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Unintended consequences of health and safety interventions in fisheries

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Abstract

Fishing communities globally continue to face poor health and safety outcomes, driving the expansion of fisheries occupational health and safety (OHS) interventions. However, narrowly focused OHS interventions that neglect the social and structural determinants of health may have unintended consequences. We illustrate this problem through a case study from the UK where a recent OHS intervention, the introduction of compulsory medical certificates to all commercial fishers, led to unforeseen negative impacts. Through analysis of data from interviews, focus groups and a participatory workshop in Cornwall, UK, we highlight three key findings. First, while seeking to improve safety at sea, the regulatory change actually had negative consequences for fishers' health, their access to healthcare and potentially even their safety. Second, a mismatch between the requirements of the regulation and fishers' lived experience undermined the efforts of health promotion and outreach activities. Third, a failure to account for the implications for different sectors of the fleet has contributed to mistrust that may have ramifications for future fisheries governance activity. Our research brings to the fore important implications for the design of OHS regimes in fisheries. These include the broadening of OHS approaches to consider fishers' wider health and well-being; engagement of fishers in the development and implementation of OHS interventions to account for their lived experiences of health and safety at sea and better integrate their knowledge; support for bottom-up fisher-led initiatives aimed at managing health and safety at sea; and improved coordination between agencies responsible for different areas of fisheries governance.

KEYWORDS
fishing, governance, interventions, occupational health, safety, well-being

1 | INTRODUCTION

Fishing is a hazardous industry with a poor track record of health and safety outcomes. Globally, commercial fishing remains one of the world's most dangerous occupations. An estimated 32,000 casualties occur each year, and a lack of standardised reporting means that this is probably an underestimate (FAO, 2021). In the UK, fishing remains the most dangerous occupation, with fatality rates approximately 100 times higher than the UK workforce overall (MCA, 2021b). In response to these challenges, recent years have seen increasing development of occupational health and safety (OHS) regimes for fisheries internationally, and the extension of their application from larger vessels to small-scale fisheries (Ben-Yami, 2000; Windle et al., 2008). These interventions are often technical, narrowly defined to address specific risks and practices, and have primarily focused on avoiding accidents and injuries (Perez-Labajos, 2008). Yet, there is increasing recognition that health and safety issues in fisheries encompass a much wider range of issues beyond injuries and fatalities.

Fisheries OHS interventions that take a narrow perspective on health, risk causing unintended consequences for some aspects of health while intervening in other aspects. This is because health and safety outcomes in fisheries are in fact influenced by complex and interconnected factors, including not only the decisions and behaviour (e.g. risk-taking) of individual fishers but also the structural and systemic factors that shape these (e.g. social norms, economic circumstances, regulatory environments). Recent literature highlights how changes in complex and interconnected systems can have knock-on effects on health and safety in fisheries. Fisheries governance and management interventions (typically motivated by environmental sustainability and economic objectives) can increase health and safety risks for fishing when the implications are not thought through (Emery et al., 2014; Shan et al., 2023). For example, the introduction of individual transferable quotas in the Tasmanian rock lobster fishery led to greater exposure to health risks among quota leaseholders (Emery et al., 2014), and regulatory pressures and other 'modern uncertainties' associated with fisheries management have been found to impact fishers' mental health (King et al., 2015).

Using a more holistic conception of health – defined as 'a state of complete physical, mental, and social well-being' (WHO, 1948) – recent research on health issues in fisheries has further reinforced the limitations of narrowly focused OHS approaches. Applying a well being lens to fisheries, which recognises material, subjective and relational aspects of fishers' health, this body of scholarship highlights that, globally, fishers experience a wide range of interconnected physical and mental health issues (Coulthard et al., 2011; Weeratunge et al., 2014; Woodhead et al., 2018). Alongside musculoskeletal problems related to physical labour, these include risks associated with working practices, such as fatigue and poor diet, and increasingly mental health problems such as anxiety and depression (King et al., 2021; Matheson et al., 2001). Fishers in the UK, for example, have among the poorest general health and life-limiting illness outcomes compared to other UK industries (Turner et al., 2019). Furthermore, they are less likely to access healthcare due to a combination of organisational constraints and social norms (Turner et al., 2018). Growing recognition of the specific challenges and health inequalities experienced by fishers has led to the development of targeted interventions to promote good health and well-being in fishing communities. Such interventions are often developed by public health agencies, fishers' welfare organisations and maritime charities. In the UK, these have included the provision of health checks and dental treatment on the quayside, specialised physiotherapy and mental health support, and priority access to some National Health Service elective treatments (NHS, 2014, 2018; Seafarers Hospital Society, 2018).

Emerging work on health in fisheries thus points to the role of wider social and structural determinants of health, which remain largely neglected in fisheries OHS policy and practice (Guillot-Wright et al., 2022). Despite recognition of this complexity, there has been little attention to the wider implications of OHS regulations

themselves, aside from the financial costs that are incurred by fishers to meet the requirements (Hayman et al., 2010). Consequently, the ways in which narrowly focused OHS measures may have unintended consequences for health more broadly remain poorly understood. In this paper, we argue that if OHS interventions are to be successful, their design and evaluation must adopt a broad conception of health and consider the wider context influencing fishers' health and safety, which is often poorly accounted for. To support this argument, we draw on a case study from the UK, where a recent OHS intervention, the introduction of compulsory medical certificates to all commercial fishers, led to several unforeseen problems. This case illustrates how a specific OHS intervention failed to account for the diverse implications for heterogeneous fishers and conflicted with their lived experience. In trying to improve safety at sea, the intervention actually had negative impacts on fishers' health, and potentially their safety, both directly and indirectly. Furthermore, the intervention contributed to wider challenges of marginalisation and distrust in governance, with the risk of undermining legitimacy in complex fisheries governance systems.

This paper proceeds as follows. First, we outline the recent introduction of compulsory medical certificates in UK fisheries. Second, we introduce our study region of Cornwall and our research approach, which comprised semi-structured interviews, focus groups and a participatory workshop. Third, we present the key themes emerging from our analysis of qualitative data, pointing to the unforeseen consequences of the regulatory change highlighted through the perceptions of fishing industry and health professionals, and the experiences of fishers themselves. Fourth, we discuss the implications of these findings for future OHS interventions, and for wider efforts to support healthy, viable fishing communities and fisheries. While our research reflects the particular experiences of fishers in Cornwall to a specific intervention, the findings provide insights that can be deployed globally to proactively design and implement future OHS interventions and to coordinate effectively with other components of fisheries governance systems to mitigate negative impacts.

2 | OHS INTERVENTION CASE STUDY: MEDICAL CERTIFICATION IN UK FISHERIES

In 2018, a requirement for commercial fishers to obtain a certificate of medical fitness (hereafter 'medical certificate') was introduced in the UK, with the objective of identifying underlying medical conditions so that conditions are treated or prevented from worsening to protect lives at sea (MCA, 2018, 2019). This regulation was driven by the need to implement the International Labour Organisation (ILO) Work in Fishing Convention, 2007 (No. 188), which aims to ensure decent working conditions for all fishers globally.

