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RESEARCH

Elevating labor concerns in small-scale fisheries: challenges to decent work in Peru's jumbo flying squid fishery

Alejandro Garcia Lozano[1] · Jesica Pino Shibata[2] · Juan Carlos Jeri[3] · John N. Kittinger[4,5]

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Abstract

Despite growing attention on severe labor abuses in seafood production, questions remain about the broader range of challenges to decent work in the sector. Small-scale fisheries (SSFs) in particular have received relatively little attention from a labor-focused perspective. Motivated by this gap, this study elaborates a methodology to assess working conditions in SSFs across multiple dimensions of decent work, specifically through a case study of the artisanal jumbo squid fishery in Peru, a socially and economically important fishery in which working conditions are poorly understood. The findings highlight key decent work deficits in this fishery, including: inadequate coverage and lack of social protections; remuneration occasionally below the minimum wage; excessive working hours; increasingly longer trips in vessels that often lack adequate occupational safety and health features; informal employment relations and high turnover of crew, which are linked to safety issues (i.e., crew sometimes lack skills for this difficult work at sea); and fragmented fishing organizations with limited capacities for social dialogue. Many of the problems are rooted in or exacerbated by the broader governance context, especially widespread informality. The primary policy solutions being pursued are not labor-specific and are unlikely to address decent work deficits. Addressing these complex problems will require involving fishers—importantly, crew members—in efforts to drive improvements in the fishery and enhancing their capacities to lead in the development of solutions to the problems that affect them. More work is necessary to refine indicators and assess working conditions, but this work contributes towards advancing methodologies and highlighting the importance of studying labor in SSFs.

Keywords Labor · Small-scale fisheries · Decent work · Peru · Artisanal fishing · Work in fishing

Introduction

Over the last decade, numerous investigations have shed light on severe abuses such as forced labor and human trafficking in seafood supply chains, particularly but not exclusively in industrial fisheries, and often characterized by the exploitation of vulnerable workers such as migrants (e.g., McDowell et al. 2015; Stringer et al. 2016; Marschke and Vandergeest 2016; EJF 2019; Greenpeace 2019; Decker Sparks 2022; Murphy et al. 2023). Relatively less attention has been directed towards a broader range of labor challenges in fishing, raising questions about what *decent work* might look like beyond forms of work that must be abolished (Garcia Lozano et al. 2022). Decent work is "productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment."[1] Attending to multiple dimensions of decent work (ILO 2013) provides opportunities to assess labor issues holistically and to address knowledge gaps

✉ Alejandro Garcia Lozano
agarcialozano@jjay.cuny.edu

1 Department of Anthropology, John Jay College of Criminal Justice, The City University of New York, New York City, NY, USA

2 Asociación para el Desarrollo Sostenible Sancti, Lima, Perú

3 Conservation International, Peru Country Program, Lima, Perú

4 Center for Oceans, Conservation International, Honolulu, HI, USA

5 School of Sustainability, Arizona State University, Tempe, AZ, USA

[1] ILO, "Decent Work," https://www.ilo.org/global/topics/decent-work/lang--en/index.htm.

about certain production modes, such as small-scale fisheries (SSFs).

SSFs make significant contributions to livelihoods, employment, economies, and nutrition for approximately 492 million people globally who depend on them at least partially (FAO et al. 2023). The importance of decent work in SSFs is increasingly recognized internationally– e.g., in the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) (FAO 2015). However, despite growing scholarly and policy attention, SSF remain understudied from an explicitly labor-focused perspective, with emphasis more commonly on related dimensions like livelihoods, rights, access, participation, and patron-client relations (e.g., Allison and Ellis 2001; Pomeroy and Andrew 2011; Allison et al. 2012; Basurto et al. 2013). Partly this is because SSFs differ significantly from industrial contexts, where employment relations are formalized. SSFs are commonly owner-operated, employment relations are informal, and recruitment involves kinship or community networks, which contributes to blind-spots about who constitutes the labor force and ambiguity about who is responsible for protecting workers. Ideas about SSFs as community enterprises perhaps obscure the specific employment relations, which is compounded by regulatory and information gaps, poverty, and dynamic ecological systems (Salas et al. 2011; FAO et al. 2023). In other words, despite inclusion of SSFs in international policies, their labor dimensions may still be understood as those of "co-adventurers" (Mathew 2010) rather than employment with formal responsibilities and risks (with several exceptions, e.g., FAO 2019; ILO 2020; Lout et al. 2022).

This study examines labor conditions in the jumbo flying squid fishery in Peru, a socio-economically important SSF that provides rich empirical context for thinking critically about decent work. The jumbo flying squid (JFS) (Humboldt squid or *pota*) is the second largest and economically important fishery in Peru after the anchoveta. Despite its growing importance, working conditions are not well documented, yet evidence suggests that benefits from this export-oriented, offshore SSF are not equitably distributed, generating vulnerabilities for producers and workers who often struggle to make ends meet (De la Puente et al. 2020; Gozzer-Wuest et al. 2022). These characteristics of the fishery make it instructive for examining SSFs not purely as patron-client arrangements or community-based but also through the lens of hired labor in a sector that contributes significantly to export economies. From this perspective, the purpose of this study is both to improve understandings of working conditions in the JFS fishery and to advance a methodological approach that encompasses multiple dimensions of decent work and foregrounds labor concerns in SSFs.

