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Health in fishing communities: A global perspective

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Abstract

In resource-dependent communities such as fishing communities, human health underpins the ability of individuals and families to maintain viable livelihoods. Fishing is a dangerous occupation, in which fishers are exposed to health risks both on and offshore. Many of these risks and associated health concerns also extend to fishing families and wider communities. Despite the importance of health, there is a lack of understanding of the breadth of health issues affecting people associated with fishing. This study presents the findings of a scoping review of peer-reviewed literature that identifies the range of health issues and health determinants studied in fishing communities around the world. The findings reveal a wide variety of documented health issues, but with greater emphasis on physical health and occupational and behavioral factors, with limited attention paid to mental health. The majority of studies focused on fishers themselves, as opposed to other subgroups within fishing communities. Geographic differences in the health topics investigated highlight prevalent concerns and offer potential to share insights and solutions across contexts. The breadth of findings illustrates the complexity of health for people dependent on fishing, and the relevance of the many health determinants in maintaining viable fishing communities. We propose that a social well-being approach offers an integrative lens through which a better understanding of human health in fisheries can be achieved and used to inform fisheries management that is ecologically and socially sustainable.

KEYWORDS
fisheries, fishing communities, health, scoping review, well-being

1 | INTRODUCTION

With growing recognition that sustainable fisheries require viable fishing communities, improving the social sustainability of fishing-dependent communities is increasingly seen as a legitimate and important goal of fisheries governance (Britton & Coulthard, 2013; Coulthard, 2012; Jentoft, 2000; Weeratunge et al., 2014). Human health has been recognized as an important factor contributing to social sustainability (Dempsey, Bramley, Power, & Brown, 2009). In the case of fishing communities, the importance of seafood for nutrition and food security provides a direct link between fishing and human health outcomes (Béné et al., 2016). However, research into different health concerns and their drivers in fishing communities has only recently become an area of focus for fisheries research (King, Kilpatrick, Willis, & Speldewinde, 2015; Matheson et al., 2001). Meanwhile, fisheries policy has struggled to incorporate social objectives, such as health, into fisheries governance systems (Symes & Phillipson, 2009; Urquhart, Acott, Reed, & Courtney, 2011; Voyer, Barclay, McIlgorm, & Mazur, 2017).

While good health underpins the ability of people to contribute towards a sustainable fishery, fishers often experience poor health and are exposed to a variety of occupational hazards (Grimsmo-Powney, Harris, Reading, & Coggon, 2009; Lawrie, Matheson, Murphy, Ritchie, & Bond, 2003; Lawrie, Matheson, Ritchie, Murphy,

& Bond, 2004). Fishing is widely considered one of the most dangerous peacetime occupations due to the high incidence of fatalities (International Labour Organisation, 1999; McGuinness, Aasjord, Utne, & Holmen, 2013; Roberts, 2002, 2010). Documented health concerns include accidents and injuries resulting from working in unpredictable weather conditions (Rezaee, Pelot, & Finnis, 2016), using heavy machinery on unstable platforms (Windle, Neis, Bornstein, Binkley, & Navarro, 2008), and fatigue relating to long working hours (Allen, Wellens, & Smith, 2010). Chronic physical problems have been associated with heavy labor and behaviors such as high alcohol consumption, smoking, and poor diet (Lawrie et al., 2003, 2004; Matheson et al., 2001). Emerging literature suggests that mental health problems such as anxiety and depression may also be prevalent among fishers (King et al., 2015).

Health is affected by economic, social, political, and behavioral circumstances (World Health Organisation, 2017). The impacts of ill health are exacerbated by the self-employed nature of most fishers (Matheson et al., 2001; Tomaszunas, 1992), who are often remunerated on a catch share basis (Symes & Phillipson, 2009), and may fall through the gaps of social security systems (Garrone Neto, Cordeiro, & Haddad, 2005). The unpredictable and high fixed costs of fishing, among other factors, mean that fishers tend to prioritise opportunities to fish over health (Emery, Hartmann, Green, Gardner, & Tisdell, 2014). Fishers are also less likely to seek help (MacCalman, Shafrir, Cowie, & Ritchie, 2011) and may downplay the importance of occupational health and safety (Petursdottir, Hannibalsson, & Turner, 2001). Exacerbating these challenges, fishing communities can be relatively isolated and disconnected from vital services (Prosenewicz & Lippi, 2012; Seeley & Allison, 2005). Nonetheless, fishing lifestyles can also confer health benefits, including the positive effects of dietary fish intake (Béné et al., 2016; Hagmar, Linden, & Nilsson, 1992), physical activity (Turunen, Suominen, Kiviranta, Verkasalo, & Pukkala, 2014), and high levels of job satisfaction (Pollnac & Poggie, 2008).

Poor health has important implications for the social integrity, economic viability, and environmental sustainability of fisheries. Most immediately, in physically demanding occupations such as fisheries, health is a key asset underpinning productivity. Health issues related to fishing also extend beyond individual fishers to the wider fishing industry, fishing families, and fishing communities (Pahlke, Lord, & Christiansen-Ruffman, 2001). Fishing businesses often incorporate family members; thus, the health of these families is important for maintaining viable fishing communities. Social relationships and support networks also contribute to improved mental health and play a significant role in coping with health issues (Kilpatrick, King, & Willis, 2014). Allison and Seeley (2004) demonstrate that beyond the recognized macro-economic costs of poor health, the reduced physical ability of fishers can result in unexpected shifts towards more easily accessed target species, with potential implications for marine ecosystems. Evidently, human health is instrumental in supporting the multiple purposes of sustainable fisheries, which include food production and income generation that, in turn, can support food security and provision of basic needs (Narayan, 2000).

