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Survival at a cost: how artisanal fishers perceive occupational hazards in the Okavango Delta, Botswana

Oluwatoyin Dare Kolawole^{a,b} and Kabo Bolobilwe^c

^aOkavango Research Institute, University of Botswana, Gaborone, Botswana; ^bCollege of Health and Social Sciences, Eastern University, St. Davids, USA; ^cSurgical Ward Department, Deborah Retief Memorial Hospital, Mochudi, Botswana

ABSTRACT

Fishing is regarded as an important livelihood activity in any riparian communities. People's attitudes and perceptions of occupational risks associated with fishing are engendered by certain socio-cultural norms. This study, therefore, analyses some factors, which influence artisanal fishers' perceptions of occupational hazards in the Okavango Delta, Botswana. A case study design was used to sample opinions from 48 fishers in Shakawe community. Semi-structured interview schedules and focus group discussions (FGDs) were used to collect the data. Descriptive statistics and Pearson's Chi square (X^2) were used to summarize the data and test the associations between fishers' perceptions of occupational hazards and nominal variables, respectively. Findings show that the commonest injuries associated with fishing activities included fish bone pricks (36.3%), body injury and traumas due to accidental fall into the river (20.5%), which could lead to dangerous animal attacks, and snake or fish bite (4.3%). The commonest accident identified was boat capsize, which most fishers (61.4%) linked with non-adherence to cultural taboos or lack of experience. Attesting to their low level of risk-aversion or perhaps high desperations arising from socio-economic demands, most respondents (97.7%) strongly agreed that a fisher must be willing to risk their lives for their families (56.8%), even though fishing is a hazardous occupation (65.5%). A strong association existed between fishers' perceptions about occupational hazards and their marital status, years of fishing experience, income, number of dependants, access to fishing information and risk acceptance.

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Introduction

Although the fishing industry continues to witness modernization and the use of advanced technologies, it remains one of the most hazardous industries in the world. Based on the FAO/Government Cooperative Programme (2010) Report, the International Labour Organization (ILO) estimated global fatalities at 24,000 deaths in 1999. This is a conservative estimate as data are only available for some countries. The fatality rates are much higher than the national averages of all occupational fatalities even in highly industrialized countries

CONTACT Oluwatoyin Dare Kolawole  tkolawole@ub.ac.bw  Okavango Research Institute, University of Botswana, Gaborone, Botswana

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(Windle, Neis, Bornstein, Binkley, & Navarro, 2008). In the USA, fishing has consistently been ranked the most dangerous occupation with fatality rates for commercial fishers reaching 30 times as high as the overall occupational fatality rate (Levin et al., 2010). Literature does not have sufficient data especially for comparative purposes (Windle et al., 2008). The occupational health and safety of fishers is poorly enumerated, making it difficult to ascertain the exact figures of casualties (Brooks 2005). However, Brooks (2005) opines that the fishing industry has become substantially safer in the last few decades as the available accident data suggests that fishing does not have the same levels of occupational fatality rate generally attributed to it.

Research in Asia, West Africa and South Africa show that fishing fatality rates are high (FAO 2010; Windle et al., 2008), although the fatalities were reported to have reduced in South Africa after the implementation of national policies that were designed to improve occupational health and safety. In Botswana, the Okavango Delta system provides perennial water sources, which support livelihood activities such as farming, fishing and gathering of other veld products. Although fishing does not have a significant impact on the overall economy of Botswana as a whole, it has local importance in the North-West District because 65% of the population in the area directly depends on fish as either part of their diet or a source of income (Mosepele & Ngwenya, 2010). Artisanal fishing, which is a commonplace in riparian communities, particularly in the Okavango Delta, Botswana, is, therefore, considered as a 'natural safety net' for the rural, fishing households (Mosepele & Kolawole, 2017; Ngwenya & Mosepele, 2007). At a global scale, the majority of the studies conducted on industrial-scale fishing, although with a few on small-scale fishing, show that fishers tend to deny and trivialize occupational hazards (Davis, 2012; Eklöf & Törner 2002). However, McDonald and Kucera's (2007) study concludes that the independent commercial fishers' approach is in contrast with the reported approach of the industrial scale fishers. This has been attributed to the fact that their working conditions are not the same; they work in smaller groups, are not formally organized and their work environments change seasonally based on what they fish. Different researchers disagree over whether fishers as a whole tend to be risk-loving or risk averse (Davis, 2012; Smith & Wilen, 2005). Given that many factors interplay in the fishing industry, fishers are continuously faced with the challenges of decision-making where the financial gain or loss is highly uncertain.

Previous studies of fishers' attitudes towards occupational hazards suggest that various social and cultural norms have impact on what is perceived as dangerous or risky (McDonald & Kucera, 2007). It is thus critical to know the beliefs and practices of a group before developing any interventions targeted towards occupational risk challenges. Factors that influence fishers' perceptions of the hazards associated with fishing, therefore, need to be investigated in order to ensure successful implementation of occupational health and safety programmes, which are meant to mitigate fishing hazards. Fishing is regarded as an important activity in the fishing communities of the Okavango Delta. While fishing is a major source of income for the riparian communities, people have also developed emotional as well as utilitarian ties with their environment through fishing activities; fishing contributes to social cohesion among the people (Mosepele & Ngwenya, 2010). There are currently no studies conducted on fishers' occupational hazards and their perceptions as well as what shapes those perceptions in relation to the subject in the Okavango Delta. This article, therefore, answers the questions on how artisanal fishers' demographics, psychosocial and

cultural attributes influence their perceptions of occupational hazards in fishing activities in the Okavango Delta, Botswana.