Key events in the rollout of the legislation are detailed in Table 1. Phased in over 5 years, it initially applied only to vessels over 24 m in length, or to smaller vessels that either operated at sea for more than 72 h or worked in offshore waters (more than 200 miles from the UK coastline or beyond the continental shelf). Fishers on these vessels were required to obtain an ENG1 medical certificate, issued by a UK Maritime and Coastguard Agency (MCA)-approved doctor. Guidance on the regulations detailed statutory medical fitness standards, outlining four categories: (1) fit for sea service, (2) fit for sea service with restrictions (e.g. on working practices such as lone working), (3) temporarily unfit for sea service and (4) permanently unfit for sea service (MCA, 2020). Initial consultation on the ILO 188 in the UK highlighted concerns over the introduction of medical certificates and a need for 'grandfather rights'. Measures were therefore introduced alongside the regulations to allow fishers with pre-existing conditions to obtain a certificate, as long as their conditions did not impede navigational ability or pose a threat to safety.

The final phase of the rollout was due to come into effect on 30 November 2023, by which date all fishers on smaller vessels were required to obtain either an ML5 medical certificate, which can be issued by a general practitioner (GP) (MCA, 2023), or an ENG1 certificate. Yet, even before this date passed, warnings were raised about the unintended consequences of the regulation for commercial fishers in the UK, with the National Federation of Fishermen's Organisations (NFFO) saying: 'Livelihoods will be lost, and the looming mental health crisis in fishing communities will be worsened' (Fishing News, 2023). Concerns were also raised about the planned measures in the UK, since many other European Member States had not ratified the EC Directive (2017) on ILO 188 because of challenges to effectively consulting with the small-scale inshore fleets about the potential impacts (NUTFA, 2023).

In response to an outpouring of industry concerns about the implications of the regulations, the UK Government launched a consultation on medical certificate exemptions for small-scale fishers on vessels 10 m and under. Over 98% of responses were in favour of an exemption, citing reasons including overly stringent medical standards; impacts on fishers' finances, mental health and livelihood viability; overregulation of the industry; and a lack of evidence that medical certificates prevent accidents (MCA, 2024a). The regulation was updated in March 2024, to include an exemption for existing fishers on vessels of 10 m and under, which covers 82.6% of UK fishing vessels (MCA, 2024a). In the meantime, however, many of the anticipated impacts had already begun to take effect.

3 | METHODS

The findings in this paper draw on a research project in 2023 that sought to understand fisher's experiences of health and access to healthcare in Cornwall, UK. Though the project did not set out to examine the implications of the medical certificates, its timing coincided with the period leading up to the 30 November 2023 deadline,

TABLE 1 Key regulatory changes and events surrounding the medical certificates.

Date	Description
16/11/2017	ILO 188 came into force internationally. UK public consultation on ILO 188.
30/11/2018	The Merchant Shipping (Work in Fishing) (Medical Certification) Regulations 2018[a] come into force in the UK, implementing articles 10–12 of ILO 188. MSN 1883 (F)[b] provided guidance on the regulations. MIN 575 (F)[c] provided guidance on the application of 'Grandfather Rights' to existing fishermen with a medical condition.
31/05/2019	Deadline for fishers on vessels that undergo foreign inspections or ≥ 24 m and at sea for more than 7 days to obtain ENG1 certificate.
30/11/2019	Deadline for fishers on all vessels ≥24 m, vessels <24 m at sea more than 72 hours or more than 200 miles from UK coastline to obtain ENG1 certificate.
15/07/2020	MSN 1886 (M&F)[d] outlined statutory medical fitness standards.
14/07/2022	MSN 1883 (F) Amendment 1[e] and MIN 575 (F) Amendment 2[f] incorporated the acceptance of ML5 in lieu of ENG1 to facilitate implementation for smaller vessels.
30/11/2023	Deadline for fishers on all other vessels >10 m and < 24 m and new entrant fishers on vessels <24 m to obtain an ENG1 or ML5 certificate.
30/11/2023	MIN 575 (F) Amendment 3[g] extended the period for which grandfather rights were available to eligible fishermen applying for their first medical certificate and included specific provisions for eligible fishers with insulin-treated diabetes.
16/01/2024	Launch of public consultation on vessels 10 m and under.
27/03/2024	MSN 1915 (F)[h] outlined an exemption from medical certification for existing fishers (those who worked 4 weeks or more between 30/11/2021–29/11/2023) working aboard vessels of 10 m and under in length, who are not normally at sea for more than 3 days.
28/03/2024	MSN 1883 (F) Amendment 3[i] and MSN 1886 (M&F) Amendment 2[j] updated these regulations to incorporate the exemption for smaller vessels.
30/04/2024	Deadline for medical certificate applications for which grandfather rights considered.
01/05/2024	MSN 1883 (F) Amendment 4[k] updated the guidance following the close of the 30 April 2024 grandfather rights (GFR) deadline.
03/05/2024	MIN 575 (F) Guidance withdrawn.

[a]https://www.legislation.gov.uk/uksi/2018/1108/contents/made.

[b]https://assets.publishing.service.gov.uk/media/5ec7bd2cd3bf7f45fb3213ea/MSN_1883__F__ILO_Work_in_fishing_convention_medical_examination_and_certification.pdf.

[c]https://assets.publishing.service.gov.uk/media/5ed0d7dad3bf7f45fcf2c5af/MIN_575_-_Tagged.pdf.

[d]https://assets.publishing.service.gov.uk/media/5c0670a2ed915d746ce208c8/MSN_1886__M_F__MLC_and_ILO_188_work_in_fishing_convention_medical_examination_system_appointment_of_approved_doctors_and_medical_and_eyesight_standards.pdf.

[e]http://www.govwire.co.uk/news/maritime-coastguard-agency/guidance-msn-1883-f-amendment-1-work-in-fishing-convention-no.-188-medical-examination-and-certification-for-fishermen-17731.

[f]https://www.gov.uk/government/publications/min-575-f-amendment-2-ilo-work-in-fishing-convention-medical-certification-grandfather-rights/min-575-f-amendment-2-ilo-work-in-fishing-convention-medical-certification-grandfather-rights#:~:text=Summary,-From%2030%20November&text=Existing%20fishermen%20who%20are%20eligible,of%20the%20ENG1%20medical%20certificate.

[g]https://www.gov.uk/government/publications/min-575-f-amendment-3-ilo-work-in-fishing-convention-medical-certification-grandfather-rights.

[h]https://www.gov.uk/government/publications/msn-1915f-merchant-shipping-work-in-fishing-convention-medical-certification-regulations-2018-exemption/msn-1915f-merchant-shipping-work-in-fishing-convention-medical-certification-regulations-2018-exemption#fn.

[i]https://www.gov.uk/government/publications/msn-1883-f-amendment-2-work-in-fishing-convention-no-188-medical-examination-and-certification-for-fishermen/msn-1883-f-amendment-2-work-in-fishing-convention-no-188-medical-examination-and-certification-for-fis.

[j]https://assets.publishing.service.gov.uk/media/6605a63791a320001a82b219/MSN_1886__M+F__Amendment_2_maritime_labour_convention_2006__work_in_fishing_convention_2007__ILO_188__medical_examination_system.pdf.

[k]https://www.gov.uk/government/publications/msn-1883-f-amendment-2-work-in-fishing-convention-no-188-medical-examination-and-certification-for-fishermen#:~:text=fishing%20convention%20(No.-,188)%20medical%20examination%20and%20certification%20for%20fishermen,examinations%20and%20certificates%20for%20fishermen.

after which all fishers would be required to have obtained a medical certificate, and to have applied for grandfather rights where necessary. Consequently, the impending deadline was a priority discussion topic in our interviews and focus groups and offered the opportunity to examine the implications in detail. Ethical approval for the research was granted by the University of Exeter Penryn Research Ethics Committee.