Despite its importance, health has remained peripheral to fisheries research and has only recently been recognized alongside other social dimensions of fisheries management such as the importance of income and employment security, ensuring viable fishing businesses and maintaining strong local communities (Emery et al., 2014; King et al., 2015; Symes & Phillipson, 2009). Recognition of the multidimensional challenges of fisheries has led to an emergence of more holistic analytical tools, notably an interest in well-being as a lens through which the social and ecological aspects of fisheries dynamics can be interpreted (Belton, 2016; Britton, 2012; Coulthard, 2012; Weeratunge et al., 2014). The definitions of well-being and health are often intertwined, which can hamper the use of well-being as a unifying concept (de Chavez, Backett-Milburn, Parry, & Platt, 2005). On one hand, the health literature treats well-being as an integral part of good health, defined as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO, 1948: 1). On the other hand, well-being scholars consider health to be one of several domains, or components, of "living well" (Doyal & Gough, 1991; McGregor, Coulthard, & Camfield, 2015; Narayan, 2000).

An emerging approach to well-being in fisheries that helps reconcile these perspectives is the concept of social well-being (Coulthard, Johnson, & McGregor, 2011; Weeratunge et al., 2014). The approach advocates a holistic view of well-being, where human needs are met, where one can act meaningfully to pursue one's own goals and where one can enjoy a satisfactory quality of life (McGregor, 2008). It recognizes three interlinked dimensions of well-being that shape health differently across cultural and social contexts. First, health is shaped by the material conditions

surrounding a person—for example, their working environment and material resources. Second, health is influenced by relationships that enable people to achieve well-being, including relationships that provide social support. Third subjective perceptions such as satisfaction with quality of life and sense of self-worth influence individuals' health. In the case of fisheries, multidimensional well-being is evident in the strong sense of identity and attachment to fishing, which is seen not merely as an occupation but a way of life (Trimble & Johnson, 2013). Thus, we argue health lies at the intersection of the three dimensions of social well-being.

Although numerous links have been articulated between fishing communities and health, there has been limited synthesis of the research in this area, and the breadth of health topics identified in relation to fishers, their families, communities, and ancillary industries remains poorly understood. In other resource-dependent communities such as farmers, a growing body of research highlights concerns around physical and mental health (Fraser, 2005; Gerrard, 1998; Gregoire, 2002; Xiang, Stallones, & Keefe, 1999), yet health remains underexplored in the fisheries context. This presents a gap in the existing evidence base that could potentially inform fisheries policy and management and help support the viability of fishing communities. While the drivers of individual or community health are likely to be associated with a fishery's geographic or socioeconomic context, health is a universal determinant in maintaining a viable fishing business.

This study presents the findings of a scoping review to examine the breadth of research on health in fishing communities globally. In drawing together a disparate literature, the aims of this analysis are to: (a) identify the breadth of human health topics in fisheries that are present in the published literature; (b) establish the geographic focus of this research; and (c) ascertain the relative prevalence of study participants (e.g., fishers, fishing families) within fishing communities. The findings are discussed in the context of a social well-being approach to fisheries (Coulthard et al., 2011; Weeratunge et al., 2014), which we propose provides a suitable framework to understand health in fisheries more holistically; situate health in the wider social context of fishing communities; and better integrate an understanding of human health in more socially aware fisheries policy. The findings form a starting point for drawing health professionals' and fisheries decision-makers' attention to the importance of health in creating viable fishing communities and provide a platform from which future research in this nascent area can be directed.

2 | METHODS

The World Health Organization states that the health of individuals and communities is determined by a range of factors including their social, economic, and physical environment, and individuals' own traits and behaviors (World Health Organization, 2017). We sought to assess the breadth of health issues present in fishing communities, and the range of health determinants that have been specifically associated with fishing as a livelihood activity. A scoping review, which supports an iterative process of investigation, provided the most suitable method to capture the breadth and range of health topics present in fishing communities globally, without attempting to assess the quality of individual studies (Arksey & O'Malley, 2005). Although this process relies on a specific set of search terms, which might omit highly specialized literature, it is ideal to synthesize information on a topic that spans a number of disciplinary boundaries (medicine, environmental health, and marine social science to name a few).

2.1 | Scoping review

A dataset of research articles was compiled from all available databases in the commonly used ISI Web of Knowledge (ISI WoK), with no historical cutoff. We explicitly searched for studies focusing on health in all subgroups of a fishery including fishers, the fishing sector, fishing families, and the wider fishing community. The final search terms used were as follows: (((Health AND ("Fishing communit*" OR "fisher" OR "fishers" OR "fisherfolk" OR "fishermen" OR "fishing families" OR "fishing households") NOT (Martes) NOT (Fisher's NEAR/1 test)))). The Boolean operators pertaining to the North American mustelid *Martes pennanti* and Fisher's test were included to limit the number of irrelevant results. Articles were ordered by relevance under ISI WoK search criteria, which sorts results in descending order according to the number of search terms in the title, abstract, key words, or Keywords Plus® (Web of Science and Current Contents Connect only). A list of 6,654 articles was identified in the final search (conducted on 19th October 2015).

Starting from the top of the ordered list of articles, abstracts were initially screened to generate a manageable dataset for analysis that would reflect the breadth of health topics present in the literature. The health topics mentioned in each abstract were recorded sequentially. As we sought to capture health themes central to the topics addressed in the papers, data were collected based on reading of the abstract, which we assume reflects the key areas of research focus in the article. Where abstracts were unavailable, topics were identified from the full text. Where no new health issues were presented in the abstracts of the ordered list, the dataset was considered complete in reflecting the breadth of research topics on human health in fisheries (following Levy & Ellis, 2006: 192). A cutoff point was determined at 195 records into the ordered list (Supporting information 1).