Theoretical underpinning

People use their social and moral values to evaluate situations that are poorly defined. From Po, Kaercher, and Nancarrow (2003) perspective, people do not use the same underlying frames of reference when making judgements of risky situations and might use different judgement strategies to determine the acceptability of risky decisions. A number of theories of risk perception have been developed in order to explain who fears what and why. Wildavsky and Dake (1990) refer to this as the notion of risk perception. In the present context, two relevant theories, which relate to fishers' perceptions of occupational hazards, include cultural perception, and risk and benefit perception. The cultural perception theory was first developed by Douglas and Wildavsky (1982) who opine that risk perception and concern about environmental or social issues are socially and culturally framed. This means that the values and worldviews of certain social or cultural contexts shape the individual's perceptions and evaluation of risks. Individuals are embedded in a social structure and context, which eventually shape their values, attitudes and worldviews (Douglas & Wildavsky, 1982; Kolawole, 2014). Therefore, the most important predictors for selecting what people fear or do not fear are socially shared worldviews, which are the so-called cultural biases that determine the individual's perceptions (Wildavsky & Dake, 1990). This result can be interpreted as an indication of the relevance of socialized cognitive schemata that work like a filter in evaluating information. In this sense, values frame the interpretation of information. Cultural theory proposes that individuals choose what they fear in relation to their way of life; that is, in relation to the 'culture' to which they belong (Rippl, 2002). This may imply that sources of fear and subsequent risk perceptions are pre-determined and embedded within the social system. Nonetheless, scholars like Oltedal, Moen, Klempe, and Rundmo (2004) and Sjöberg (2000) have offered some critiques of the cultural theory on different grounds. For Oltedal et al. (2004), cultural adherence is insignificant in the debate on how people perceive and understand risks other than through more or less coincidental connections; they suggest that theory is not a good predictor of risk perception. From Sjöberg's (2000) own perspective, a theory becomes an ineffective predictor because it may not have been adequately tested within the right conditions.

The risk and benefit perception theory, on the other hand, postulates that there is an inverse relationship between perceived risk and perceived benefit of an activity or technology (Frewer, Howard, & Shepherd, 1998). When people perceive that there are many benefits associated with an activity, they tend to associate the activity with little or no risks or vice versa. Frewer et al. (1998) then assert that technologies viewed as beneficial were associated with little risks than those not viewed as such.

Siegrist and Cvetkovich (2000) offered different explanations for the inverse relationship between perceived risk and perceived benefit of any activity. First, they argue on the need for consistency in beliefs and the tendency to avoid cognitive dissonance. For technologies (or activity) perceived as good, there is pressure to underestimate the risks and elevate benefits. If they are viewed as bad, the benefits

are devalued and risks elevated. Second, they explain that social trust simultaneously influences both perceived risks and perceived benefits. For most technologies, the associated risks and benefits are not directly visible; people, therefore, rely on risk-benefit information provided by the sources they trust. On the basis of this inverse relationship, Frewer et al. (1998) argue that it may be possible to change how people perceive risks associated with an activity by changing their perceptions of the benefits, which the activity offers. For instance, fishers will perceive a fishing activity as worthwhile when they perceive that the benefits far outweigh the risks associated with the activity.

Methodology

Research design

The study adopts a cross-sectional, case study design and a mixed methods approach to sample opinions from artisanal fishers in the Okavango Delta, Botswana. While interview survey was conducted using open and close-ended interview schedules to collect quantitative data, a focus group discussion (FGD) was used to collect qualitative data from the respondents.

Study area and population

The Okavango Delta is located in the North West District of Botswana. It derives its annual flood pulse from the Cuito and Cubango Rivers that flow from the central upland plains of Angola (Kolawole, 2014). The wetland attained a status of international significance when it was declared a Ramsar site in 1997 and was subsequently inscribed as the 1000th UNESCO World Heritage Site in 2014. It sustains rich wildlife and aquatic resources and is a habitat for diverse species of plants. The wetland provides perennial water sources, supporting different livelihood activities such as farming, fishing, hunting and gathering of veld products, international tourism and wildlife management. It is home to about 150,000 people who live within and around it and who directly or indirectly depend on the extraction of natural resources found in the area. Majority of fishing villages are situated in the panhandle area of the delta, which begins at Mohembo where the river enters Botswana. The permanent waters of the panhandle support slightly higher fish species diversity and a larger concentration of fishers than the lower delta, being a direct relationship between the hydrological status and the productive potential of the water body (Mosepele, Mosepele, Bokhutlo, & Amutenya, 2011).

In addition to Shakawe village, which is the headquarters of the Okavango sub-District and situated along the panhandle of the delta, two contiguous settlements (Samochema and Mohembo West), were chosen as the study sites (Figure 1). Shakawe's fishing activities contribute approximately 90% of Botswana's fish production (Mmopelwa, Raletsatsi, & Mosepele, 2005). A cost benefit analysis of commercial fishing in Shakawe conducted by Mmopelwa et al. (2005) showed that commercial fishing is a viable enterprise which can offer positive investment opportunities for the people.