3.1 | Study area

Cornwall is a rural region with a large fishing community in comparison to other coastal areas in England. The county has diverse fisheries in terms of target species, gear use and management regimes, with fishers operating under a mixture of regulations including licenses, quotas, technical measures and temporal or

spatial closures. Fishing communities in Cornwall are also diverse, including numerous small, rural fishing villages as well as larger, more modern harbours. Cornwall's largest fishing port, Newlyn, is the largest in England in terms of landings, and fourth largest in the UK by value of landings (MMO, 2021). Overall, Cornwall's seafood sector is estimated to be four times more important to the region than seafood is to the UK generally (Plunkett-Cole & Curtis, 2023), highlighting the importance of maintaining a healthy and productive workforce to the regional economy. Fisheries are governed by several institutions, including the Department for Environment Food and Rural Affairs (Defra), its executive non-departmental public body (the Marine Management Organisation (MMO)), and regionally, the Inshore Fisheries and Conservation Authority (Cornwall IFCA). These institutions have responsibilities for fisheries policy and management, with the latter having specific responsibilities for regional inshore waters. In contrast, the Maritime and Coastguard Agency (MCA) is responsible for regulation pertaining to safety on fishing vessels.

Cornwall's coastal communities experience relatively high levels of deprivation, having a 'coastal excess of disease' (Department of Health and Social Care, 2021, p. 7). As part of a national NHS England approach to support the reduction of health inequalities (Core20PLUS5), Public Health activities in Cornwall include a focus on population groups that may experience health inequalities, including those in rural and coastal communities (NHS, 2022). The last decade has seen the emergence of dedicated services designed to engage with people working in the fishing industry who experience poor health outcomes but traditionally do not regularly access health services. Between 2019 and 2022, Healthy Cornwall, the health promotion arm of Cornwall Council Public Health, hosted a dedicated full-time Health Improvement Practitioner to work with fishermen in Cornwall. This was funded as part of the national SeaFit programme, a maritime charity initiative aiming to improve the health and wellbeing of fishermen and their families in the UK (Seafarers Hospital Society, n.d.). Following the success of the initial work, Healthy Cornwall is now funding three Health Improvement Practitioners to work with fishermen at key ports across the county on a monthly basis. Health promotion activity is varied but includes healthy lifestyle advice around weight management, delivering health checks and smoking cessation support.

Three sites across Cornwall – Newlyn, Mylor and Newquay – were chosen to represent variability in terms of port size, demographic of fishers, type of fisheries (gear use, target species), and existing healthcare service provision. Newlyn is Cornwall's biggest port, home to both smaller vessels undertaking day trips, and larger beam-trawl and crab potting fleets that undertake multi-day trips. Fishers work a variety of gear types including beam trawl, purse seines, passive nets, hand lines and pots. Crew members on larger vessels operating from Newlyn include international workers from countries such as Ghana and the Philippines who typically work as crew members with fishing companies that own multiple larger vessels. Newlyn has been a primary focus of several healthcare schemes including quayside health checks and dental checks, physiotherapy and mental health support (Fairwinds, n.d.; Fishermen's Mission, n.d.; Seafarers Hospital Society, n.d.). It is also home to the regional offices of organisations such as the Fishermen's Mission and the regional producers' organisation, the Cornish Fish Producers Organisation (CFPO). Mylor is a small port on the south coast of Cornwall, home to inshore trawlers, potters and handliners, but with leisure craft being the primary focus of the harbour. Landings come from fishers operating both off the coast and on the River Fal, and as such the research in Mylor also included fishers from the nearby small ports of St Mawes and Falmouth. Newquay is a medium-sized harbour on the North coast of Cornwall. It is home to a fleet of approximately 20 boats, ranging from 5 to 10 m in length, all undertaking 1-day trips using primarily pots but also nets and handlines.

3.2 | Data collection

Interviews were conducted with seven key informants who work closely with Cornish fisheries either through direct engagement in healthcare provision and advice or through their capacity in supporting welfare and safety in the fishing industry. Respondents included individuals from the following organisations: Seafood Cornwall Training, the Fishermen's Mission, the National Federation of Fishermen's Organisations (NFFO), Atlantic Medical Group (a GP practice) and Cornwall Council Public Health. Interview questions focused on health issues in fishing communities, healthcare access and use of schemes to support fishers' health. These issues were discussed in the context of the introduction of medical certificates. Interviews also gathered information to inform the site selection for further research and the design of focus group protocols.

Four focus groups with fishers were organised across the three study sites (two were organised in Newlyn, one of which specifically targeted non-UK national crew members). Focus groups were held at locations close to landing sites, including cafes and training spaces. The University of Exeter team liaised with key contacts in each community to organise the focus groups. In total, 30 fishers across the different sites participated. Focus groups lasted, on average, 45 minutes. These informal discussions covered a series of topics, structured around a topic guide that included open-ended questions used to encourage further discussion. Topics covered included health in fishing communities, lifestyle risks, prevention and management of health issues, healthcare access, and changes to health and healthcare over time.

A participatory workshop aimed at policy actors and practitioners was held in April 2024 to discuss the research findings and their implications. The workshop was attended by 17 participants, including individuals from local fisheries and fisheries organisations, public health organisations and third-sector organisations engaged in supporting fishers' welfare. The workshop provided an opportunity to reflect on the regulatory amendment made in March 2024 which included the exemption for smaller vessels.

3.3 | Data analysis

Interviews and focus groups were audio-recorded with participant permission and later transcribed for analysis. Transcripts were thematically coded and analysed in NVivo to iteratively identify key themes and sub-themes. This included a first round of deductive coding to identify themes related to the focus group topic guide. A second round of inductive coding enabled more emergent sub-themes linked to the impacts of the rollout of medical certificates. In the quotes presented in the Results, individual interview transcripts are coded Int1–Int7 and focus groups F1–F4.

4 | RESULTS

The requirement for medical certificates was at the forefront of fishers' discussions of health and access to healthcare. Qualitative analysis revealed four key themes relating to: access to primary healthcare, the provision and uptake of community-centred health promotion services, impacts of the medical certificate rollout on fishers' health, and implications for fisheries management more generally.

4.1 | Access to primary healthcare

Participants discussed two key themes related to the implications of the medical certificates for access to primary healthcare: first, practical and organisational constraints to obtaining the certificates, and second, a fear of medical diagnoses that may discourage access to healthcare services.

4.1.1 | Practical constraints

Accessing healthcare to obtain the medical certificate was considered one of the first hurdles to overcome. One fisherman said, 'the most pressing one is actually being able to get somebody to do the medical' (FG2). One interviewee confirmed that this was a widespread challenge: 'fishers even last week came to me and said [...] the GP refuses to provide this medical examination because [they're] too busy administering primary care, that is their priority' (Int1). Fishers also reported that the medicals were costly to obtain. Access to dental care (both unavailability of NHS dentists and cost of private dentists) was also noted as a problem if dental problems were required to be monitored or addressed. Time pressure was also an issue for those with existing health issues, as focus group participants explained: 'probably for most people … we've all got to have [the medical] for the 30th of November, or else we lose our grandfather rights for existing medical conditions' (FG2). In some ports, coordination between fishers and GPs had made the process easier. Information sharing via social media had helped fishers to get information and coordinate access to healthcare services including medical certificates. This was identified as a model to replicate across ports, with one interviewee saying: 'fishers have their own groups with clever people who are concerned and will make it work…I think those should be celebrated and replicated' (Int2).