Methods

Decent work is the primary analytical concept motivating this research. Since 1999, the International Labour Organization (ILO) has pursued a Decent Work Agenda consisting of four pillars: (1) Standards and fundamental principles and rights at work, (2) Employment creation and opportunities, (3) Social protection and social security, and (4) Social dialogue between governments, workers' and employers' organizations. In 2013, the ILO published a set of guidelines translating these pillars into substantive elements with accompanying statistical and legal indicators for national-level measurement (Appendix 1). We adapted these broad elements into specific questions and considerations for the context of fisheries (Table 1). We mapped these onto existing frameworks of indicators and guidelines (Appendix 2), drawing on the Social Responsibility Assessment framework (SRA) (Conservation International 2020, 2021), which operationalizes the pillars of the Monterrey Framework for Social Responsibility: (1) Protecting human rights, dignity, and access to resources; (2) Ensuring equality and equitable opportunity to benefit; and (3) Improving food and livelihood security (Kittinger et al. 2017).

The SRA was assessed to be an adequate and comprehensive framework for developing our methodology because it encompassed all the substantive elements of decent work, and its development was guided by all the relevant international legal instruments, including the ILO Work in Fishing Convention, No. 188 (C188) (the only convention specific to the fishing sector), other ILO conventions and guidelines, the FAO SSF Guidelines, and the International Bill of Human Rights (See Appendix 2). Each indicator of the SRA is associated with specific guidance on data sources, interview questions, and other data collection considerations which were applied in this research design (i.e., developing interview guides, reviewing secondary sources).

Data collection was conducted in a stepwise fashion consistent with an interactive qualitative case study methodology, with each phase used to refine the specific questions and sources of information sought (Maxwell 2005). First, 8 scoping interviews were conducted with key informants from NGOs (some former government) to understand major social and environmental issues in the fishery, refine questions, and identify local participants for interviews (May-October 2021). Then, 10 semi-structured interviews with key informants (NGO, government, fishing sector) were conducted (December 2021-March 2022). Informants were selected through referral and all had extensive experience working with SSFs and fishing communities in Peru. Interviews took place remotely on Zoom. Interviews generated insights consistent with academic and government literature, as well as accounts by fishers in news media. Concurrently,

Table 1 Substantive elements or dimensions of decent work in the context of SSFs

Substantive element	SSF Considerations
(i) Employment opportunities	Who gets to fish or work in the value chain? Do people who desire to work in the fishery have the opportunity?
	Is the fishery a dependable source of employment? How does it relate to other livelihood strategies?
(ii) Adequate earnings and productive work	Do fishers make a productive income (i.e., enough to support their families, avoiding poverty)?
(iii) Decent working time	Do workers have sufficient rest? Do they working excessive hours?
(iv) Combining work, family, and personal life	What family responsibilities do fishers/workers have? How do they fulfill these while maintaining employed? Do they spend enough time with their families?
(v) Work that should be abolished (child labor, forced labor)	Are there any indications that forced labor or human trafficking may be occurring in the fishery?
	Are there any indications that child labor (hazardous, worst forms, otherwise) may be taking place?
(vi) Stability and security of work	Is the fishery a secure source of employment? Is employment in this fishery precarious? Do workers have job security or stable job tenure?
(vii) Equal opportunity and treatment in employment	Are there any groups that are discriminated against in this fishery? Are there any vulnerable groups?
(viii) Safe work environment	Do workers have access to basic services and accommodations (including food and water)?
	Are there adequate conditions, benefits, and/or safeguards to ensure the occupational health and safety (OSH) of workers?
	What happens in cases of occupational injury?
(ix) Social security	Do fishers have access to social security? Health insurance? Other social protections?
(x) Social dialogue, employers' and workers' representation	Do workers have freedom of association and collective bargaining?
	To what extent do fishers and their organizations participate in fisheries management?
Economic and social context	How do labor policies, fishery management, and other factors at the national level influence labor concerns in this fishery?

25 semi-structured interviews were conducted in person with fishers to understand working conditions and broad governance and labor challenges from fishers' perspectives (February-May 2022). Participants included 14 vessel owners and 11 workers (6 captains, 5 regular crew). Sampling was non-random, relying on existing networks and relationships with fishing organizations, complemented by port visits to identify additional informants.

Interviews were audio recorded when permitted. Otherwise, detailed notes were taken. Informed consent was obtained in writing using an online form (key informants), and orally (fishers), following an approved ethics protocol. Qualitative interview data were coded to substantive elements of decent work and subcategories using MaxQDA. Additional codes generated inductively included: history of participation in the fishery, changes in the fishery, conflicts with other actors, problems in fisheries management.

Interview data were triangulated using existing literature, cited throughout, and publicly available data from a national survey of artisanal fishers (ENEPA III), which included a sample of 10,658 fishers (Castillo Mendoza et al. 2018). From this dataset, we identified all individuals who reported harvesting squid at some point throughout the year ($n = 1{,}493$). Data from this survey provided valuable information on variables such as income, social security, health insurance, and governance problems reported by fishers.