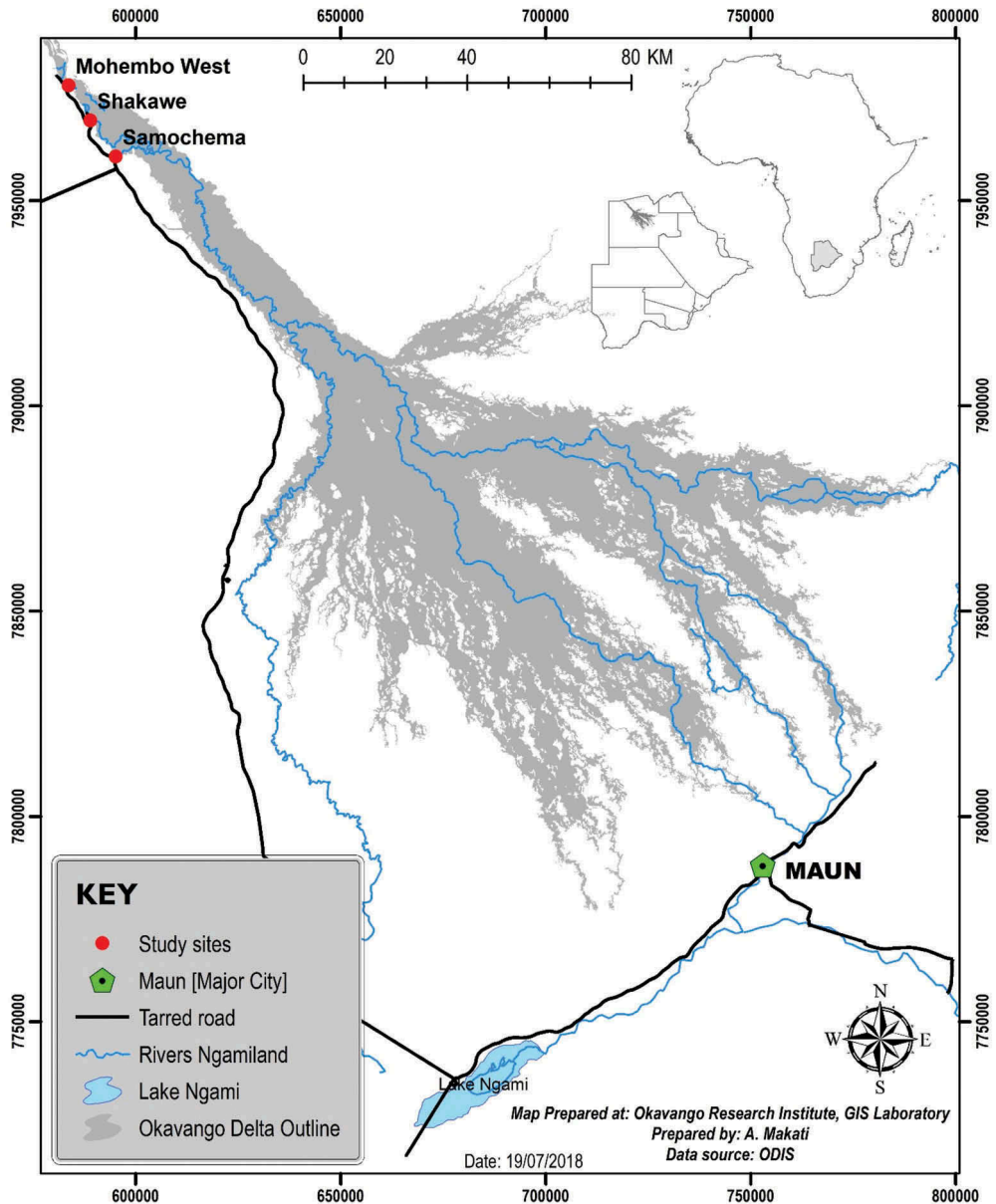


Figure 1. Map showing the point locations of study sites in the upper panhandle of the Okavango Delta, Botswana (Courtesy: GIS Laboratory, Okavango Research Institute, University of Botswana).

The Okavango Delta is home to many ethnic groups, including but not limited to the BamBukushu, BaYei, BaSarwa, BaHerero and BaTawana (Bock 1998). The national census of 2011 estimated the population of Shakawe and Mohembo West at 7,420 and 1988 people, respectively (Statistics Botswana, 2015). Based on Mosepele and Ngwenya's (2010) study, the BamBukushu is the main fishing group. Apart from fishing, other economic activities include livestock husbandry and arable agriculture, basket-making and grass/reed collection. The growing tourism industry and conservation sector have

now become a pivotal part of the Okavango Delta. Presently there is a reduction in the traditional agricultural, fishing, hunting and gathering activities of the riparian communities along the delta that had previously depended on the land, which is now being used for developing the relatively new sectors (see, for instance, Kolawole, Mogobe, & Magole, 2017). Except for the tourism industry, the Okavango Delta and the rest of the North West District have, in the past, experienced shocks that affected the livelihoods of communities. Common shocks include animal diseases like contagious bovine *pleuropneumonia* (CBPP), African animal *trypanosomiasis* (nagana) and foot and mouth disease (FMD), human diseases like HIV/AIDS and malaria, recurrent droughts and changing flood distribution patterns. Fidzani, Mlenga, Athlopheng, and Shatera (1999) note that livestock farming was once the most important livelihood activity in the district before the eradication of livestock in 1995/1996; fishing has now gained increased importance for the sustenance of local, riparian communities.

Sampling and sample size

A comprehensive survey of fishers is challenging because they often crisscross a broad geographic area, and are not centrally located (Davis, 2012). Based on the data provided by the Department of Fisheries in the Okavango sub-District, the population of all fishers who had a valid fishing licence was used as the sampling frame; the total number of fishers from the list provided was 92. It is noteworthy that individuals that were registered with the Fisheries Department largely operated as commercial fishers.