4.1.2 | Fear of diagnoses

Over and above the practical challenges of obtaining the medical certificates, fear of diagnoses has increased among fishers. This fear has led to a reluctance to access healthcare, with one interviewee stating: 'I have spoken to several fishers now who are becoming so fearful of actually having any medical conditions treated because they don't want it on their record because they fear a mention of a medical condition on their record will restrict their ability to go to sea fishing' (Int1). A focus group participant said, 'I can't see anyone going to the doctor between now and November. If they have a serious problem, then they are going to avoid going because then it's on their notes [...] Like, I have got a really bad hip and sore knees, but I ain't going to the doctor because I haven't got my certificate yet' (FG1). This fear was particularly prevalent among skippers of smaller vessels, many of which are older fishers working alone, because of the potential ramifications of not fulfilling the requirements of the medical certificate. For these fishers, restrictions on lone working due to health conditions could make their livelihoods economically unviable. One interviewee said, 'there are a lot of people who are very worried coming to see us for those medicals … just petrified' (Int5). Others suggested that further to avoiding diagnoses, fishers may refuse to take the medical altogether, or actively hide any medical issues when completing the form: 'Is there any point [if] people are just ticking no, no, no, no, no, no. No to everything. Just to pass the medical' (FG3).

In summary, despite the intention of the regulation to ensure that health issues are highlighted and addressed to improve safety at sea, discussions suggested that the requirement for medical certificates would not, at least in the short-term, improve either health or access to healthcare, and may in fact lead people to avoid accessing healthcare services and to conceal health problems.

4.2 | Community-centred health promotion services

Respondents highlighted two themes related to the provision and uptake of health promotion services and outreach. First, the important role that informal services could play in the context of increasing fear of medical diagnoses. Second, the risk that the requirements of the medical certificates are undermining the efforts made by portside health promotion providers by stigmatising some health conditions and reducing individual autonomy around health.

4.2.1 | Role of health promotion services

Some fishers viewed the medical certificates as well-intentioned. For example, one focus group participant said: 'I don't actually think it's necessarily a bad thing [...] there's people down here that go out single-handed [and it] isn't necessarily safe to be out by themselves' (FG3). However, in general, there was widespread consensus that medical certificates should not be used to restrict people's livelihoods. Focus group participants suggested they would be keen to undertake annual health checks to check for risk factors for disease, but only if they were voluntary and run by a 'neutral party'. Since becoming aware of the medical certificates, fishers were reluctant to consent to health check data being added to their NHS record in case it was used to restrict their future fishing activities. In the context of fears around medical diagnoses that may impact the medical certificates, interviewees noted that portside support services for fishers have an important role to play: 'because we're not a health provider, we get an amazing reaction when we've got a health check available. They would do very simple health checks, like BMI, blood pressure, and I think a very simple blood test and cholesterol test' (Int2). Another interviewee said, 'since we've had the Health Improvement Practitioners... they're able to start conversations with people' (Int3). Such conversations included signposting to healthcare services and promoting preventative healthcare practices.

4.2.2 | Undermining progress and loss of autonomy

Despite the potentially important role of informal service provision highlighted by respondents, many fishers and interviewees felt that the rollout of the medical certificates was undermining the progress in access to healthcare services that has been made by schemes such as the SeaFit programme. For example, one interviewee stated, 'they are suddenly being told that they [are] unfit to do their job...it's starting to undo all the work that across the UK has been going on - trying to get the guys to think about their health and prioritise it a bit more - because it then starts becoming quite dictatorial' (Int6).

Many respondents felt that the medical certificates were stigmatising some health conditions. For instance, one focus group commented: 'I don't feel like my BMI restricts me in any aspect of my job. Yes, it would be good to lose weight but is not a necessity for my job, whereas if I had a leg injury, I would pursue medical treatment' (FG1). In general, respondents felt that the medical certificates had contributed to a feeling of loss of autonomy amongst fishers in relation to health, because judgements on their health are being made by external parties through the medical certification process. One fisherman commented, 'we are "sea fit", and now we are being told by someone in Southampton that we can't do our job' (FG1). This was perceived to contribute to undermining outreach efforts that seek to promote preventative action and autonomy around health among fishers.

In summary, the findings revealed a contradiction between the efforts of informal service providers to support access to healthcare, preventative measures and autonomy over health, and the requirements of the medical certificate which address specific issues that many fishers do not see as priorities for their health and safety at sea.

4.3 | Impacts on health

Focus group discussions suggested that the requirement for medical certificates may have negative impacts on health, by contributing to the escalating regulatory changes that are a key driver of stress and anxiety: 'I think I am probably getting more stressed from the MMO and the MCA. It's not the actual job, it's the stress associated with the medical and all that, and that's across the board I would say' (FG1). The medical certificates form part of a wider landscape of regulatory change. Another fisherman commented, 'You are stressed out all the time, every email you get' (FG2). Navigating the implications of increasing regulation was consistently considered the primary contributor to escalating stress. Focus group participants described how fear for their future livelihoods was the most pressing contemporary issue, and one interviewee said: 'I think the main challenge, which I also know is directly affecting fisherman's mental health, is the regulatory explosion we have entered in the fishing industry' (Int1).

Some fishers related the health risk of cardiovascular disease to the physical and mental demands of fishing, notably increasing stress caused by constantly changing regulations and growing uncertainty about the future. One fisherman summarised, 'you are stressed out all the time...it's over-regulated and it will kill us, you know. People will have heart attacks' (FG2). Related to this, some fishers said it had been hard to avoid stress during recovery from illness. For example, one focus group participant described missing important communications from authorities while off work convalescing, which led to substantial stress, while at the same time being advised by healthcare professionals that, 'the one thing *not* to do after a stroke is get stressed' (FG2).

4.4 | Implications for fisheries management

Finally, the implications of the medical certificates extend beyond fishers' health and safety to the wider relationships with fisheries governance institutions and regulations. One interviewee outlined a lack of legitimacy around the requirement for medical certificates: 'I think [fishers] would welcome it and have buy-in if, say, there were active statistics which helped underpin the requirement for medical examinations. But unfortunately, there just isn't' (Int1). As well as a perception of the requirements being unsupported with evidence of the safety risks associated with particular health metrics, they were also seen to be overly stringent in comparison to other industries. Many fishers made comparisons

to occupations such as lorry driving and construction, where they perceived the requirements to be less severe given the risks. One focus group participant commented: 'A 40 ton lorry, I could drive 100mph down the road, but … with a health condition [I] can't go out on a 7 metre boat by myself, not being a danger to anyone but myself' [FG1].

The disproportionate impacts of the medical certificates on some sectors of the fishery contributed to a sense of being 'unwanted' and 'squeezed out' by authorities. One focus group participant commented: '… we are providing food for people and the opportunity to do that is getting less and less. I don't know what their gain is and why they want to take it away from us and [not] to have an industry for future generations to come. I don't know if the MCA knows what they are doing' (FG2). Another put it more strongly: 'Why are they picking on the fishermen? […] they aren't bringing in any strict rules around lorry driving because they need them, they're desperate for them, and unfortunately in the eyes of the powers that be, we are quite sacrificial' (FG1). In particular, older fishers working on smaller vessels, many of which might previously have worked with a crew member but cannot afford to do so now, were concerned about the possibility of restrictions being imposed on their working practices. One fisher said: 'The problem is with some of the measures that if they say you've got some issues then you have to have a chaperone, well, you've got to have somebody who's willing to go and work unsociable hours, reduce the amount you earn. It's just not as viable for most small boats' (FG2). Workshop discussions revealed anecdotal reports of older fishers who were single-handedly operating small vessels having sold their boats and exited the fishery in anticipation of not passing the medical certificate, only for the exemption on under 10 m vessels to be introduced several months later. These impacts were perceived to be particularly unjust in light of the absence of any measures to address issues such as substance abuse, which were perceived to be much greater risks to health and safety of fishers at sea. When asked about the issues that might stop people from passing the medical, one focus group participant commented: 'It will be weight I think, standard wear and tear when you get to about 50, you know … hearing and eyesight. What it *should* be is drugs and alcohol, but they aren't looking at that' (FG1).

