 percent of the respondents sell their shellfish through clubs, hotels, and specialty stores, indicating these venues as popular and possibly profitable channels. Meanwhile, 28.4 percent of the workers prefer to sell their shellfish directly through independent fish markets, which may offer more direct access to consumers. Additionally, 16.6 percent of the respondents sell their shellfish through agents, relying on intermediaries to handle the sales process. Lastly, 15 percent of the workers use supermarkets as their sales outlets, benefiting from the wide reach and convenience these larger retailers provide.

The shellfish workers are catching shellfish and they are also home workers. Home workers are individuals who process seafood either at home or outside of factory settings, and this study aimed to provide a preliminary assessment of these workers, focusing on their general working conditions. According to the survey, the majority of home workers (70%) processed clams, while 26% processed mussels and 4% processed oysters. On average, home workers worked six days per week, with about half reporting a seven-day workweek. Approximately 25% of home workers worked seven hours or more daily, with the average workday lasting 5.5 hours. Despite the informal nature of this work and lack of regulation, no reports of child labor, either occasional or regular, were made. Nearly 98% of home workers were paid in cash, and 71% earned wages based on piece rates without a fixed salary component. Most shellfish workers (64%) received daily payments, and none earned a monthly salary. The average monthly income for a home shellfish worker, calculated from daily pay, was Rs. 4000, with fewer than one-third earning at least the minimum wage. Payment frequency varied, with 92% paid daily and 8% paid weekly.

Kerala experiences a tropical climate characterized by two distinct rainy seasons: the heavy southwest monsoon, which occurs from June to September, and the lighter northeast monsoon from October to November. During these monsoon periods, rivers experience significant flood discharge. In contrast, the off-season, marked by a reduction in shellfish availability, is typically dry with light winds. During the monsoon, the salinity levels in the estuarine waters decline, causing a decrease in estuarine fish catches. However, in the pre-monsoon and post-

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monsoon periods, marine finfishes tend to move into the upper reaches of the estuaries where salinity is more favorable for their survival. The river environment in Kerala consists of both brackish and nearly freshwater zones, which are separated seasonally due to these variations. The incidence of shellfish varies with the seasons, showing the highest occurrence during the monsoon season. Shellfish workers reported that the percentage of shellfish incidence peaks in the monsoon, followed by the post-monsoon and then the pre-monsoon seasons. The increased presence of shellfish during the monsoon may be attributed to precipitation and runoff, which carry pollutants and organic matter into rivers and coastal waters. These conditions promote the multiplication of shellfish and related organisms due to the abundance of organic substances. Furthermore, the environmental conditions during the monsoon not only contribute to contamination but also support the extended survival of these organisms in aquatic systems, leading to a higher incidence of shellfish during this period.

FINDINGS

The survey results reveal important demographic and occupational information about shellfish workers in the study area. Among the respondents, 73.4 percent are male, and 26.6 percent are female. Age-wise, only 3.4 percent fall between 20 to 30 years, while a significant 45 percent are aged above 50 years. Income data shows that 28.3 percent of the shellfish workers earn less than ₹1000 monthly. A larger group, 46.6 percent, earn between ₹1000 and ₹2000, while 18.4 percent report monthly incomes between ₹2000 and ₹3000. Only 6.7 percent earn more than ₹3000. Regarding daily wages, 45 percent earn between ₹250 to ₹500, 33.3 percent earn ₹500 to ₹750, 16.7 percent earn ₹750 to ₹1000, and 5 percent earn ₹1000 to ₹1250 or more. Those earning above ₹1000 are primarily shellfish agents.

The types of shellfish available in the Koduvally area include Clams, Mussels, Oysters, and Scallops. Among respondents, 45 percent catch Clams, 38.3 percent catch Mussels, 13.3 percent catch Oysters, and only 3.3 percent catch Scallops. Notably, 60 percent of the workers operate on the seashore where Mussels are found, while the remaining 40 percent work by the river, where Clams are found exclusively. Experience levels vary: 31.7 percent have 10 to 20 years of experience, 38.4 percent have 20 to 30 years, 21.6 percent have 30 to 40 years, and 8.3 percent have 40 to 50 years of experience. Employment types include 43.4 percent self-employed workers, 36.7 percent fish workers, 11.6 percent fish retailers, and 8.3 percent entrepreneurs.