Determined at 95% confidence level and a standard deviation of 0.5, and a margin of error of 0.3%, the total sample size of 48 fishers was obtained by using Cochran's sample size for continuous data (an online survey sample size calculator software). The formula is given below as:

$$t^2x s^2/d^2$$

Where:

n = sample size

t = value for selected alpha level;

s = estimate of standard deviation in the population; and

d = acceptable margin of error for mean being estimated.

While the study participants were randomly selected from the list provided by the Fisheries Department, a snowball technique was then used to obtain data from the sampled fishers because of their itinerant nature.

Data collection

Interview schedules and one FGD session (comprising 11 fishers) were used to obtain quantitative and qualitative information, respectively, from both women and men fishers in June 2016. Closed-ended questions and statements or items placed on a 5-point Likert scale in the interview schedules were used to gather information on different factors contributing to fishers' perceptions of occupational hazards associated with fishing. The FGD session was used to obtain in-depth information about fishers'

perceptions on occupational hazards. According to Wong (2008), a focus group creates an 'accepting environment' that puts participants at ease allowing them to thoughtfully answer questions in their own words.

Instrumentation and measurement of variables

The interview schedule was designed to probe technical, economic, cultural and social aspects of risk perceptions investigated in the study. Demographic and socio-economic variables (such as sex, age, level of education, income, access to information, marital status, ethnicity, etc.) were either measured or coded. For instance, age was measured by the number of years, which an individual had lived; income was measured by the amount of money (in Botswana Pula), which an individual earned every month; level of education was measured by the number of years during which a fisher had acquired formal education. Fishing experience was measured by the number of years spent in fishing; access to safety training was measured in relation to whether or not fishers had been trained and how easy it was for them to get the training if they needed it.

Statements or items on psychosocial and cultural-related issues such as fatalism, risk acceptance and culture were placed on a 5-point Likert scale ranging from 1 to 5, with 'strongly disagree' assigned 1 point and 'strongly agree' assigned 5 points. Fishers' perception of occupational hazards was also measured by a number of items placed on a 5-point Likert scale, accordingly (see [Tables 2–5](#)).

Data analysis

Statistical Package for Social Science (SPSS) version 20 was used to analyse the data. Descriptive statistics such as frequencies, percentages, mean, etc.), charts, etc. were used to summarize the primary data. The associations between selected demographic/socio-economic and psychosocial attributes of fishers and their perceptions of occupational hazards were determined through Pearson Chi Square test. Thematic analysis was used to identify the themes and summarize the results of the FGDs (Braun & Clarke, 2006).

Results

Fishers' demographic and socio-economic attributes

Data in [Figure 2](#) show that majority (84.1%) of fishers were men while the rest (15.9%) were women. The average age of the fishers was 42 years. The fishers' ages ranged from 18 to 79 years. Most (36.4%) of the fishers were in the age bracket of 31–40 years. Thirty-one percent of them were still actively involved in fishing at a relatively old age (i.e. 50+ years), which is typical of many fishing communities (Branch, May, Roberts, Russell, & Clark, 2002). Approximately 21% of the fishers fell within the age bracket of 15–30 years while 11.4% ranged from 31 to 40 years. Although the age distribution varies, it is representative across different ages.

Typical of most fishing communities, one-half (50%) of the fishers had no formal education. While 20% of them attended only primary school, 29.6% had secondary education. This is consistent with Ngwenya and Mosepele's (2008) findings, which