5 | DISCUSSION

Our analysis of Cornish fishers' experiences of the final stage of the planned rollout of medical certificates in the UK has highlighted three key findings. First, the regulatory change and the way it was implemented had unintended consequences for fishers' health and well-being and their access to healthcare. Second, a mismatch between the requirements of the regulation and fishers' lived experience was perceived to have undermined the efforts of other health promotion and outreach activities. Third, a failure to account for the implications for different sectors of the fleet has contributed to mistrust that may have ramifications for future fisheries governance activity. We discuss each of these findings in turn.

5.1 | Negative impacts on health

In seeking to improve safety at sea by identifying underlying medical conditions early, the introduction of medical certificates inadvertently had negative impacts on aspects of fishers' health and may also have exacerbated some safety risks. OHS measures can enhance or reduce risk of adverse outcomes by influencing fishers' behaviour and decision-making. For example, OHS regulations can result in an economic burden for those who must comply with them (Windle et al., 2008), which can exacerbate risk-taking and undermine safety. Fishers routinely make trade-offs between economic and physical risks, often considering greater risk-taking when they need to meet their economic needs (Sainsbury et al., 2021). Though the cost of the medical certificate alone may not push fishers to desperate measures, the threat of associated economic burdens (e.g. through medical treatment required or restrictions on working practices) may lead to greater risk-taking and/or non-compliance, for example, by avoiding the medical and working uninsured or fishing illegally despite restrictions on lone working.

In Cornwall, the medical certificate was viewed as part of a growing regulatory burden that places increased pressure on commercial fishers, especially on small-scale vessels that have limited flexibility to respond. Escalating regulation causes considerable stress for many fishers and is perceived as one of the major drivers of poor health. For example, Australian fishers perceived stress to be the biggest issue facing the industry, above concerns related to lifestyle (e.g. diet, exercise), environment (e.g. sun/wind exposure) and working environment (e.g. prolonged hours on a pitching deck) (King et al., 2015). The threat of restrictions on fishing activity contributed to job insecurity for some fishers, which has a detrimental impact on health and well-being (King et al., 2021; Lübke, 2021). Stress may further contribute to poor health through behaviours such as alcohol and drug use to cope with what is perceived as 'intolerable stress' (Sorensen et al., 2022), which in turn can undermine safety at sea and lead to poor health. Greater psychological stress can also increase cognitive failure and influence the 'safety climate', increasing the probability of workplace accidents (Day et al., 2012; Hilton & Whiteford, 2010; Khoshakhlagh et al., 2021).

The impacts of the medical certificates on fishers' health must be understood in relation to the wider determinants of health and safety outcomes. In the Gulf of Mexico, fishers' physical and mental health was impacted by economic deregulation policies that led to unregulated hours and low-paid work without good health benefits, contributing to wider poverty (Guillot-Wright et al., 2022). These changes intensified the challenges of maintaining fishing vessels and safety equipment, and made healthcare financially less accessible, exacerbating risks to fishers' health and safety (Guillot-Wright et al., 2022). Similarly, in the UK, social and economic changes in recent years – including a local housing crisis in Cornwall, Britain's exit from the European Union, the COVID-19 pandemic, and rising fuel costs – have caused financial uncertainty and stress for fishers (MCA, 2021a; Phillipson & Symes, 2018). These were coupled with growing organisational barriers to accessing healthcare, manifest in

long waiting times and the difficulty of securing dental checks and treatment under the UK's National Health Service (NHS) (Turner et al., 2018). Such barriers can also lead to adverse financial implications, for example, when private medical or dental treatment is sought at a high cost. The rollout of medical certificates contributes to these challenges not only by adding a further stressor but also by discouraging access to healthcare when fishers may need it most.

Finally, fishers are affected not only by the substance of the regulatory change but also by their experiences of the process through which it is implemented. In the USA, the emotional health of fishers was influenced by perceptions that regulations were disproportionately applied to some sectors of the fishery, were not well communicated or led to fishers incurring economic burdens to ensure their compliance (Sorensen et al., 2022). In New Zealand, skippers incurred emotional stress not only from the cost of complying with safety standards but also from the way in which management of safety incidents was seen to attribute blame (Hayman et al., 2010). These findings are consistent with reports from Cornish fishers that the rollout of medical certificates has caused confusion and worry, with consequences for emotional health. Overall, this risked negatively impacting fishers' health and safety, while simultaneously discouraging access to healthcare.

5.2 | Undermining fishers' autonomy

Our findings reflect a wider discontent with managerial OHS approaches that undervalue the experiential knowledge of those who work at sea. Fisheries OHS research and practice have tended to focus on technical measures, training, information campaigns, and enforcement (Guillot-Wright et al., 2022; Thorvaldsen et al., 2022). OHS approaches neglect to consider people's day-to-day experiences of negotiating risk and their attitudes to safety (Power, 2008). In Norway, for example, the Maritime Authority perceived a 'lack of safety culture' in fisheries, while fishers disagreed, arguing that they use common sense and take precautions to avoid risks (Thorvaldsen et al., 2022). Managerial approaches to OHS that downplay the role of fishers' local knowledge can undermine fishers' agency in managing risk. Yet, prior experiences indicate that fishers implement their own risk management initiatives, informed by their in-depth understanding of the fishery. For example, in Canada fishers delayed season openings to mitigate safety risks in the lobster fishery (Reid-Musson et al., 2022). Tensions between the perceptions of regulators and fishers are often illustrated by a mismatch between what is regulated or inspected by maritime authorities (i.e. equipment, vessels) and the factors that are perceived by fishers to be a risk to safety (including stress, fatigue and drinking) (Binkley, 1991; Thorvaldsen, 2015). This was echoed in Cornwall, where the marginalisation of fishers' experience is reflected in the mismatch between the requirements of the medical certificate and fishers' perceptions of the key risk factors at sea. Comparable to previous research, fishers perceived factors such as stress, fatigue and drug use, which affect ability to think clearly and respond quickly, to influence safety at sea. In contrast, fishers expressed being able to manage underlying health conditions in ways that allowed them to continue fishing safely. Through perceived stigmatisation of certain health metrics that do not match fishers' own conception of what it means to be 'sea fit', the medical certificates lessened fishers' sense of autonomy in determining their own health priorities, and in doing so, undermined the work of health services that have sought to enhance this autonomy.