Several limitations of this work are worth highlighting. A major one is the difficulty in collecting verifiable information about working conditions, a common problem in fishing since work takes place at sea and in isolation. Only those aboard the vessels understand how crew members are treated or how safety issues are addressed, for instance. Another is that crew members, who are often most vulnerable or precarious, do not generally form organizations representing their interests, they are largely informal and exhibit high turnover between vessels, and are therefore difficult to recruit for interviews. As such, it was difficult to recruit more crew members into this study. The COVID-19 pandemic and vaccine distribution issues during fieldwork also made this challenging. Many of the issues identified here therefore require further research and more systematic evidence, given the small sample relative to the size of the fishery– squid fishing occurs all along the Peruvian coastline. Nonetheless, this research is not intended to provide an exhaustive or representative sample, but rather to elucidate some of the major challenges, their causes, and the perspective of key actors drawing on primary and secondary sources. A third major limitation is that, given the aim to encompass all dimensions of decent work, there was a trade-off between breadth and depth in interviews with fishers. For some issues, there was insufficient time to discuss in depth. When possible, these gaps were addressed through interviews with other informants and through secondary sources. Remaining gaps and questions are highlighted throughout.

Background on the fishery

Jumbo flying squid (JFS) (*Dosidicus gigas*) are large, non-selective predators that make remarkable daily vertical migrations chasing prey, diving 200–1000 m during the day

and returning to the surface at night (Gilly et al. 2006). Like other species in the Humboldt current region, JFS abundance and distribution respond strongly to environmental factors (e.g., temperature, primary productivity), which influence prey availability (Arguelles et al. 2019).

The JFS is among the largest invertebrate fisheries globally– a transboundary resource involving other artisanal fleets (Chile, Ecuador) and industrial distant-water fishing (DWF) fleets in the Southeastern Pacific (China, Taiwan, South Korea). Peru's artisanal or SSF fleet captures approximately half of total landings, over 500,000 tonnes (t) in 2019, which generated $850 million USD in export revenue (Gozzer-Wuest et al. 2021). Chile's domestic fleet captures approximately 18% of total catch, while landings from DWF fleets in the South Pacific Regional Management Organisation (SPRFMO) convention area have increased from 61,000 t in 2007 to 313,000 t in 2019 (Arguelles et al. 2016; SPRFMO 2021). Despite uncertainty about the status of the stock, significant evidence of genetic connectivity in the southern hemisphere (Ibáñez et al. 2015; Roa-Ureta et al. 2021; Sotil and Guarnizo 2021) suggests that localized management practices may affect the overall population.

Commercial harvest in Peru started in 1989, primarily by Japanese and Korean vessels using mechanized gear (i.e., jiggers) (Paredes and De la Puente 2014; Arguelles et al. 2019). Since the 1990s, the proportion of foreign vessels has decreased and foreign permits were discontinued after 2011, when a regulatory plan was established for the fishery. Growing recognition of the fishery's economic potential contributed to the SSF fleet's expansion, currently consisting of thousands of vessels, with most of the growth in the northern Piura region (Guevara Carrasco and Bertrand 2017). The majority of landings (92%) are processed into frozen products for export (PRODUCE 2022); fresh squid is mostly destined to wholesale markets ('mayoristas') for export, and a smaller subset to small-scale merchants ('minoristas') for local consumption (REDES 2018).

Decent work challenges in the jumbo flying squid fishery

General characteristics

Fourteen vessel owners (*armadores*) were interviewed, primarily from the northern region of Piura ($n=5$), where fishing activity has concentrated historically, the central Lima region ($n=5$), and other communities farther south. Their ages ranged between 35 and 56. Only one was a woman. Two have worked in the fishery less than 10 years, while the majority have done so between 10 and 15 years ($n=6$) and 20 or more years ($n=6$). The majority own only one vessel ($n=5$), but others own several (3–5). Vessels varied in size considerably, between 8 and 32.6 m^3 of holding capacity (Fig. 1), consistent with ranges reported in the literature (Paredes and De la Puente 2014). Some work with crew aboard their own vessels, but the majority ($n=11$) do not, instead handling logistical tasks (e.g., maintenance, financing), and delegating others to captains. Eleven workers were interviewed (5 captains, 6 crew), mainly from Piura and Lima ($n=5$), but also Callao, Moquegua, Arequipa, and Ica. All were men between 38 and 64 years old. The majority reported participating in the fishery for 10 or more years ($n=8$). The reported number of persons on board also varied. Most participants ($n=18$) stated that 4–6 individuals are normally present during fishing trips; the rest reported 7–9.

Fishing takes place at night, following the squid's diurnal rhythm. Fishers use artisanal jigs, weighted handlines with multiple rows of hooks in a crown-like fashion that can be outfitted with bait, lures, and lights to attract squid. The division of tasks among crew members varies depending on the size of the operation. There is often a designated worker in charge of maintaining the ice, another in charge of cooking, another operates the engine (*motorista*), and others only harvest (pulling jigs). In some operations crew members

Fig. 1 Squid fishing vessels in (**a**) Paita and (**b**) Ilo (credit: Jesica Pino-Shibata)

might rotate. At the peak of fishing, all crew members may be involved in pulling squid aboard. Captains (*patrones*) often work alongside other crew members on harvesting tasks (setting up jigs, pulling in squid), but are also responsible for logistical tasks, including recruitment, navigation, and ensuring crew and vessel safety. They are therefore still workers yet occupy a unique role in the fishery.