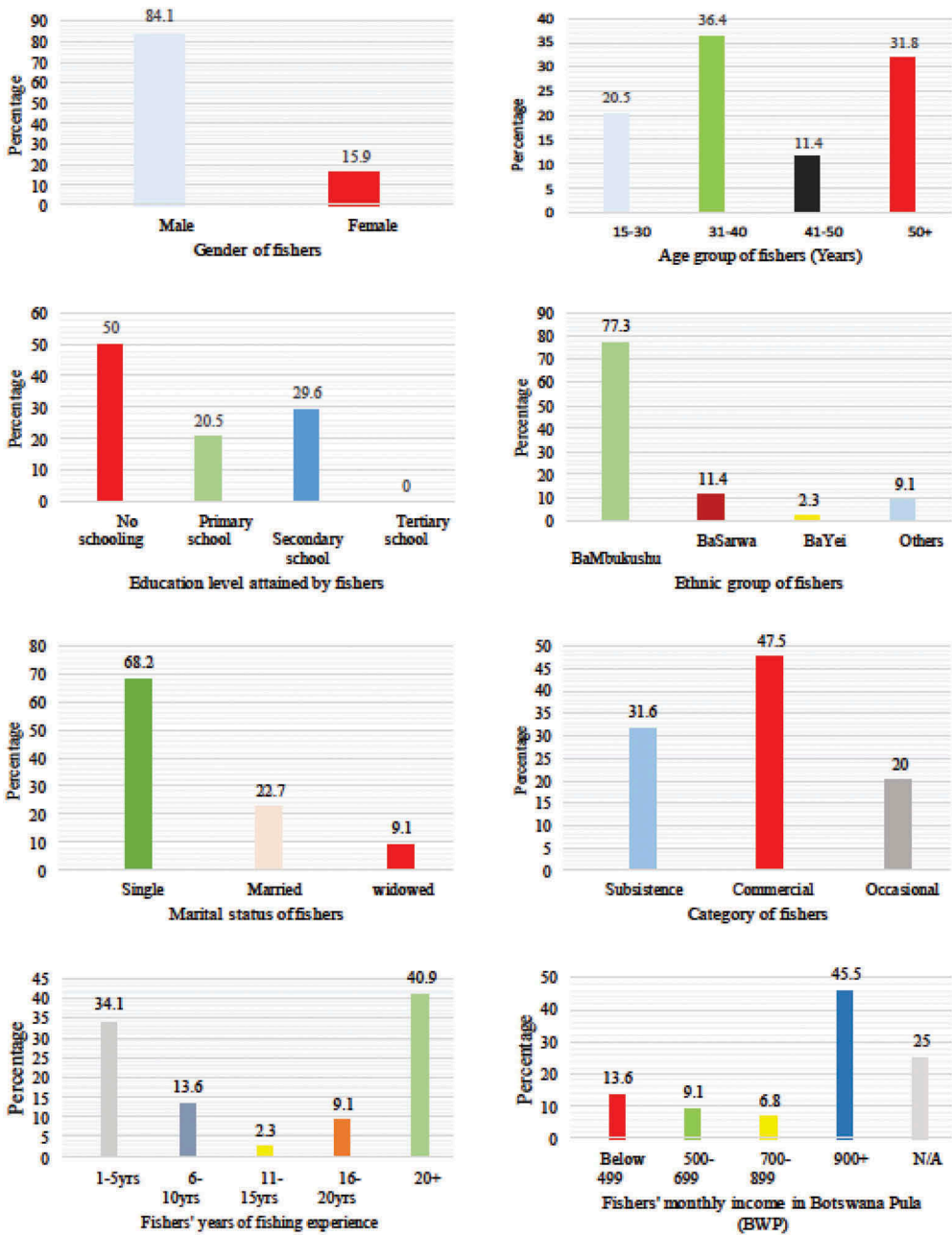


Figure 2. Bar charts showing fishers' demographic and socio-economic attributes.

Source: Field Survey, 2016

show that a significant percentage (42.1%) of the fishers in the Okavango Delta had no formal education while 42% had attained some level of primary education. The findings in this study corroborate those obtained in South Africa and the USA, where it was found that fishers also had low level of education (Branch et al., 2002; Davis, 2012). The

BaMbukushu ethnic group constituted the majority (77.3%) of the fishers. Mosepele and Ngwenya (2010) and Ngwenya and Mosepele (2008) found that the BaMbukushu were the most subsistent and commercial fishers around the Okavango Delta. While the BaSarwa constituted 11.4% of the fishers, the BaYei comprised only 2.3%, with others (including BaKalanga and BaTawana) constituting 9.1% of the fishers' population. Mmopelwa, Ngwenya, and Sakwape (2007) also found similar ethnic distribution among small-scale fishing communities in the study area.

Most (68.2%) of the fishers were single while those married constituted only 22.7% of the respondents. Only 9.1% of the fishers were widowed. Pearson Chi square analysis shows that marital status ($\chi^2 = 25.27$; $p \leq 0.01$) had a strong association with fishers' perceptions of occupational hazards. Forty-eight percent of the respondents were commercial fishers and 32% practised subsistence farming. Some 20% of them were occasional fishers who used hook and line, and baskets. Mosepele and Ngwenya (2010) study categorizes fishers according to the main reason for fishing and the intensity of fishing. Based on their findings, fishers indicated that the extent and intensity of the flood regime regulate their fishing behaviour, having a high likelihood of not fishing during low flood.

While most (45.5%) fishers received a monthly income of more than¹ BWP900, 6.8% of them earned between P700-P899. Some 9% earned between BWP500-699 while 13.6% earned below BWP499. The 'not applicable' response reflects the occasional fishers who did not sell their catch. Pearson Chi square analysis shows that the monthly income earned by the fishers ($\chi^2 = 22.14$; $p \leq 0.01$) had a strong association with their perceptions. The majority (40.9%) of the fishers had more than 20 years of fishing experience and 34.1% had 1–5 years of fishing experience. While those who had 6–10 years' experience constituted 13.6%, some 9.1% of them had 16–20 years' experience and 11–15 years' experience constituted 2.3% of the fishers. In many fishing communities, fishers were found to have a substantial number of years of fishing experiences (Branch et al., 2002; Olatunji & Olah, 2012). Pearson Chi square analysis reveals that years of fishing experience ($\chi^2 = 24.41$; $p \leq 0.01$) had a strong association with fishers' perceptions. Older fishers among local fishers offer training on cultural principles and taboos to which fishers must adhere. Most (52.3%) fishers are involved in arable farming as an alternative strategy for generating income. Kgathi, Ngwenya and Wilk (2007), however, noted that although the traditional means of support activities like agriculture still play a substantial livelihood role, their importance has been reduced because of land use change occurring in the delta; a significant portion of land is now being used for other activities such as tourism. Forty-three percent of the fishers indicated that they were not involved in any other activity (Table 1). Mmopelwa et al. (2007) observed that a number of economic activities which are pursued in the villages along the panhandle include fishing, arable and livestock farming, basket making and collection of veld products. Nonetheless, analysis shows that 2.3% of the fishers were involved in hawking and craft production (Table 1).