The 195 abstracts were screened against specific criteria for inclusion in subsequent analysis. An article was retained in the dataset if it met the following criteria: (a) It was published in an academic journal (thus excluding technical papers, book series, and conference proceedings), and (b) the abstract outlined research that explicitly linked health topics to fishers, the fishing sector, fishing families, or fishing communities. Rejection or retention of abstracts in accordance with the above criteria was decided by the lead author and cross-checked among coauthors in any case of uncertainty. Abstracts that did not meet these criteria were removed from the sample. Of the 195 articles initially identified, 140 were retained for further analysis (for full list, see Supporting information 2). The data supporting this publication can be publically accessed in the Open

Research Exeter repository (https://ore.exeter.ac.uk/repository) via the following persistent identifier: DOI: 10.24378/exe.423. The research materials are available under a CC BY 4.0 licence.

2.2 | Categorization of health topics

An iterative process of coding and categorization of health topics was completed collaboratively by the authors. The International Statistical Classification of Diseases and Related Health Problems (ICD-10; World Health Organization, 2016) was used as a template for classification, with the highest levels of categories from ICD-10 used to group health topics that were presented in relation to fisheries. The ICD-10 categories were renamed here to increase accessibility to a wider audience (for original names, see Supporting information 3). These were further grouped into six broad health topics, including "Physical health," "Mental health," and four categories that reflect health determinants explicitly linked to working or living in a fishing community. These comprised: "Accidents and injuries," "Occupational factors," "Lifestyle factors," and "Context of individual and community health" (Table 1). Although accidents and injuries may be considered an occupational hazard in fishing, they were categorized separately in accordance with the ICD-10 classification system. These broad categories reflect the World Health Organization definition of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1946), and the acknowledgement that this state can be affected by internal or external determinants of health (World Health Organization, 2017).

2.3 | Contextual information

Where available, the focal study subjects of the abstracts were recorded under four categories: fishers; the fishing sector (including fishers, fish traders, and other fishing-related workers); fishing families; and whole fishing communities. Geographic data on study site location, where available, were classified by region according to the United Nations country classification system (United Nations, 2013).

Contextual data including publication date, study type (empirical or review article), and journal name were also recorded. The latter were grouped into categories according to the subject area they covered: "Environmental science" and a subgroup of environmental science specializing in marine science and fisheries; "Health" and subgroups including environmental and maritime health; "Social science" and a subgroup on social and environmental science; and finally, a broad "Science" category covering the remaining science and medicine topics.

3 | RESULTS

Of the 140 abstracts in the final dataset, 135 were empirical studies and five were reviews. The reviews were all published in the last two decades and either focused on a specific health area (e.g., HIV; Seeley & Allison, 2005) or fishers in a specific sector (e.g., the offshore catch sector; Matheson et al., 2001). No reviews were detected that examined the health of fishers, their families and communities on a global scale. Seventy-nine percent of the sampled research related specifically to fishers, with only 9%, 7%, and 5% concerned with fishing families, the fishing community, and the fishing sector, respectively.

Across the six health topics identified (Table 1), 68% of the abstracts mentioned physical health in relation to fisheries. This was followed by references to lifestyle factors (44%), occupational factors (43%), the context of individual and community health (34%), and accidents and injuries (18%). Mental health was mentioned in only 7% of the dataset (Figure 1).

Within these health topics, research effort was spread unevenly across health subtopics (Table 2). Of the references to physical health, 19% referred to infectious and parasitic diseases in the fishery. A large number of those focusing on infectious diseases related to HIV/AIDs (Entz, Prachuabmoh, Griensven, Soskolne, & Gan, 2001) and sexually transmitted diseases (STDs) more generally, while parasitic diseases commonly included malaria (Escovar, González, & Quiñones, 2013) and schistosomiasis (Chimbari, Dhlomo, Mwadiwa, & Mubila, 2003). General physical health (14%) brought together studies on generic chronic disease (Grimsmo-Powney et al., 2009) and a small number of studies on very specific issues which were not categorized elsewhere (e.g., changes in chromosomal structure; Rodríguez-Trigo et al., 2010).

Of the lifestyle factors, just over a third (39%) related to diet and eating habits. This was largely influenced by research into the potential for dietary heavy metal contamination (Kosatsky, Przybysz, Shatenstein, Weber, & Armstrong, 1999) but also included topics such as obesity (Poulsen, Burr, Hansen, & Jepsen, 2014). Approximately another third discussed high-risk behaviors such as alcohol use (16%), high-risk sexual behaviors (15%), tobacco use (14%), and drug use (7%). Remaining research in this group (5%) brought together articles that investigated unhealthy lifestyles as a whole (Percin, Akyol, Davas, & Saygi, 2012) and specific one-off factors (e.g., the migration of a whole fishing community; Nugroho, Fujimura, & Inaoka, 2012; Table 2).

Forty percent of research into occupational risk factors in the sampled literature investigated exposure to contaminants, which was associated with the aforementioned concern over dietary exposure to heavy metal contaminants, as well as other sources, for example, fuel exhaust (Moitra, Maity, Haldar, Pandit, & Sahu, 2015). This was followed by research into the impacts of work and sleep patterns (13%) and exposure to climatic conditions (11%). Less commonly mentioned subtopics included exposure to parasites (10%), noise (9%), and risk of assault (6%). Other general, for example, "work-related illnesses" (Pena & Gomez, 2014), and specific occupational factors not included elsewhere (e.g., ships' movement; Breidahl, Christensen, Jepsen, Johansen, & Omland, 2013) made up 11% of this topic (Table 2).