Changes in the fishery over time

The jumbo flying squid (JFS) fishery has undergone significant changes since the 1990s, when it went from exploratory to fulfilling orders from local buyers (e.g., processing plants) and gradually became established as an export-oriented activity (Paredes and De la Puente 2014). The fishery is now characterized by excess harvest relative to the capacity of processing plants and other buyers. Fishers are seldom involved in commercialization and usually do not know the destination of catches. Vessels often travel from port to port to find buyers and secure the best prices.

Ongoing, unregulated growth of the artisanal squid fleet (despite a moratorium on the construction of new vessels) and widespread informality contribute to problems such as overcapacity and dissipating economic benefits (Paredes and De la Puente 2014). The number of artisanal vessels in Peru has increased from an estimated 6,200 in 1997 to 16,000 in 2012, largely reflecting growth in the JFS and mahi-mahi fisheries (Guevara Carrasco & Bertrand 2017).

The number of days at sea per trip has increased significantly, according to all participants. Historically as short as 1–3 days, fishing trips now commonly last over 5 days, and upwards of 12–16 days. Fishers argue trip length has increased because squid have become increasingly scarce. Squid abundance varies annually, but landings likely peaked at over 500,000 t in 2014 (Guevara Carrasco & Bertrand 2017). Recent studies suggest decreasing economic performance (i.e., landings and off-vessel prices) (Gozzer-Wuest et al. 2022). Most participants also reported having to travel farther than before, but generally artisanal fishers remain within Peru's exclusive economic zone (EEZ) (Csirke et al. 2015). Further research is needed to understand how the fleet responds to squid availability over time, but longer trips have implications for working conditions. Some vessels are better equipped for longer trips (e.g., accommodations, safety), but many are designed for shorter trips and have not been adequately upgraded to account for changes in the fishery.

Assessment of decent work dimensions

Findings below are annotated using romanettes (*i*-*x*) to indicate the corresponding substantive element of decent work (Table 1).

(i) Employment opportunities in the JFS fishery are influenced by informality and few alternative livelihood strategies. Informality is a defining issue in Peru's SSFs. According to one informant involved in formalization, only 60% of the fleet has obtained registration and permits. The total number of vessels and workers is therefore difficult to estimate. Given informality and unregulated growth, opportunities to work exist but economic benefits decrease with resource competition. Employment relationships between vessel owners and crew are also informal. Captains are tasked with recruiting crew members, usually dockside, by referral or through established relationships.

All participants reported having no written contracts for work. One implication is that workers have no recourse when working conditions differ from oral agreements. However, workers are also free to leave when conditions do not suit them. Two informants reported that crew members often desert captains ahead of fishing trips, despite being paid advances. However, it remains unclear how commonly this occurs, or how vessel owners or captains may respond (e.g., blacklisting).

Because fishing is a discontinuous economic activity, dependent on seasonal availability, artisanal fishers commonly adapt to target different species or alternate between livelihood strategies. The majority of workers interviewed rely on fishing as their primary economic activity. Among those who work as crew or captains, one has a private business; another works in port maintenance; one engages in dive fishing, while two harvest mollusks or shellfish; the rest reported artisanal fishing as their sole activity. In Paita, Piura, approximately 80% of offshore fishers have no alternative economic activity (REDES 2018), consistent with national estimates that 63% of squid fishers do not have additional occupations (Castillo Mendoza et al. 2018). All participants interviewed indicated that there is no access to unemployment insurance or other social protections (*ix*) when fishing fails to provide sufficient income (*ii*).

(ii) Earnings are generally inadequate for preventing poverty (i.e. productive work). Remuneration is share-based and dependent on catch volume. Typically, vessel owners receive 40% of profit while 60% is distributed equally among crew. Earnings depend on prices, which are highly volatile (Gozzer-Wuest et al. 2022). One informant indicated that prices used to be much higher, around 100 Peruvian soles (PEN) per kg in 1998, but now are closer to 3–6 PEN/kg. Official off-vessel prices per ton have generally increased, but tend to be elastic and depend on demand from

processing plants (De la Puente et al. 2020). Between 2009 and 2018, squid fishers' income occasionally dipped below minimum wage, despite the fishery generating 17% of all SSF revenue in Peru (De la Puente et al. 2020). This suggests a fundamental economic inequity in the supply chain, where producers obtain limited economic benefits relative to processors, partly because of limited negotiating power (Gozzer-Wuest et al. 2022).

(iii) Working time is an important, cross-cutting dimension of decent work, with implications for occupational health and safety (OHS), adequate pay, work-life balance, and workers' long-term wellbeing (ILO 2013). In Peru, the recommended maximum workday is 8 h; the maximum work week is 48 h, and night work must occur in rotations (Decreto Legislativo No. 854, 1996). ILO C188 recommends 10 h of rest per day and at least 77 h per week.