While a majority (77%) of the respondents had more than five people depending on them for sustenance, 9.1% of them had four dependants (Table 1). Mmopelwa et al. (2007) had earlier found that the average household size of the same area was about six persons. Pearson Chi square analysis also shows that the number of dependants ($\chi^2 = 91.23$; $p \leq 0.01$) had a very strong association with fishers' perceptions of occupational hazards. Approximately 71% of the fishers were sole income earners in their households. While 25% of the fishers' population

Table 1. Distribution of fishers by other socio-economic attributes.

Variable	Frequency	Percentage n = 44
Other income generating activities		
Farming	23	52.3
Craft Production	1	2.3
Hawking	1	2.3
Nil	19	43.2
Number of dependents		
Only me	4	9.1
2 people	1	2.3
3 people	1	2.3
4 people	4	9.1
5 people+	34	77.3
Number of other working family members		
None	31	70.5
1 person	11	25.0
2 persons	2	4.5

Source: Field study 2016

Table 2. Fishers' disposition to fatalism.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
There is no amount of safety information that can keep you safe once you are in the river	6(13.6)*	5(11.4)	3(6.8)	7(15.9)	23(52.3)	44(100)
Regardless of human effort and intervention in preventing fish accidents/fatalities, what will be will still be	13(29.5)	6(13.6)	3(6.8)	3(6.8)	19(43.2)	44(100)
Fishing accidents/fatalities are an act of God or the gods	33(75)	3(6.8)	3(6.8)	0(0)	5(11.4)	44(100)
There is no use trying to change a situation which appears irredeemable	18(40.9)	5(11.4)	7(15.9)	7(15.9)	7(15.9)	44(100)
We cannot do anything about what happens once a person begins to fish in the river	16(36.4)	3(6.8)	3(6.8)	6(13.6)	16(36.4)	44(100)
I do not think I want to exert my energy on what I think I cannot influence	15(34.1)	5(11.4)	5(11.4)	5(11.4)	14(31.8)	44(100)
It is good to remain quiet and accept one's fate as they come	14(31.8)	1(2.3)	9(20.5)	7(15.9)	13(29.5)	44(100)
It does not make a difference whether I am cautious or not, I cannot do anything to protect myself	7(15.9)	3(6.8)	6(13.6)	6(13.6)	22(50)	44(100)

Source: Field Survey 2016

*Percentages (%) are in parenthesis ()

had at least one other person in the family who earned income, only 4.5% of them had more than two family members who earned income (Table 1).

Most (70.5%) of the fishers indicated they had access to fishing information through the Department of Wildlife and National Parks (in which the Fisheries sub-division is housed). While 56.8% of them had access to the radio, 6.8% had access to both local newspapers and television. Only 2.3% of the fishers had access to cell phone. Chi square analysis shows that there was a strong association between access to information ($\chi^2 = 51.10$; $p \leq 0.01$) and fishers' perceptions of hazards.

Table 3. Fishers' distribution based on their degree of risk acceptance.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
I have to learn to live with the risks associated with fishing	0(0)*	0(0)	1(2.3)	1(2.3)	42(95.5)	44(100)
I should be able to take care of myself	0(0)	0(0)	0(0)	3(6.8)	41(93.2)	44(100)
I should be able to challenges forces of nature	1(2.3)	0(0)	1(2.3)	2(4.5)	40(90.9)	44(100)
I cannot afford to be seen to be cowardly	0(0)	0(0)	0(0)	2(4.5)	42(95.5)	44(100)
I should be able to keep up with my peers and prove that I am a man/ woman	0(0)	0(0)	0(0)	3(6.8)	41(93.2)	44(100)
I should be willing to risk my life for my family	14(31.8)	2(4.5)	1(2.3)	2(4.5)	25(56.8)	44(100)
I cannot abandon fishing for the sake of safety	12(27.3)	4(9.1)	2(4.5)	1(2.3)	25(56.8)	44(100)
A fisher has to be strong and brave	0(0)	0(0)	1(2.3)	0(0)	43(97.7)	44(100)

Source: Field Survey 2016

*Percentages (%) are in parenthesis ()

Table 4. Fishers' responses to how their culture interacts with fishing.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Fishing is part of my culture and identity	1(2.3)*	0(0)	2(4.5)	1(2.3)	40(90.9)	44(100)
I fish just because it is a cultural thing	10(22.7)	10(22.7)	7(15.9)	8(18.2)	9(20.5)	44(100)
If I were to stop fishing, it would be shameful	9(20.5)	4(9.1)	2(4.5)	2(4.5)	27(61.4)	44(100)
Most of my family members are involved in fishing	1(2.3)	5(11.4)	2(4.5)	1(2.3)	35(79.5)	44(100)
My family expects me to be a fisher	4(9.1)	2(4.5)	3(6.8)	3(6.8)	32(72.7)	44(100)
Fishing is not a taboo in my community	0(0)	0(0)	1(2.3)	0(0)	43(97.7)	44(100)
Our culture teaches us when to engage in fishing and when not to	1(2.3)	0(0)	1(2.3)	0(0)	42(95.5)	44(100)
Our culture teaches us certain management practices in relation to ensuring the sustainability of fishing resources in our rivers	0(0)	0(0)	3(6.8)	2(4.5)	39(88.6)	44(100)

Source: Field Survey, 2016

*Percentages (%) are in parenthesis ()