The majority of research into the social and policy context that may have an impact on the health of individuals and communities investigated had two key themes: (a) the knowledge and attitudes

TABLE 1 Definition of health topics and subtopics identified in fisheries

Health topic	Definition	Health subtopic
Physical health	Condition of, functioning of, disease and/or disorder relating to the physical health of the individual and/or group in the fishery	Cancer
		Cardiovascular health
		Dermatological health
		Digestive system health
		Ear health
		Endocrine, nutritional and metabolic health
		Eye health
		Genitourinary system health
		Infectious and parasitic diseases
		Musculoskeletal system health
		Nervous system health
		Respiratory system health
		General and specific physical health issues not categorised elsewhere
Mental health	Condition of, functioning of, disease and/or disorder relating to the mental health of the individual and/or group in the fishery	NA
Accidents and injuries	Relating to the physical trauma and secondary conditions caused by an accident and/or injury.	NA
Lifestyle factors	Lifestyle traits that are associated with the fishery and that are identified as being relevant or as having an impact on the health of individuals or groups.	Alcohol use
		Diet and eating habits
		Drug use
		High-risk sexual behaviour
		Personal hygiene
		Physical exercise
		Self-inflicted harm
		Tobacco use
		General and specific lifestyle traits not categorised elsewhere
Occupational factors	Occupational traits that are associated with the fishery and that are identified as relevant or as having an impact on the health of individuals or groups.	Exposure to climatic conditions
		Exposure to contaminants
		Exposure to noise
		Exposure to parasites
		Risk of assault
		Work and sleep patterns
		General occupational factors and specific factors not categorised elsewhere
Context of individual and community health	External factors that contribute directly to the health of individuals and groups in the fishery	Access to healthcare and policies around health
		Health and safety practices
		Knowledge of and attitude towards health

Notes. Health topics broadly reflect the World Health Organization (WHO) definition of health and its determinants (The Constitution of WHO, 1946: 1, WHO 2017). Health subtopics were based on the classification in the International Statistical Classification of Diseases and Related Health Problems (ICD-10 Version: 2016; See Supporting information 3)

of individuals and/or groups in fishing communities towards health (46%), and (b) the accessibility of healthcare and policies relevant to health (44%). Policy in this context included health and safety policies such as vessel safety policy (Lincoln & Conway, 1999), but also a wider range of policies that may influence health and safety at sea, such as changes in fisheries policy (Emery et al., 2014). The

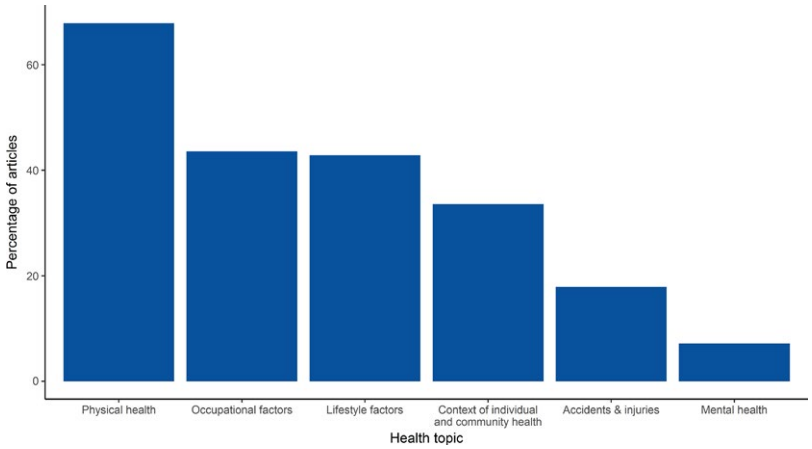

FIGURE 1 Frequency with which health topics occurred in the dataset of articles (n = 140). Many of the articles mentioned >1 topic; therefore, the total of all categories exceeds 100% [Colour figure can be viewed at wileyonlinelibrary.com]

remaining articles under this health topic (11%) explored health and safety practices, for example, the use and availability of individual protective equipment (Prosenewicz & Lippi, 2012) (Table 2).

Accidents and injuries, which were mentioned in 25 of the abstracts analyzed, included examples of injuries from handling marine organisms (Gweta, Spanier, & Bentur, 2008), drowning (Prosenewicz & Lippi, 2012), and the risk of decompression associated with fishers who dive (Lee et al., 1994). References to mental health were made in 10 of the abstracts and included specifically depression (Zeigelboim et al., 2014, 2015) and stress (Smith, Jacob, Jepson, & Israel, 2003), as well as mental health as a whole (King et al., 2015; Table 2).

The majority of articles addressed one (29%) or two (40%) health topics. These abstracts typically focused on physical health singularly, or in conjunction with occupational or lifestyle factors. A further 23% and 7% of abstracts encompassed three and four health topics, respectively. None of the abstracts highlighted all six areas of health, and only two looked at five health topics; these were in the context of assessing the drivers and overall health of fishers within a particular geographic area (Frantzeskou, Kastania, Riza, Jensen, & Linos, 2012) or policy context (Pena, Martins, & Rego, 2013).

Over half of the articles in the dataset (60%) were published in the past decade at the time of the search. The oldest abstract in the dataset dated from 1962. Between then and 1980, physical health and occupational factors were the only health topics represented. Articles from the 1980s onwards contained a wider range of topics, with the addition of lifestyle factors, mental health, and the context of individual and group health. From the 1990s onwards, all six health topics were represented in the reviewed abstracts, and the proportional representation of topics within the sample was relatively consistent over time (Figure 2).