The JFS fishery involves long working hours, commonly from sunset until sunrise with little rest during shifts. Captains and crew reported working 9–18 h per day. Most ($n=7$) reported resting for 2–4 h in a 24-hour period; only one said they rest for 8 h, and another stated that they tend to rest in the hours when they are not fishing. Participants indicated that they rest for short periods because they take turns guarding the vessel and fishing lines. Similarly, vessel owners indicated that crew usually work between 8 and 16 h. Most vessel owners ($n=7$) reported that crew normally rest for 8–12 h per day; others ($n=4$) indicated that normal resting times are 0–5 h. Around 80% of vessel owners and 50% of crew said there is a designated space for crew members to rest (e.g., cabin), while in other instances they rest on the deck. Further research across the fishery is necessary, but long shifts may take place consecutively every day during fishing trips, which have also become longer.

Overtime is common. The rhythm of work corresponds to the availability of squid more than the needs of workers, and participants uniformly reported working for longer when more fishing is possible. To stay awake during long shifts, participants commonly drink coffee, energy drinks, or chew coca leaves. Another said many consume processed coca (i.e., cocaine), arguing that drugs are a big problem in the fishery. There was no indication that drug use is forced or encouraged (v).

(iv) Indicators regarding family and personal life (i.e., work-life balance) are not clearly defined beyond parental leave. No formal family leave exists in SSFs in Peru. Most interviewees reported taking 1–2 days between fishing trips, while some have as much as 4–5 days. At times, vessels land their catch far away from the communities where crew members live, adding additional time to return home from fishing trips. All crew and vessel owners expressed that fishing involves making personal sacrifices and being away from family during important times. One vessel owner, the only woman among them, said she balances business and family responsibilities by delegating tasks to captains on her three vessels.

(v) Work that should be abolished refers primarily to forced labor and child labor. Established indicators of forced labor include abuse of vulnerability, deception, restriction of movement, isolation, physical and sexual violence, intimidation and threats, retention of identity documents, withholding of wages, debt bondage, abusive working and living conditions, and excessive overtime (ILO 2012). Interviews and secondary sources suggest most of these issues are not present in the fishery. However, this should not be taken as evidence that the entire fishery is free from forced labor, given the small sample size and because workers may not report these outright. Other issues, many inherent to fishing, could indicate increased forced labor risks: long working hours with uncompensated overtime and questionable voluntariness; work in isolation at sea; lack of grievance mechanisms; increased participation by migrant workers from Venezuela.

Debt bondage may be occurring in the fishery, though this manifests differently in SSFs than other contexts. Rather than coercing individual workers, debt bondage in SSFs stems from vessel owners' reliance on intermediaries for financing, which limits negotiating power and perpetuates cycles of poverty, often exacerbated by factors like low productivity and prices (ILO 2020). Fishers and other informants indicated that vessel owners are commonly indebted to intermediaries, often finding themselves in cycles of debt, low productivity, and poverty; dependent on financing from buyers (see also Gozzer-Wuest et al. 2022). Only those who finance their own fishing trips can commercialize directly. In Piura, vessels commonly sell to buyers that finance fishing trips; only approximately 20% are financed independently (REDES 2018). Several participants argued that buyers are not transparent in setting prices and take advantage of fishers, but many are bound to specific buyers because of debt.

Regarding child labor, Peru has ratified numerous international instruments and established national legislative frameworks. However, an estimated 1,251,400 children between the ages of 5 and 17 were involved in hazardous child labor in 2015; approximately 58.4% in agriculture, fishing and mining (ILAB 2021; ILO 2016). The minimum age for working in fishing in Peru is 16, with parental permission and authorization from the coastguard (DICAPI). Captains are required to ensure all crew meet minimum age requirements, but given widespread informality, compliance rates in artisanal fisheries are unclear. The Ministry of Women and Vulnerable Populations of Peru (MIMP) recently published a list of jobs unsuitable for minors under the age of 18, including work conducted in rivers and at sea.

As such, work in the JFS fishery could be deemed inappropriate for minors, conflicting with existing regulations.

Most fishers and vessel owners interviewed indicated that they believe the legal minimum age for squid fishing is 18. Vessel owners tended to respond that minors (under 18) do not participate in the fishery, except accompanying family members as apprentices. This is an important consideration in SSFs, which provide opportunities for youth apprenticeship (FAO and ILO 2013). Nonetheless, fishers' descriptions of their own professional trajectories suggest that it has been common for minors to begin working in fishing at an early age. Additionally, nearly all crew and captains reported seeing minors working in the fishery as crew, sometimes as young as 13 or 14. One captain made a formal complaint to DICAPI regarding an 11-year-old working in the fishery and posted about it on social media, but says nothing was done. Another worker (crew) reported that DICAPI sometimes grants departure clearances when minimum age is unmet or unverified.

(vi) Stability and security of work is relative and varies across economic activities (Anker et al. 2003). Some indicators include protection from unfair termination and unemployment insurance, neither of which exists in Peru. SSFs are seasonal, highly variable, and tend to be associated with conditions of poverty and marginalization, making this occupation perhaps inherently more precarious than many others (Mathew 2010). The JFS fishery is no exception. More systematic information is needed, but many fishers do not see the fishery as a stable source of employment in the future. According to one fisher from Callao, "The way things are going, it's going to get difficult. There are too many vessels and in this trajectory the fishery could disappear." Another from Paita responded that his "grandfather was a fisher, [he] liked the environment and good income for the job, saw a stable mode of living, but that is not the case anymore."