Regarding motivation, 35 percent were encouraged by family or friends to take up shellfish work, and 25 percent inherited the job from their parents, reflecting the traditional nature of the profession. In terms of shellfish collection methods, the canoe is considered the most effective by many respondents. Workplace challenges include 45 percent reporting heavy workloads, 26.6 percent citing low payment, 20 percent affected by climate variation, and 8.4 percent facing health problems. Reasons for entering the shellfish profession include 20 percent due to unemployment, 26.6 percent because of family situations, 15 percent inheriting the job from parents, and another 15 percent compelled to support their families due to lack of other work.

Preferences for this job include 23.3 percent valuing the low cost and minimal investment required, 38.4 percent appreciating the absence of an age limit, and 31.7 percent noting that no prior knowledge is needed. A smaller group, 6.6 percent, has personally experienced these combined benefits. Regarding sales channels, 40 percent sell their shellfish through clubs, hotels, and specialty stores; 28.4 percent use independent fish markets; 16.6 percent sell through agents; and 15 percent sell at supermarkets. Transportation methods vary: 30 percent use bikes, 10 percent rely on buses, 38.4 percent walk, and 21.6 percent use autos for carrying shellfish. Health issues among workers include 18.4 percent lacking adequate energy, 31.6 percent experiencing headaches, 13.4 percent suffering from shortness of breath (common among shellfish divers), and 36.6 percent enduring chronic back pain. Finally, consumer preferences show that 70 percent buy shellfish for its taste, while 30 percent consider it a healthy food choice.

LIMITATIONS

The study is confined to a limited geographical area, which may restrict the generalizability of the findings to broader populations or contexts. Some participants demonstrated reluctance during the data collection process, either by refusing to respond to certain items or by providing inaccurate information, which may have introduced response bias into the findings. The research process was considerably time-intensive, requiring substantial

investment of time and resources across the various stages of data collection and analysis. The study involved a large volume of data, which posed challenges in verifying the accuracy and consistency of the information gathered. Furthermore, the extensive dataset complicated the processes of data processing and analysis. A considerable number of respondents possessed limited knowledge regarding certain aspects of the subject matter, which may have affected the depth and reliability of the information obtained. Some secondary data sources utilized in this study were found to be outdated, and no current or updated data were available to supplement or replace the existing information, potentially affecting the relevance of the findings. The sample size was insufficient to meet the assumptions required for inferential statistical testing. Consequently, this study acknowledges this as a methodological limitation and presents descriptive statistics only, without extending the findings to broader statistical generalizations.

CONCLUSION

Shellfish work is a critical issue that must be addressed to ensure that the growth of fisheries and aquaculture leads to improved livelihoods for shellfish workers, fish farmers, and those involved in fish value chains. There are significant data gaps, especially regarding sex- and age-disaggregated information on the number of people employed in fisheries and aquaculture, particularly within small-scale operations and inland fisheries.

Inland fisheries and aquaculture face unique challenges due to the sector's characteristics, including widespread informality, seasonal work patterns, remote locations, hazardous working conditions, and the complexity of value chains. The productivity of small-scale fish workers in developing countries is hindered by various factors such as limited knowledge and skills, inadequate market access and infrastructure, unequal tenure rights, poor resource management, overfishing, climate change impacts, conflicting policies, and weak political representation.

A major concern for decent work in inland fisheries is the absence of a comprehensive international regulatory framework specifically tailored to the sector. Although the International Labour Organization (ILO) developed the Work in Fishing Convention, 2007 (No. 188), it has yet to enter into force due to insufficient ratification by member states. Thus, supporting countries in ratifying key international instruments is crucial.

Labour issues in shellfish processing units also need attention, including social protection, fair benefit distribution, and addressing hazardous working conditions. Export markets are becoming increasingly aware of these concerns, making it essential to promote productive and profitable employment in the sector. Achieving this requires better alignment between employment policies and specific policies for inland fisheries and shellfish workers to encourage job creation and enterprise development.

Improving the visibility of small-scale fishers, fish farmers, and processors through enhanced national and international employment statistics is vital for informed decision-making. Practical measures should focus on creating sustainable and inclusive value chains, with special emphasis on supporting small-scale operators, women, and youth.

To unlock the full potential of employment and productivity in fisheries and aquaculture, it is important to provide access to customized services, markets, and training. Additionally, to reduce overcapacity in inland fishing, alternative and complementary employment opportunities should be developed and promoted.

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