Fishers' disposition to fatalism

Data in Table 2 shows fishers' responses on fatalism. Analysis shows that most (68.2%) of the fishers disagreed with the statement that '[n]o amount of safety information can keep you safe while you are in the river'. Only 25% agreed with the statement. While 43.1% of the fishers agreed that 'regardless of human effort and intervention, what will be will still be', a half (50%) of them, however, did not agree with the statement. A majority (81.8%) of the fishers agreed that 'fishing accidents and fatalities are an act of God or the gods'. Some 11.4% of them strongly disagreed with the statement. Most (52.3%) of them believed that '[t]here is no use trying to change a situation that appears irredeemable'. Nonetheless, some 31.8% of them disagreed. While 50% of the fishers disagreed that 'nothing can be done about what happens once a person begins to fish in the river', 43.2% of them agreed with the statement. Fishers were almost equally distributed regarding the need to exert energy on what they thought they could not influence as 45.4% agreed and 43.2% disagreed with the statement. Only 11.4% of them were neutral. As 45.4%

Table 5. Fishers' perceptions of occupational hazards associated with fishing.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
I think Fishing is a dangerous activity	13(29.5)*	1(2.3)	1(2.3)	0(0)	29(65.9)	44(100)
I think Fishing is like any other occupation in terms of its level of risk	14(31.8)	1(2.3)	0(0)	0(0)	29(65.9)	44(100)
I think safety training is important in fishing	4(9.1)	0(0)	0(0)	1(2.3)	39(88.6)	44(100)
There is no weather condition that would stop me from fishing	40(90.9)	2(4.5)	0(0)	0(0)	0(0)	44(100)
I would not fish if there is equipment failure	5(11.4)	1(2.3)	1(2.3)	1(2.3)	36(81.8)	44(100)
I know how to take precautionary measures against any fishing hazards without depending on anybody or government official's guidance on how to protect myself	0(0)	1(2.3)	2(4.5)	4(9.1)	37(84.1)	44(100)
I know how to discern when to fish in relation to adverse weather conditions and adhere to such weathers signs when embarking on fishing expeditions	1(2.3)	0(0)	0(0)	1(2.3)	42(95.5)	44(100)
I know I have to promptly deal with consequences of fishing hazards whenever it occurs. Otherwise my family's livelihood would be jeopardized	1(2.3)	0(0)	1(2.3)	2(4.5)	40(90.9)	44(100)

Source: Field Survey 2016

*Percentages (%) are in parenthesis ()

disagreed that '[i]t is good to remain quiet and accept one's fate as it comes', 34.1% agreed while the remaining 20.5% were neutral. While a majority (63.6%) of the fishers believed that 'it does not make a difference whether I am cautious or not, as I cannot protect myself, only 22.7% of them agreed while 13.6% remained neutral.

Fishers' disposition to risk acceptance

Risk acceptance implies making an informed decision to accept the probability and impact of a particular risk. Table 3, thus, shows fishers' response to risk acceptance. Almost all (97.7%) the fishers confirmed that they had to learn to live with risks associated with fishing. This was buttressed by all (100%) of them who agreed that they should be able to take care of themselves when faced with occupation-related, risky circumstances. Also, the majority (95.5%) agreed that 'I should be able to challenge forces of nature', while 2.3% either disagreed or was neutral. All the fishers agreed that they could not afford to be seen as being cowardly and that they should be able to keep up with their peers and prove that they are courageous men and women. A good number (61.3%) of the fishers either strongly agreed or agreed that they should be willing to risk their lives for their families while 35.3% either strongly disagreed or disagreed with the viewpoint. Most (59.1%) of the fishers either strongly agreed or agreed that 'I cannot abandon fishing for the sake of safety' while 31.4% either strongly disagreed or disagreed with the statement. A majority (97.7%) of them strongly agreed that '[a] fisher has to be strong and brave'. Findings show that almost all the fishers did accept the risks associated with fishing activities. Pearson Chi square analysis indicates that risk acceptance ($\chi^2 = 65.47; p \leq 0.01$) had a strong association with fishers' perceptions of occupational hazards.

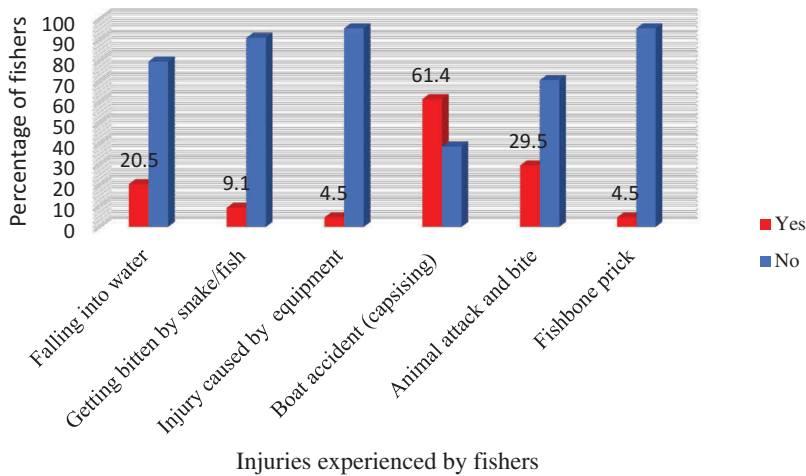


Figure 3. Distribution of fishers based on the injuries or hazards they commonly experience.
Source: Field Survey 2016.

Injuries and possible hazards commonly experienced by fishers

Multiple sources of risk include the physical and biological environments, fishing location as well as a broad range of socio-economic, cultural and human factors that include fatigue, inexperience and failure to use safety practices (Windle et al., 2008). **Figure 3** shows that most (61.4%) of the fishers affirmed boat capsizing as the commonest accident in their region. Participants in the FGD session affirmed that:

Boat accidents could be due to numerous factors that include collision with animals like hippos, weather changes during fishing, unstable river topography that inexperienced fishers may fail to ‘navigate’, etc. Most accidents are, however, caused by failure to obey cultural taboos.