(vii) Equal opportunity and treatment indicators tend to focus on gender-based issues, which were not identified in this largely male labor force. Squid processing is largely done by women and little information exists about this segment of the supply chain. None of the participants reported experiencing or hearing about discrimination in the fishery. Several raised concerns about Venezuelan migrants who may accept lower wages, fill lower-ranking positions (e.g., fish hauling), and lack adequate training. One informant indicated that some Peruvian fishers are resentful of Venezuelans for "taking their jobs." However, interviews with vessel owners, captains and crew largely suggest that outsiders (e.g., Venezuelans) get along well with others in the fishery and are compensated similarly. According to one fisher, "No one wears a crown," meaning preferential treatment does not occur. Others alluded to conflicts between Peruvians and Venezuelans rooted in cultural differences. Two vessel owners indicated they do not hire any foreigners and another said he would not hire anyone from outside the community.

(viii) The right to a safe working environment (i.e., OHS) was recently included among ILO's fundamental principles and rights at work. Peru has published a national plan of action and regulatory framework promoting OHS. However, these do not adequately include SSFs which are largely informal. OHS issues identified in the JFS fishery include risks and hazards, accommodations, safety equipment, and medical examinations.

Participants highlighted risks and hazards of fishing offshore as a major preoccupation. One crew-member from Lima explained: "when there are strong winds, it doesn't let us navigate and makes it difficult, it's a risk to our lives and the people on board." Another from Pucusana expressed that one the most difficult parts of his job is going out to sea without knowing if he will come back to see his family. Similarly, a vessel owner from Paita stated that one of the most difficult things about work at sea is "having to track down a brother that has fallen into the sea." Rescue protocols are largely lacking, and one fisher argued delays in rescue have resulted in deaths, which some fishers attributed to the variable capacities of local coastguard captaincies (DICAPI). Another informant indicated that fishers commonly fail obtain departure clearances or safety certifications from DICAPI because vessels are not properly registered– another way informality exacerbates vulnerabilities for workers. Several informants argued that lack of training for crew also contributes to risks. News sources commonly report accidents and shipwrecks (Redacción RPP 2018; Urbina 2020; Redacción El Comercio 2021), but no unified accident database exists (Alvarado Pereda 2008), making it difficult to estimate incidence rates.

Accommodations in the fishery are variable. Some vessels have cabins and designated spaces for rest. Others are smaller and crew members tend to rest on the deck or on mats. Some vessels have toilets or bathrooms, but many do not, which may indicate problems related to sanitation and hygiene. Vessel owners commonly provide money and the captains and crew decide how much food to carry. All participants indicated that there is usually enough water and food on board, and other informants also suggested this is likely not an issue but may require more systematic assessment.

Most participants indicated basic safety equipment is present, including first aid kits, life jackets, buoys, flares, radios. Some indicated that these basic elements are missing or "in process of being acquired." One participant said life jackets are "for decoration" and to meet requirements, because they cannot wear them while working. Another pointed out that they lack rafts in case of accidents, and

sometimes borrow them to pass inspections. Many rely on radios to communicate both with land and other vessels, describing it as a major safety strategy for mutual assistance, but these are not always well-maintained. Most vessels also lack radio beacons (*radiobalizas*) used to locate vessels in distress. One informant mentioned a government program to provide *radiobalizas*, which fewer than 10% of artisanal fishers obtained, citing 'lack of will' and cultural barriers as reasons.

Artisanal fishers in Peru are also sometimes vulnerable to organized crime through extortion and piracy (e.g., extracting fees for access to fishing grounds or docks) (Koch and Ruiz Serkovic 2019). Two informants mentioned this as a major safety and security issue for the sector. One argued that the remoteness of coastal communities makes it difficult to assess the prevalence and impact of these practices and of many labor vulnerabilities in general. This topic deserves greater attention in the future.

Medical examinations to certify the fitness of crew is another important component of safety included in ILO C188; ILO Medical Examination (Fishermen) Convention (1959, C113), ratified by Peru; and Peru's Law No. 26,620. C113 contains exceptions for vessels that spend less than 3 days at sea, which excludes many SSFs. The JFS fishery, with increasing trip lengths, requires greater attention regarding compliance with medical fitness. Law No. 26,620 requires crew members to obtain identification and medical examination through DICAPI. Compliance is likely variable but low given informality of employment.

(ix) Social security encompasses social protections for medical care, sickness, unemployment, old age, employment injury, family, maternity, invalidity, and survivors' benefits. These may be non-contributive (e.g., social assistance programs) or contributive (individuals pay to varying degrees, e.g., health insurance and pensions) (FAO 2019). Only approximately 26% of working people in Peru are covered by protections for disability, old age, death, illness and accidents at work.[2] Few sectors have been able to achieve even 50% coverage in employer-financed health insurance; as low as 9.2% in the aggregate agriculture, livestock, fishing and silviculture sector (Política Nacional de Empleo Decente, 2021). Only 13% of the economically active population in the agriculture sector (including fisheries) has access to a pension fund, although a non-contributive system exists for the most vulnerable elderly above age 65 (Decreto Supremo N° 081). No system of unemployment protection exists in Peru. A recent study explores the viability of implementing one in the future (ILO 2021), a priority articulated in the 2021 National Plan for Decent Work. The degree to which SSF workers would be covered is uncertain.