The dataset drew on a wide range of journals (94 in total), which were grouped by broad journal types. Eighty-three percent of the articles were published in general health journals, 12% of which were from journals specializing in human health in the environment. A further 15% were published in journals specializing in environmental or marine environmental science, with the remaining 3% split equally between general sciences, social science, and environmental social science journals.

Of the articles that specified their geographic focus (n = 125), one study compared across countries (Dawson, Sheeshka, Cole, Kraft, & Waugh, 2008: United States of America and Canada) and three were comparative across UNEP regions (Naruse, Kagamimori, Watanabe, Minowa, & Iibuchi, 1985; Percin et al., 2012: Asia and Europe; Smolak, 2014: Africa and Asia). In total, 129 study locations were identified in the abstracts, a third (33%) of which were in Europe, followed by Asia (28%), Latin America and the Caribbean (12%), North America (12%), Africa (12%), and Oceania (3%). Not all the topics were represented in all regions, for example, mental health and accidents and injuries were not discussed in an African context in this dataset (Figure 3).

4 | DISCUSSION

This scoping review provides for the first time a clear overview of the extent and breadth of research on health in fishing communities globally. The lack of synthesis of this literature to date is emphasized by the lack of review articles identified in the literature search, yet the number and breadth of studies have steadily expanded over time. Much of the research was found in the health literature and may therefore be less visible to fisheries research audiences. Importantly, the results indicate that in this sample, not all of the health topics or subgroups of fishing communities are equally present, and that research on health in fisheries may be distributed unevenly across geographic areas. The majority of health issues identified related to physical health and were typically discussed in conjunction with the lifestyle and occupational drivers of health outcomes. Although physical and mental health outcomes are inextricably linked, the following sections draw attention to the gap in mental health research

TABLE 2 Frequencies of health topics and subtopics in the dataset (n = 140, note some abstracts referred to multiple health topics and/or subtopics)

Health topic and subtopics	Total references made to topic and subtopic, and percentage contribution of subtopics to each health topic
Physical health	166
Infectious and parasitic diseases	31 (19%)
General and specific physical health issues not categorised elsewhere	23 (14%)
Cardiovascular health	22 (13%)
Cancer	16 (10%)
Respiratory system health	15 (9%)
Musculoskeletal system health	15 (9%)
Ear health	11 (7%)
Digestive system health	9 (5%)
Dermatological health	8 (5%)
Eye health	6 (4%)
Genitourinary system health	4 (2%)
Nervous system health	4 (2%)
Endocrine, nutritional and metabolic health	2 (1%)
Lifestyle factors	88
Diet and eating habits	34 (39%)
Alcohol use	14 (16%)
High-risk sexual behaviours	13 (15%)
Tobacco use	12 (14%)
Drug use	6 (7%)
General and specific lifestyle traits not categorised elsewhere	4 (5%)
Physical exercise	2 (2%)
Personal hygiene	2 (2%)
Self-inflicted harm	1 (1%)
Occupational factors	70
Exposure to contaminants	28 (40%)
Work and sleep patterns	9 (13%)
Exposure to climatic conditions	8 (11%)
General occupational factors and specific occupational factors not categorised elsewhere	8 (11%)
Exposure to parasites	7 (10%)
Exposure to noise	6 (9%)
Risk of assault	4 (6%)
Context of individual and community health	57
Knowledge and attitude towards health	26 (46%)
Access to healthcare and policies around health	25 (44%)
Health and safety practices	6 (11%)
Accidents and injuries	25
Mental health	10

by discussing physical and mental health outcomes separately, in relation to the four categories of health determinants. We then discuss some of the patterns in health topics investigated and conclude by discussing the merits of a social well-being approach as a conceptual framing for advancing further exploration of human health in fisheries.

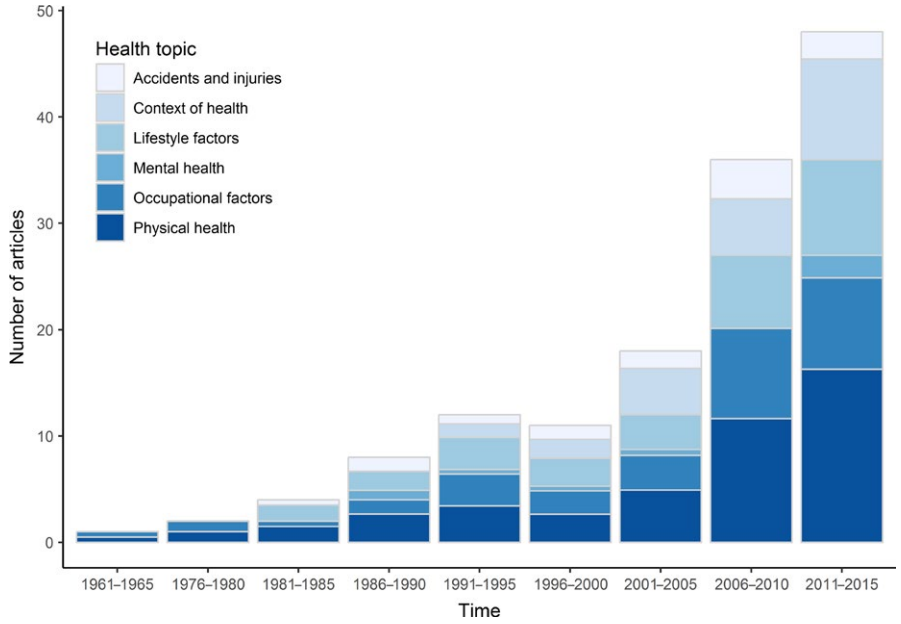

FIGURE 2 Health topics recorded in article abstracts (n = 140) by publication date. Bar height shows number of articles per 5-year interval. Shading represents health topics as a proportion of all topics mentioned in each time period (some articles mention >1 topic) [Colour figure can be viewed at wileyonlinelibrary.com]