Not only did the medical certificates fail to reflect the issues that fishers cared about, but interviewees also raised concerns about whether there is evidence that the measure reflected a proportionate response to real safety risks at sea. UK government guidance on the medical certificates acknowledged that the Marine Accident Investigation Branch (MAIB) investigations rarely attribute marine accidents or injuries to underlying medical conditions (MCA, 2024b). The guidance notes that the MAIB investigates serious marine incidents and casualties, and refers to other relevant data sources (e.g. lifeboat or coastguard call-outs and calls to Telemedical Advice Services) that may provide a fuller picture. However, no evidence is presented in the guidance to support the link between underlying medical conditions and OHS incidents at sea. While fishers in Cornwall were supportive of the idea of health checks as a preventative measure, most viewed the possible restrictions on their working practices as overly stringent in relation to the potential risks. Though there is a debate about whether fishers are in denial about the risks they face, with some research suggesting that fishers trivialise risks as an adaptive psycho-cultural strategy (Poggie et al., 1995), fishers' attitudes to risks can often be seen as 'logical' in the context of their experiences (Binkley, 1991). Many fishers contend that they effectively manage risk by using common sense and taking appropriate precautions (Thorvaldsen, 2013). Such practices are dynamic, responding to changing working environments and institutional contexts (Power, 2008). Whether or not there is sufficient evidence to justify the role of the medical certificates in addressing OHS outcomes, the lack of transparency around this has undermined support. Furthermore, workshop discussions confirmed that these events have impacted uptake of services designed to support fishers in seeking preventative healthcare and making proactive changes to avoid ill-health. Such impacts may also undermine efforts to improve reporting, contributing to the well-documented challenge of poor-quality data on fishers' health (e.g. Soykan, 2023). These experiences reinforce the need to situate OHS within the wider context of health and well-being in fisheries (Coulthard, 2012; Homolova et al., 2020; Woodhead et al., 2018).

5.3 | Damaging legitimacy in fisheries governance

Our findings point to unintended consequences of the medical certificate rollout for the wider legitimacy of fisheries governance. By revealing perceived inequalities in outcomes for different fishers and problems specific to the small-scale sector, the research reflects wider challenges about tailoring policy to heterogeneous

fisheries. It is well established that top-down, one-size-fits-all approaches to management do not typically work well in fisheries (Arceo et al., 2013; Shan, 2022). Instead, there is a need to tailor management measures to the diverse needs and circumstances of diverse groups. This includes variation in the level of risk across different fisheries (Windle et al., 2008) but also diverse capacity to respond to changing regulations. In other contexts, small-scale fishers have also been disproportionately impacted by OHS measures. In Norway, for example, laws on ship safety were applied to fishing vessels of all sizes in 2010, and small vessels with low-income margins struggled to invest capital to meet the new requirements (Thorvaldsen, 2015). Co-fishing arrangements were also introduced in Norway, to address the elevated risk of fatal accidents among those fishing alone; however, the scheme was not available to small-scale coastal fishers, leading to a perception that it was an underhand method of fleet restructuring (Thorvaldsen, 2015). In Cornwall, small-scale fishers in particular perceived the medical certificates in a similar way, as an indication that they were being squeezed out of the fishery by governing agencies. This reflects a wider sense of marginalisation linked to other issues including historical distribution of quota and limited representation in decision-making (Carpenter & Kleinjans, 2017). It also resonates with similar sentiments in small-scale fisheries at a global level, where inshore fleets are gradually being squeezed out when economic, political and environmental interests are prioritised without due regard for social implications (Brennan, 2022; Cohen et al., 2019; Fabinyi et al., 2022). Though the regulation responded to some of these concerns and granted an exception for vessels under 10 m in length, prior consultation and consideration of the impacts could have avoided a considerable amount of fear and concern among the small-scale sector of the fleet. Furthermore, many fishers have already incurred considerable costs through pursuing medical treatment to meet the requirements of the medical certification process.

Understanding fishers' experiences of governance processes is critical to uncover the wider implications of regulatory change for future OHS policy and fisheries management more generally. Despite recognition that fisheries management can influence OHS outcomes, the implications of OHS regulation for fisheries management are seldom considered. However, fishers' negative experiences of governance can have adverse impacts by influencing willingness to engage in future fisheries management (Sorensen et al., 2022). Perceptions that the requirements of the medical certificates are not well evidenced; that they do not relate to the everyday experiences of risk management; that they threaten livelihoods or financial security; that they leave fishers feeling disenfranchised or lacking voice; or that they result in inequalities through disproportionate impacts on some fishers can undermine the legitimacy of OHS governance (Sorensen et al., 2022 and others). The implementation of OHS regimes is often governed separately from fisheries management more generally (Shan, 2022; Thorvaldsen, 2015). In the UK, fishing health and safety regulation falls within the remit of the Maritime and Coastguard Agency (MCA), while the Department for Environment Food and Rural Affairs (Defra) is responsible for fisheries policy and management. Regulatory agencies are not always well coordinated, and there is often limited capacity to anticipate the wider consequences of individual policies or regulations (Windle et al., 2008). However, fishers may not differentiate between the roles and responsibilities of different agencies, thus undermining the legitimacy of one can have knock-on impacts on others. This could risk further eroding trust in fisheries governance institutions in the UK, where there are already low levels of trust in national-level fisheries governance institutions (Dixon et al., 2024; Ford & Stewart, 2021). The imposition of rules and regulations that fishers disagree with can thus damage legitimacy and may therefore risks undermining future OHS initiatives and other fisheries governance activity.

5.4 | Implications

Lessons from the proposed rollout of medical certificates across the entire fishing fleet in the UK have demonstrated that the intervention which aimed to improve health and safety had a number of unintended negative consequences. While the later amendment to the regulation sought to address some of these challenges, the examination of this case study points to several possible ways to avoid such outcomes in the future. First, if OHS interventions are to be successful at addressing health and safety risks associated with fishing, they must take a more holistic approach to health. Such an approach considers the complex landscape of interlinked determinants of physical and mental health, as well as the factors that mediate access to healthcare and other health support among fishers, which are often poorly accounted for. This is a pre-requisite of moving away from prescriptive, technical or managerial approaches to OHS, which have been shown to be ineffective in and beyond UK fisheries. Second, recognising and incorporating fishers' local knowledge and lived experiences into the design and implementation of OHS measures is essential and, furthermore, there is much to be gained by supporting initiatives led by fishers for the mitigation of occupational risks at sea. While mainstream approaches to OHS have often removed a sense of autonomy from fishers, undermining not only the success of OHS interventions but also fishers' health itself, positive examples of fisher-led initiatives show that given the chance, fishers can drive efforts to mitigate risks at sea. Third, as we demonstrate, the disconnect between different areas of fisheries governance risks undermining the legitimacy and thus uptake of future policies and interventions. This calls for improved coordination between different government agencies, as well as for collaboration with informal service providers through an integrated approach to governance and service provision.

6 | CONCLUSION

Fishing communities around the world continue to face poor health and safety outcomes, driving the expansion of fisheries OHS

interventions. Our findings have important implications for the design of OHS regimes in fisheries. First, we demonstrate that OHS interventions may actually have had negative impacts on fishers' health and possibly exacerbated some safety risks. These impacts were both direct (e.g. via stress) and indirect (e.g. through discouraging access to healthcare). Second, we highlight a tension between the premise of the medical certificates and the lived experience of fishers, which reduced fishers' autonomy in making decisions about their health and safety priorities, and undermined the work of health agencies and fisheries welfare organisations seeking to promote proactive and preventative healthcare. Third, the failure to tailor the rollout of the regulations to the needs of a diverse fishing community contributes to a wider challenge of marginalisation and distrust in governance, with the risk of undermining trust legitimacy in complex fisheries governance systems. The design and evaluation of future OHS interventions in fisheries must consider the wider context influencing fishers' health and safety; engage fishers in the development and implementation of OHS interventions to account for their lived experiences of health and safety at sea and support fisher-led initiatives; and improve coordination between agencies responsible for different areas of fisheries governance.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to report.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Arceo, H. O., Cazalet, B., Aliño, P. M., Mangialajo, L., & Francour, P. (2013). Moving beyond a top-down fisheries management approach in the northwestern Mediterranean: Some lessons from The Philippines. *Marine Policy*, *39*(1), 29–42. https://doi.org/10.1016/j.marpol.2012.10.006

Ben-Yami, M. (2000). *Risks and dangers in small-scale fisheries: An overview*. International Labour Office.