Approximately 70% of artisanal fishers lack health insurance, despite low-cost government-subsidized schemes (Villanueva and Flores 2016; FAO 2019). Low coverage likely stems from informality, economic uncertainty and unpredictability, and remoteness of coastal communities which limits access to health centers (FAO 2019). Interviews with informants suggest another reason is that fishers lack knowledge of their rights, the programs available, and the specific benefits available through formalization. Most workers interviewed (captains, crew) do not have health insurance ($n=7$). Those who do are covered by one of two government schemes: a non-contributive system for those in conditions of poverty (SIS), or a low-cost contributive system (ESSALUD) that can be complemented with life insurance ("+Vida"). Three participants reported having this life insurance. These patterns are consistent with the ENEPA III national survey (Table 2). Vessel owners also indicated that there is inadequate access to health insurance, which has remained unchanged or worsened over the years. Some willingly cover the contributions of crew but find it challenging as small enterprises with high worker turnover. Several participants indicated that public clinics are not desirable and individuals often seek private care.

Mandatory insurance exists for high-risk activities like fishing (*Seguro Complementario de Trabajo de Riesgo*, SCTR), but artisanal fishers are often not enrolled. Many vessel owners opposed another mandatory insurance for artisanal fishers established in 2017, citing reasons like high costs, unfavorable rates, limited coverage, and contributions to other systems (Redacción Gestión, 2022); it was subsequently repealed in 2022. Some vessel owners argued they should not be responsible for crew's benefits, who they view as independent contractors. Other vessel owners believe they have responsibility for workers and have advocated for mandatory insurance for crew.

Social protections specific to fishing in Peru are predominantly formulated for the industrial sector and fail to adequately cover artisanal fishers (Carrasco Mendoza, b). A recent legislative reform proposal (Proyecto de Ley 1616/2021-CR) argues that this system is exclusionary and

Table 2 Social protection coverage of squid fishers (source: ENEPA III, 2015)

Type of Benefit	Number of fishers
None	914
Health insurance only	271
Health and life insurance	102
Health insurance and pension	4
Life insurance and pension	3
Life insurance only	185
Pension only	11
All	3
Total	**1,493**

[2] ILO, Social Protection Platform, "Peru".

inadequate for protecting a vast segment of the fishing sector in Peru (see also Alvarado Pereda 2008). Several informants highlighted similar claims by artisanal fishing organizations which call for a more inclusive system.

Medical care is informal. Some vessels have designated crew trained in first aid, but formal training is largely lacking. Minor issues are addressed on the vessel. In severe cases, vessels return to land or send another vessel to transport the injured. Most crew and captains ($n=7$) indicated that individuals injured at work receive some compensation. Most vessel owners ($n=9$) also reported providing some compensation. However, this is done at will by vessel owners or workers who pool earnings, and provides only short-term support. Some interviewees reported that injured crew do not receive any support. Because many workers do not have insurance covering injury or economic losses, suffering injuries at work could be devastating.

(x) Social dialogue and representation include freedom of association, collective bargaining, and other forms of communication and negotiation between governments, employers, and employees. These principles are enshrined in Peru's Constitution and statutory law. However, rather than unions, artisanal fishers more commonly form social organizations of artisanal fishers (OSPAs) (e.g., associations). OSPAs are often not fishery-specific but geographically- or community-oriented; many are poorly organized or lack up-to-date registrations and cannot adequately assist fishers; and tend to be biased towards the interests of vessel owners rather than crew. Informants cited fragmentation and heterogeneity of OSPAs as a major challenge to representation.

All but two participants interviewed belong to OSPAs. They indicated their purpose is to represent the interests and advance the rights of their members. Other functions included support with rescue at sea, caring for fishing resources, and assisting with formalization. Most felt that OSPAs adequately represented them and the interests of all members. Some said their organizations are not well organized and fail to achieve agreements or negotiations that benefit them. Recent research on squid and other offshore SSFs also suggests high variability in the capacities of fishing organizations to represent the interests of the sector, with OSPAs in the Piura region having relatively greater influence in dialogue with government and resource management, access to development projects, and support from NGOs (REDES 2018). Fishing organizations require further capacity building and meaningful mechanisms for participation, which may improve social dialogue and help address the lack of trust and low regulatory compliance (De la Puente et al. 2020; Gozzer-Wuest et al. 2021).

Discussion

Like other SSFs, the JFS fishery is highly dynamic. Fishers chase aggregations of squid as long as necessary to fill their vessel holds; they travel to different ports seeking the best price for their catch; and some shift gears seasonally to target other species (e.g., mahi-mahi). Employment relationships are informal and sometimes unstable. Workers (as well as vessel owners) often lack basic social protections or access to adequate representation. Safety at work was especially concerning to participants, partly reflecting the changing nature of the fishery, with longer trips offshore on vessels lacking adequate accommodations. These concerns play out in a context of open access, resource competition, and economic inequity. Fishers struggle to make ends meet despite producing significant export revenue downstream. Workers who make possible the circulation of seafood throughout the food system are too often disregarded and exploited, their work undervalued relative to the profits generated– a fundamental environmental and labor justice challenge.