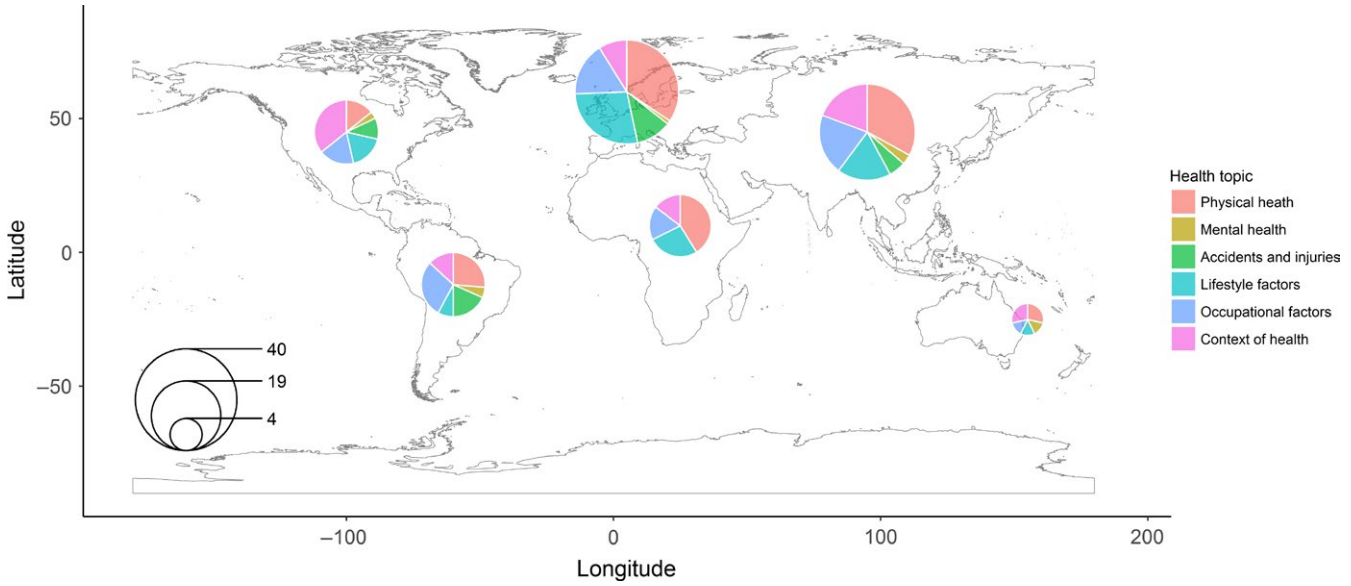

FIGURE 3 Frequency of health topics by geographic area, showing North America, Latin America and the Caribbean, Europe, Africa, Asia and Oceania. Circle size reflects the number of studies focusing on each area. Pie charts show each health topic as a proportion of all health topics mentioned (some studies mentioned >1 topic) [Colour figure can be viewed at wileyonlinelibrary.com]

4.1 | Physical health

Physical health issues are prominent in the reviewed literature and highlight physical health as a critical asset to fishers. Studies addressing physical health included issues affecting specific body systems including the cardiovascular, musculoskeletal, and the respiratory systems. Studies also addressed particular issues of disease, most commonly infectious and parasitic diseases, and cancer. Furthermore, the articles included in the analysis highlight an array of interactions between health determinants and conditions. For example, strains, sprains, joint pain, and wider musculoskeletal conditions are common in studies of fishers' health (Kucera et al., 2009; Lipscomb et al., 2004). In Finland, high levels of physical activity at work were commonly associated with these musculoskeletal problems, but were also identified as a likely explanation for lower than average incidences of colon cancer

in fishers (Turunen et al., 2014). In contrast, in Greece, physical activity at work was associated with low levels of cardiovascular exercise outside of work. When combined with behavioral health risk factors such as poor diet, smoking, and alcohol consumption, and occupational risk factors such as a constricted working environment, hazardous, and stressful working conditions, this led to other physical health problems including cardiovascular, respiratory, and dermatological conditions (Frantzeskou et al., 2012).

While studies in our dataset typically investigated the health risks associated with fishing, fishing is also associated with several health benefits. This is exemplified in the literature on the dietary benefits for fishing families of eating fish (Béné et al., 2016). These examples indicate that while the act of fishing is physically demanding and dangerous (McGuinness et al., 2013; Roberts, 2010), a complex range of social, contextual, and lifestyle-related factors interact with fishing practices to confer both risks and benefits for fishers' long-term physical health and persistence in a fishery.

4.2 | Mental health

A notable finding from the reviewed literature is the lack of attention to mental health issues in fisheries. Where this was addressed, references were made to overall mental health (Sugisawa, 1994) and specifically depression, anxiety (Zeigelboim et al., 2014), and stress (Smith et al., 2003). In fishing communities, mental health and the ability to cope have been viewed from the perspective of events such as unexpected fishing access restrictions (Smith et al., 2003) and large scale environmental destruction (Cherry et al., 2017), with the ramifications for fishing families lasting well beyond the event itself.