Binkley, M. (1991). Nova Scotian offshore fishermen's awareness of safety. *Marine Policy*, *15*, 170–191.

Brennan, R. (2022). Making space for plural ontologies in fisheries governance: Ireland's disobedient offshore islands. *Maritime Studies*, *21*(1), 35–51. https://doi.org/10.1007/s40152-021-00257-8

Carpenter, G., & Kleinjans, R. (2017). *Who gets to fish? The allocation of fishing opportunities in EU member states*. New Economics Foundation.

Cohen, P. J., Allison, E. H., Andrew, N. L., Cinner, J., Evans, L. S., Fabinyi, M., Garces, L. R., Hall, S. J., Hicks, C. C., Hughes, T. P., Jentoft, S., Mills, D. J., Masu, R., Mbaru, E. K., & Ratner, B. D. (2019). Securing a just space for small-scale fisheries in the blue economy. *Frontiers in Marine Science*, *6*, 171. https://doi.org/10.3389/FMARS.2019.00171/BIBTEX

Coulthard, S. (2012). Can we be both resilient and well, and what choices do people have? Incorporating agency into the resilience debate from a fisheries perspective. *Ecology and Society*, *17*(1), 4.

Coulthard, S., Johnson, D., & McGregor, J. A. (2011). Poverty, sustainability and human wellbeing: A social wellbeing approach to the global fisheries crisis. *Global Environmental Change*, *21*(2), 453–463. https://doi.org/10.1016/J.GLOENVCHA.2011.01.003

Day, A. J., Brasher, K., & Bridger, R. S. (2012). Accident proneness revisited: The role of psychological stress and cognitive failure. *Accident Analysis and Prevention*, *49*, 532–535. https://doi.org/10.1016/j.aap.2012.03.028

Department of Health and Social Care. (2021). *Chief Medical Officer's annual report 2021 health in coastal communities*. https://www.gov.uk/government/publications/chief-medical-officers-annual-report-2021-health-in-coastal-communities

Dixon, M., Grilli, G., Stewart, B. D., Bark, R. H., & Ferrini, S. (2024). The importance of rebuilding trust in fisheries governance in post-Brexit England. *Marine Policy*, *161*, 106034. https://doi.org/10.1016/j.marpol.2024.106034

Emery, T. J., Hartmann, K., Green, B. S., Gardner, C., & Tisdell, J. (2014). Fishing for revenue: How leasing quota can be hazardous to your health. *ICES Journal of Marine Science*, *71*(7), 1854–1865. https://doi.org/10.1093/icesjms/fsu019

Fabinyi, M., Belton, B., Dressler, W. H., Knudsen, M., Adhuri, D. S., Abdul Aziz, A., Akber, M. A., Kittitornkool, J., Kongkaew, C., Marschke, M., Pido, M., Stacey, N., Steenbergen, D. J., & Vandergeest, P. (2022). Coastal transitions: Small-scale fisheries, livelihoods, and maritime zone developments in Southeast Asia. *Journal of Rural Studies*, *91*, 184–194. https://doi.org/10.1016/j.jrurstud.2022.02.006

Fairwinds. (n.d.). *SeaFit: Ensuring quick access for mental health support and wellbeing for our fishermen and families*. https://Fairwindscornwall.Co.Uk/Seafit/

FAO. (2021). *Committee on fisheries: Safety at sea and decent work in fisheries and aquaculture*. www.fao.orgND596/e

Fishermen's Mission. (n.d.). *Free quayside dental health checks*. https://www.fishermensmission.org.uk/free-quayside-dental-health-checks/

Fishing News. (2023). *The National Federation of Fishermen's Organisations asks to meet minister on medical certification*. Fishing News. https://fishingnews.co.uk/news/the-national-Federation-of-Fishermens-Organisations-Asks-to-Meet-Minister-on-Medical-Certification/

Ford, E., & Stewart, B. D. (2021). Searching for a bridge over troubled waters: An exploratory analysis of trust in United Kingdom fisheries management. *Marine Policy*, *132*, 104686. https://doi.org/10.1016/j.marpol.2021.104686

Guillot-Wright, S., Cherryhomes, E., & Davis, L. (2022). The impact of economic deregulation for health disparities among Gulf of Mexico commercial fishermen. *Marine Policy*, *141*, 105099. https://doi.org/10.1016/j.marpol.2022.105099

Hayman, J., Anderson, D., & Lamm, F. (2010). *Occupational health and safety in the New Zealand fishing industry: Preliminary findings of the key issues*. Labour, Employment and Work in New Zealand. https://doi.org/10.26686/lew.v0i0.1678

Hilton, M. F., & Whiteford, H. A. (2010). Associations between psychological distress, workplace accidents, workplace failures and workplace successes. *International Archives of Occupational and Environmental Health*, *83*(8), 923–933. https://doi.org/10.1007/s00420-010-0555-x

Homolova, L., Grey, C. N., Burchett, N., & Davies, A. R. (2020). *Building resilience in the fishing sector in Wales*. Public Health Wales/Mental Health Foundation. https://www.mentalhealth.org.uk/sites/default/files/2022-09/MHF-Building-resilience-in-the-fishing-sector-in-Wales.pdf

Khoshakhlagh, A. H., Yazdanirad, S., Kashani, M. M., Khatooni, E., Hatamnegad, Y., & Kabir, S. (2021). A Bayesian network based study on determining the relationship between job stress and safety climate factors in occurrence of accidents. *BMC Public Health*, *21*(1), 2222. https://doi.org/10.1186/s12889-021-12298-z

King, T., Kilpatrick, S., Willis, K., & Speldewinde, C. (2015). "A different kettle of fish": Mental health strategies for Australian fishers, and farmers. *Marine Policy*, *60*, 134–140. https://doi.org/10.1016/j.marpol.2015.06.013

King, T., Turner, R., Versace, V., Abernethy, K., Kilpatrick, S., & Brumby, S. (2021). Mental health in the commercial fishing industry: Modern uncertainties and traditional risks. *Fish and Fisheries*, *22*(5), 1136–1149.

Lübke, C. (2021). How self-perceived job insecurity affects health: Evidence from an age-differentiated mediation analysis. *Economic and Industrial Democracy*, *42*(4), 1105–1122.