Informality– a major concern among all our informants– is a cross-cutting issue that connects labor conditions, fisheries management, and economic performance in Peru's SSFs. Informality hampers regulatory efforts by fisheries authorities, regional governments, and labor agencies. An important gap in this regard is minimum-age, and our work suggests systematic investigation of child labor in the fishery is necessary. Informal contracts and lack of grievance mechanisms mean that fishers have little recourse for addressing conflicts or potential abuses. Informality contributes to other vulnerabilities, such as safety issues aboard vessels with unverified safety features or lacking departure clearances and crew lists. Informal employment relationships also result in exclusion of workers from existing social protections, which themselves are insufficient and largely formulated for the industrial sector.

Perhaps unsurprisingly, formalization has recently emerged as a policy priority. Formalization programs emerged in 2016, with deadlines extended several times given low compliance and implementation problems. Our research suggests many fishers want to comply but lack necessary skills and face bureaucratic obstacles including corruption. Serious cultural and economic barriers also hamper formalization, while animating harmful narratives about fishers being unruly or resistant to regulation (Viatori and Bombiella 2019). Those who fail to complete formalization will be considered illegal and risk having equipment and vessels confiscated, further exacerbating precarious social conditions. Additionally, formalization has primarily focused on vessel registration and licenses, with less focus on fiscal regularization and formalization of workers along

the supply chain. Current approaches to formalization may therefore help address some problems (e.g., vessel safety), but will fail to address other labor concerns (e.g., working time, earnings).

Many of the challenges identified here reflect a serious gap regarding *who* is responsible for ensuring decent working conditions. Workers in Peru's SSFs lack representation and protection under existing policies, and their affairs fall in ambiguous purview of government agencies (fisheries, coastguard, labor). Certainly, greater harmonization and coordination between different government agencies would generate improvements. More fundamentally, however, responsibilities for the basic protections of this informal and 'discontinuous' labor force remain unclear. As employers, many vessel owners favor mandatory protections for workers. Some have implemented their own informal mechanisms for social protection and mutual aid. However, others view workers as independent contractors responsible for themselves. Accordingly, as it stands, workers in SSFs (i.e., crew, but also captains) lack adequate protections by the State but also face ambiguous and variable attitudes from their employers, vessel owners (e.g., regarding workplace injury, insurance, etc.).

This also raises an important tension in studying and regulating labor conditions in SSFs. Despite having greater power than their crew, vessel owners often occupy economically vulnerable positions in the supply chain, making it difficult for many of them to make a living or provide adequate support for their workers. However, they must bear some responsibility in providing decent working conditions for those who work aboard their vessels. Clarifying the nature of this responsibility (as well as that of government agencies) is therefore necessary for moving beyond seeing workers in SSFs as merely co-adventurers, and more as actual employees– whose rights need to be made explicit, expanded, and actualized.

Several of the gaps identified here could productively be addressed by government policies to generate basic protections for workers independently of what vessel owners can provide. Possible mechanisms include legislative reforms (e.g., to enhance or create social protection coverage), programmatic changes, interagency coordination, and support for worker and fishing sector representation. In this vein, attempts have been made to pilot social protections like unemployment insurance in SSFs (FAO and IPC-IG 2023) which could inspire the design of future policy interventions. Conversely, the worker-driven social responsibility (WSR) movements in other sectors illuminate some other possible pathways, where workers develop and enforce legally binding codes of conduct with buyers (Gladstone 2020). Exploring the potential for such interventions driven by workers in fisheries is an emerging frontier[3].

The growing literature on work in fishing has generated invaluable insights on problems such as severe abuses in industrial fisheries, linkages to illegal fishing, jurisdictional opacity and avoidance of responsibility, and State-enabled forms of vulnerability (e.g., via temporary visa programs) (Chantavanich et al. 2016; Yea 2020; Yea and Stringer 2021; Djohari and White 2022; Decker Sparks 2022). Labor dimensions of SSFs are not yet well captured in this literature (nor in the SSF scholarship). The methodological approach adopted in this study has helped us direct analytical attention to multiple dimensions of decent work that are all interrelated and integral for working towards labor justice in SSFs. This has been instructive for identifying gaps and vulnerabilities that harm SSF workers even when severe abuses (e.g., forced labor) are not the main concern. Further work is necessary to refine indicators and to unpack the interrelations between various elements of decent work in SSFs– a unique sector characterized by social-ecological dynamism, contexts of poverty and geographic isolation, multi-species and multi-gear practices, and informality. Consistent with WSR, long-term engaged research involving workers as central participants is the clearest path towards simultaneous improvement in research methods and advancing actual change on the ground. Involving workers to a greater extent in our study was challenging, but our case study nonetheless identifies some of the major decent work deficits in Peru and points to considerations deserving attention in all fisheries. Ultimately, we hope that this work provides impetus for future work that helps further reframe SSFs as a sector urgently in need of labor justice, just like all other food systems.

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[3] A pilot program is currently underway: https://labourexploitation.org/news/announcement-europes-first-worker-driven-social-responsibility-initiative-launches-pilot-to-fight-the-exploitation-of-workers-at-sea/.

Declarations

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