Emerging literature suggests that fishers are susceptible to a range of mental health issues, linked to the fundamental characteristics of fishing as a resource-dependent occupation, but also to uncertainties beyond the daily fishing operation (King et al., 2015). Fishing communities share some similarities with farming communities, where high levels of mental health problems have been identified (Hounsome, Edwards, Hounsome, & Edwards-Jones, 2012; Kolstrup et al., 2013). Similarities between these resource-dependent communities include high levels of self-employment and income uncertainty (Matheson et al., 2001; Moore, 1969); living in locations that are remote from services (Heenan, 2006; Lungu & Hüsken, 2010;); and being male-dominated industries where hegemonic masculinity norms may reduce the likelihood of acknowledging mental health concerns and help-seeking behavior (Addis & Mahalik, 2003; Roy, Tremblay, Oliffe, Jbilou, & Robertson, 2013). Importantly however, Westaway, Seeley, and Allison (2007) and Roy, Tremblay, and Robertson (2014) warn against stereotyping health-related behaviors in both sectors.

In Australia, King et al. (2015) find that in comparison with farmers, fishers are exposed to "modern uncertainties" unique to fishing that may be linked to mental health problems such as depression, anxiety, self-harm, and suicide. In recent years, in Australia, inshore fishers have faced increasing resource tenure insecurity, and greater risk and uncertainty associated with top-down and unforeseen changes to licensing and policy.

The available literature on mental health in fishing communities is predominantly in a developed country context where mental health and noncommunicable diseases are now more central to public health agendas, and often viewed as "diseases of the rich" (Boutayeb & Boutayeb, 2005). In comparison, mental health is an area of emerging focus in the developing world (Minas, Tsutsumi, Izutsu, Goetzke, & Thornicroft, 2015). Given that fishing is increasingly subject to uncertainty and change outside of the "traditional uncertainties" of fishing, it is likely that the association between the job of fishing and the risk of mental health problems may be more widespread than the current literature suggests.

4.3 | Geographic spread of research

Many of the challenges faced by fishing communities that can impact on health, such as a physical and dangerous working environment, the lifestyle of fishers, access to natural resources and provisioning of services, are shared across geographic contexts. However, this analysis highlighted that research on health issues in fisheries is unevenly distributed geographically. This may be the result of differing research interests, funding priorities, or data availability. For example, the absence of research on accidents and injuries from the sample of studies in Africa and Oceania may reflect poor monitoring of accidents rather than the absence of this health risk (Danielsson, Kuyateh, Ravikumar, Westerberg, & Yadava, 2010).

Geographic differences may also reflect the dominant health challenges in different regions. Across high-income countries, key risk factors to health are those related to chronic diseases such as heart disease and cancer and include alcohol and tobacco usage, obesity, and high blood pressure (World Health Organization, 2009). This is reflected in our findings by studies highlighting excessive weight and poor diet in European fisheries (Poulsen et al., 2014). In contrast, the greatest health risks in low-income countries are those that exacerbate the incidence or severity of infectious diseases (World Health Organization, 2009). In Africa, research on HIV and AIDS has been extensive over the last two decades (Allison & Seeley, 2004; Smolak, 2014). This work has highlighted ways in which fishing communities may experience heightened vulnerability to a prevailing local health concern, such as through alcohol consumption (Asiki et al., 2011), high-risk sexual activities (Kwena et al., 2010), a lack of access to adequate support (Ngwenya & Mosepele, 2007), and high population mobility (Hüsken & Heck, 2012). As global patterns in health change, it is important that healthcare provision and research on fishing communities adapt accordingly (Boutayeb & Boutayeb, 2005; de Cock, Simone, Davison, & Slutsker, 2013; World Health Organization, 2009).

Our analysis indicates few examples of comparative work across geographic regions (Naruse et al., 1985), despite opportunities to better understand and improve the health of fishing communities through looking at fisheries that share similar characteristics (Frantzeskou et al., 2012). Learning opportunities include improving the uptake of on-board health and safety practices (Carruth et al., 2010), the provision of onshore healthcare (Langfeldt & Grotta,

1995), and the effectiveness of national-level policy initiatives (Lincoln & Conway, 1999).

While it was beyond the scope of this study to explore these geographic differences more fully, fishing communities around the world are subject to different demographic changes such as ageing populations or regional changes in prevalent health concerns, including the double burden of chronic and infectious diseases in middle-income countries (World Health Organization, 2009). In future research, it will be important to consider the wider social, demographic, and economic context in which fisheries are evolving and how this context informs health concerns.

4.4 | Study subjects

Although our findings indicate that fishers have been the primary focus of research, fishing families and communities are not isolated from the health benefits and risks associated with fishing lifestyles (Frantzeskou et al., 2012). While fishing families, communities and ancillary workers are not exposed to the direct physical impacts of fishing, they are exposed to wider risk factors linked to the environment in which fishing communities are located. This might include being part of a highly mobile population (e.g., fish traders; Hüsken & Heck, 2012), being more isolated from healthcare facilities (Seeley & Allison, 2005), or exposed to the risks and benefits associated with seafood rich diets (Mikoczy & Rylander, 2009; Wallin, Rylander, & Hagmar, 2004).

The emotional burdens associated with fishing also extend to fishing communities, such as the impacts of injury or death at sea for people onshore, or the effects of mental health issues of fishers and their families in communities (King et al., 2015; Smith et al., 2003). Furthermore, there may be differential responses within communities. Depression and stress indicators suggest that women may disproportionately suffer from the burden of family stress (Shaw, Stocker, & Noble, 2015), and men and women may express mental health problems and symptoms differently. In both farming and fishing contexts, women have been shown to be more likely to display symptoms of depression, while men can express elevated stress through uncontrollable anger and increased suicide rates (Roy et al., 2013; Smith et al., 2003).

Acknowledging that fishers are uniquely exposed to specific health risks, the findings suggest that future research could broaden in scope to consider the health effects of fishing livelihoods and lifestyles on families and communities. Disregarding the health and resilience of fishing communities as a whole risks posing further challenges in achieving sustainable fisheries management (Jentoft, 2000).