Matheson, C., Morrison, S., Murphy, E., Lawrie, T., Ritchie, L., & Bond, C. (2001). The health of fishermen in the catching sector of the fishing industry: A gap analysis. *Occupational Medicine*, *51*(5), 305–311. https://doi.org/10.1093/occmed/51.5.305

MCA. (2018). *Explanatory Memorandum to the Merchant Shipping (Work in Fishing) (Medical Certification) Regulations 2018*. https://www.legislation.gov.uk/Uksi/2018/1108/Pdfs/Uksiem_20181108_en.Pdf

MCA. (2019). *Provisional guidance on implementation of ILO work in fishing convention (ILO 188) medical certifiation*. https://assets.publishing.service.gov.uk/Media/5bacf632ed915d258ed26e06/Provisional_Guidance_Medical_Certification.Pdf

MCA. (2020). *MSN 1886 amendment 2 MLC and ILO 188 medical standards*. https://www.gov.uk/government/Publications/Msn-1886-Amendment-1-Mlc-and-Ilo-188-Medical-Standards#full-Publication-Update-History

MCA. (2021a). *MIN 663 (F) Guidance on the long-term impacts of the COVID-19 pandemic on fishers' wellbeing*. https://www.gov.uk/Government/Publications/Min-663-f-Guidance-on-the-Long-Term-Impacts-of-the-Covid-19-Pandemic-on-Fishers-Wellbeing/Min-663-f-Guidance-on-the-Long-Term-Impacts-of-the-Covid-19-Pandemic-on-Fishers-Wellbeing

MCA. (2021b). *Small Fishing Vessel Code enters into force*. Maritime and Coastguard Agency. https://www.gov.uk/government/News/Small-Fishing-Vessel-Code-Enters-into-Force?Utm_source=dlvr.It&utm_medium=linkedin

MCA. (2023). *ML5 medical report form and certificate (MSF 4112)*. https://www.gov.uk/Government/Publications/Ml5-Medical-Report-Form-and-Certificate-Msf-4112

MCA. (2024a). *Consultation outcome: Medical exemption – Existing fishers on vessels of 10 Metres and under*. http://www.Govwire.Co.Uk/News/Maritime-Coastguard-Agency/Consultation-Outcome-Medical-Exemption-%E2%80%93-Existing-Fishers-on-Vessels-of-10-Metres-and-under-84596

MCA. (2024b). *Your certificate of medical fitness questions answered*. https://www.Gov.Uk/Government/Publications/Certificates-of-Medical-Fitness-Answering-Fishermens-Questions/Your-Certificate-of-Medical-Fitness-Questions-Answered

MMO. (2021). *UK Sea Fisheries Statistics 2021*. https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021

NHS. (2014). *Delivering the NHS health check to commercial fishermen in Cornwall (issue august)*. National Health Service. http://www.healthcheck.nhs.uk/document.php?o=788

NHS. (2018). *Dreadnought unit*. https://www.guysandstthomas.nhs.uk/our-services/wards/dreadnought.aspx

NHS. (2022). Core20PLUS5 – An approach to reducing health inequalities for children and young people. https://www.england.nhs.uk/about/equality/equality-hub/national-healthcare-inequalities-improvement-programme/core20plus5/core20plus5-cyp/#:~:text=PLUS%20population%20groups%20include%20ethnic,protected%20characteristic%20groups%3B%20amongst%20others

NUTFA. (2023). *Email communication with New Under Ten Fishermen's Association (NUTFA)*.

Perez-Labajos, C. (2008). Fishing safety policy and research. *Marine Policy*, *32*(1), 40–45. https://doi.org/10.1016/j.marpol.2007.04.002

Phillipson, J., & Symes, D. (2018). "A sea of troubles": Brexit and the fisheries question. *Marine Policy*, *90*(January), 168–173. https://doi.org/10.1016/j.marpol.2017.12.016

Plunkett-Cole, J., & Curtis, H. (2023). *Value of seafood to Cornwall and the Isles of Scilly*. Report prepared for the Cornish Fish Producers Organisation.

Poggie, J., Pollnac, R., & Jones, S. (1995). Perceptions of vessel safety regulations: A southern New England fishery. *Marine Poliicy*, *19*(5), 411–418.

Power, N. G. (2008). Occupational risks, safety and masculinity: Newfoundland fish harvesters' experiences and understandings of fishery risks. *Health, Risk and Society*, *10*(6), 565–583. https://doi.org/10.1080/13698570802167405

Reid-Musson, E., Neis, B., & Finnis, J. (2022). Fishing safety and timed openings in Atlantic Canada's lobster fisheries: The mediating role of local management systems. *Maritime Studies*, *21*(2), 223–234. https://doi.org/10.1007/s40152-021-00256-9

Sainsbury, N. C., Schuhmann, P. W., Turner, R. A., Grilli, G., Pinnegar, J. K., Genner, M. J., & Simpson, S. D. (2021). Trade-offs between physical risk and economic reward affect fishers' vulnerability to changing storminess. *Global Environmental Change*, *69*, 102228. https://doi.org/10.1016/j.gloenvcha.2021.102228

Seafarers Hospital Society. (2018). *"Having a tough time?" campaign leaflet*. http://seahospital.org.uk/wp-content/up-loads/2017/11/Seafarers-Leaflet-final.pdf

Seafarers Hospital Society. (n.d.). *The SeaFit Programme*. https://seahospital.org.uk/Help-for-You/the-Seafit-Programme/

Shan, D. (2022). Enforcement of fishing occupational health and safety (OHS) standards: Challenges in Atlantic Canada. *Marine Policy*, *145*, 105282. https://doi.org/10.1016/j.marpol.2022.105282

Shan, D., Neis, B., & Sorensen, J. (2023). Introduction to special issue on governance and fishing health and safety in the North Atlantic. *Marine Policy*, *155*, 105729. https://doi.org/10.1016/j.marpol.2023.105729

Sorensen, J. A., Kincl, L., Weil, R., Dzugan, J., & Christel, D. (2022). Fisheries governance and associated health implications: Current perspectives from US commercial fishermen. *Marine Policy*, *141*, 105119. https://doi.org/10.1016/j.marpol.2022.105119

Soykan, O. (2023). Occupational health and safety in the Turkish fisheries and aquaculture; a statistical evaluation on a neglected industry. *Safety and Health at Work*, *14*(3), 295–302. https://doi.org/10.1016/j.shaw.2023.07.004

Thorvaldsen, T. (2013). The importance of common sense: How Norwegian coastal fishermen deal with occupational risk. *Marine Policy*, *42*, 85–90. https://doi.org/10.1016/j.marpol.2013.02.007

Thorvaldsen, T. (2015). Managing risk in the Norwegian fishing fleet. *Policy and Practice in Health and Safety*, *13*(1), 17–30. https://doi.org/10.1080/14774003.2015.11667809

Thorvaldsen, T., Sønvisen, S. A., & Holmen, I. M. (2022). The impact of fisheries management on fishers' health and safety: A case study from Norway. *Marine Policy*, *140*, 105066. https://doi.org/10.1016/j.marpol.2022.105066

Turner, R. A., Sainsbury, N. C., & Wheeler, B. W. (2019). The health of commercial fishers in England and Wales: Analysis of the 2011 census. *Marine Policy*, *106*, 103548. https://doi.org/10.1016/j.marpol.2019.103548

Turner, R. A., Szaboova, L., & Williams, G. (2018). Constraints to healthcare access among commercial fishers. *Journal of Social Science and Medicine*, *216*, 10–19. https://doi.org/10.1016/j.socscimed.2018.09.026

Weeratunge, N., Béné, C., Siriwardane, R., Charles, A., Johnson, D., Allison, E. H., Nayak, P. K., & Badjeck, M.-C. C. (2014). Small-scale fisheries through the wellbeing lens. *Fish and Fisheries*, *15*(2), 255–279. https://doi.org/10.1111/faf.12016

WHO. (1948). Constitution of the World Health Organization. http://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf?ua=1

Windle, M. J. S., Neis, B., Bornstein, S., Binkley, M., & Navarro, P. (2008). Fishing occupational health and safety: A comparison of regulatory regimes and safety outcomes in six countries. *Marine Policy*, *32*(4), 701–710. https://doi.org/10.1016/j.marpol.2007.12.003

Woodhead, A., Abernethy, K. E., Szaboova, L., & Turner, R. A. (2018). Health in fishing communities: A global perspective. *Fish and Fisheries*, *19*(5), 839–852. https://doi.org/10.1111/faf.12295

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