4.5 | A social well-being approach to health in fisheries

This analysis highlights that the health of fishing communities is a multifaceted, complex component of fisheries. A social well-being approach (Coulthard, 2012; Weeratunge et al., 2014) is multidimensional and captures material, relational, and subjective elements of well-being (White, 2010). As such, it situates health in the broader dynamics of fishing communities by recognizing that "being well" can be both subjective and informed by the context in which individuals live and work. By placing health at the intersection of the different domains of social well-being, we suggest three key areas in which a social well-being framework can advance our understanding of health in fisheries.

First, incorporating subjective dimensions of well-being could help broaden an understanding of health beyond material health determinants. Material determinants are important as demonstrated in this analysis but may not fully account for some of the more intangible drivers of health, such as the effect of "modern uncertainties" of contemporary fisheries management on mental health (King et al., 2015). Or how regulatory, environmental, social and economic changes may be experienced differently across gender lines (Shaw et al., 2015), or in relation to past experiences of traumatic events (Cherry et al., 2017). By encompassing subjective perspectives, a social well-being approach can help elucidate how health determinants affect health outcomes within a dynamic context and better reflect the heterogeneity within fishing communities. Understanding this diversity is essential to foster a greater understanding of the social sustainability of fisheries (Shaw, Johnson, & Dressler, 2011). Subjective perspectives on health could be integrated into approaches that already rely on self-reporting of health conditions (e.g., Percin et al., 2012) but further work explicitly applying a social well-being framework may help to capture the breadth of subjective experiences both within and across contexts.

Second, social well-being emphasizes the importance of relationships with others. Given that health is embedded in a specific context and is socially and culturally constructed, the definition of what it means to be healthy will in part be drawn from these wider relationships. For example, perceptions of health and associated attitudes and behaviors can be influenced by social norms, such as masculinity norms (Mahalik, Burns, & Syzdek, 2007; O'Brien, Hunt, & Hart, 2005). Social relationships can also help or hinder the achievement of desired health outcomes. Kilpatrick et al. (2014) highlight the importance of family relationships and specific individuals, often women, within the fishing community who bridge between the industry, the community and health services. Operationalizing a social well-being perspective broadens the scope of investigation into health within fisheries. By recognizing the role of relationships in maintaining viable fishing communities, it encourages a wider investigation of health to encompass that of the community and draws attention to the relationships at sea and ashore that shape health outcomes. Furthermore, it can help refine health interventions to be more targeted to specific cultural and social contexts.

Third, the social well-being approach conceptualizes well-being as an outcome and a process—something that individuals pursue (Coulthard, 2012). It can therefore help develop an understanding of the decisions fishers make when adapting to change, and how these decisions influence health outcomes. For example, the introduction of individual transferable quotas in the Tasmanian rock lobster fishery led to differences in exposure to health risks among quota lease holders and quota owners. Quota lease holders' aversion to the physical risks

of fishing (swell) was offset by increases in expected revenue, likely influenced by lease holders operating at a diminished daily profit margin compared with quota owning fishers (Emery et al., 2014). Similarly, in a sea cucumber fishery in Mexico, rapid growth in demand triggered by global markets resulted in severe health consequences for fishers who were diving deeper and longer to remain competitive in a context of rapid social–ecological change (Kaplan-Hallam, Bennett, & Satterfield, 2017). A research agenda informed by a social well-being approach can help to elucidate the aspects of well-being that fishers prioritize, and under what circumstances health may be traded off against other dimensions of well-being such as income.

4.6 | Conclusions and implications

This analysis sought to identify the breadth of human health issues and determinants relevant to fisheries globally. In doing so, the findings highlight the complex range of health challenges associated with fishing communities. This includes a diversity of lifestyle, occupational, and policy-related factors that contribute to different physical and mental health outcomes, although the latter are less well-represented in the literature. Furthermore, potential biases were revealed with regards to where different health issues were investigated, and whose health was considered.

Although fisheries managers increasingly consider the social sustainability of fisheries, the high proportion of articles identified in health-focused journal publications arguably limits the visibility of health as an issue of concern for fisheries policy. This is important because evidence suggests that management interventions may have unintended consequences for both the physical health of fishers at sea (Emery et al., 2014), and the mental health of fishers and their families on land (King et al., 2015; Smith et al., 2003). Future work could aim to bridge this gap between disciplines to enhance scope for trans-disciplinary collaboration that seeks to address these challenges. Such initiatives are emerging from within the third sector, for example, the "Having a tough time?" campaign is a collaborative effort between fishers' welfare groups and mental health charities in the UK (Seafarers Hospital Society, 2018). Supporting the health of fishing communities could help underpin productivity (Allison & Seeley, 2004) and reduce fishers' vulnerability to future changes and shocks (Kilpatrick, Willis, Johns, & Peek, 2012).

Applying a social well-being framework to health in fishing communities can help address the gaps highlighted in this analysis. Notably, a well-being lens broadens the understanding of health to encompass subjective and relational components and helps to elucidate the trade-offs made between health and other aspects of well-being. As the social well-being approach gains traction in fisheries research (Voyer et al., 2017; Weeratunge et al., 2014), incorporating health into a social well-being approach to fisheries could enable a multidimensional assessment of the impacts of change. Considering health in connection with other social impacts may capture how change affects quality of life within fishing communities (Coulthard, 2012). This holistic view may enable the integration of human health into more socially aware fisheries policy, which can better predict and mitigate the likelihood of potentially undesirable health outcomes, thus helping to ensure long-term sustainability of fisheries and the communities that depend on them.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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