Animal attacks or bites were mentioned by 29.5% of the fishers as the second most recurrent hazard. The respondents indicated that animals could use different strategies to attack the fishers. For instance, the hippopotamus is notorious for hiding under the water to capsize the boat and launch an attack on people while the crocodile could pounce on the unsuspecting individuals in a boat or those in close proximity to the river bank. Some (20.5%) of the fishers indicated falling into water as a hazard (which mostly causes body traumas). An elderly fisher in Mohembo explained that ‘[t]he falls are, however, very dangerous and they can not only result in drowning but also exposes one to animal attacks’. Snake or fish bite (which fishers said could result in bodily harm) was, however, accounted for by 9.1% of the respondents. Providing a vivid scenario, a female fisher in Mohembo said ‘[t]his happens mostly to us [basket fishers] as we go into the water with our bare feet and have to handle the fish with our bare hands’. Some 4.5% apiece indicated fish-bone prick and getting hurt by fishing equipment, respectively, as some of the injuries experienced by the fishers.

The most possible hazards are environmental in nature. Hippopotamus, crocodiles and elephants were noted to occasionally pose the biggest threat to fishers. Fishers were of the opinion that hippopotamus is very dangerous as it is not often easily seen from

afar, and cannot only capsize the boat, but can also bite the victim. Unexpected winds and rains during fishing expeditions are also environmental hazards associated with the vocation. The fishers indicated they sometimes got entangled with fishing nets or trees. Culturally, fishers believed that failure to obey cultural taboos and witchcraft could be some of the major causes of fishing accidents.

Fishers' medical attention-seeking behaviour

Further analysis shows that 61.4% of the fishers had at one time or the other experienced injuries associated with fishing activities. While 85.1% of those who recorded injuries during fishing expeditions sought medical attention, 14.9% of them did not. This finding contradicts those of Marshall, Kucera, Loomis, McDonald, and Lipscomb (2004) who demonstrated that fishers had a low level of utilization of medical services. Further analysis suggests that fishers in the Okavango panhandle take time off work to seek medical intervention. Of the 61.4% who sought medical attention, about 34.1% of them got treated in a healthcare facility while 20.5% engaged in self-treatment. Others (6.8%) sought treatment from a traditional doctor.

Culture

Fishers' distribution and responses on how culture interacts with fishing are shown in Table 4. Data analysis reveals that a majority (90.9%) of the fishers strongly agreed that fishing is indeed part of their culture and identity, while 2.3% agreed and strongly disagreed with the statement, respectively. Almost half (45.4%) of the respondents either strongly disagreed or disagreed with the opinion that 'I fish just because it is a cultural thing'. Conversely, 38.7% either strongly agreed or agreed with the statement. Those who had a contrary opinion said that fishing was a source of livelihood for them rather than just a cultural practise as they needed to provide food for their families. While most (65.9%) of the fishers either strongly agreed or agreed that if they were to stop fishing it would be shameful, 29.4% either strongly disagreed or disagreed with the viewpoint.

A majority (81.8%) of the respondents agreed that '[m]ost of my family members are involved in fishing'. Only 13.7% of them did not agree with the statement. A majority (79.5%) of the fishers also agreed that they were socialized into fishing with the ultimate aim of becoming fishers. Almost all (97.7%) of them strongly agreed that fishing is not a taboo in their community. And most (95.5%) of them strongly agreed that '[o]ur culture teaches us when to engage in fishing and when not to'. Only 2.3% disagreed with the statement. Most (93.2%) fishers either strongly agreed or agreed that their culture taught them certain management practices to ensure sustainability of fishing resources. As revealed in the FGD, the different management practices taught encompass both safety issues and environmental management strategies. One elderly fisher in Mohembo remarked:

There are times when the floods are too high and it is not advisable to engage in fishing and it is also during those periods that most fish are breeding and should therefore be given the chance to do so such that the young fish can grow into maturity. The flooding

and breeding times also coincide with the ploughing season and this, therefore, means that there should be no conflicting priorities.

This finding, however, contradicts some literature on fishers who were brought up in fishing families. Being a fishing family member is considered to make fishers more likely to underrate the occupational risks associated with fishing as a result of psychological adaptation and desensitization to the daily hazards (Davis, 2012). Regulations aimed at promoting occupational attitudes and perceptions of risk among fishermen, therefore, have potential consequences for risk management (Windle et al., 2008). The fishers in the study believe that safety cultural practices like taboos should be incorporated in the overall fishing management practices designed at national level.

Fishers' perceptions of occupational hazards

Fishers' perceptions about safety can vary greatly from those of safety managers; there is, therefore, need for a better understanding of the fishing culture and ways in which safety is viewed (Kaplan & Kite-Powell, 2000). Table 5 shows fishers' distribution on how they perceive occupational hazards associated with fishing. Data analysis reveals that most (65.9%) of the fishers strongly agreed that fishing is a dangerous activity while 31.8% either strongly disagreed or disagreed with the viewpoint. Despite agreeing that fishing is dangerous, most (65.9%) of the fishers strongly agreed that '...fishing is like any other occupation in terms of its level of risk' while 34.1% either strongly disagreed or disagreed with the statement. During the FGD session, it became apparent that fishers believe that life in general is not safe and many activities put a person's life at risk. One of the fishers commented that *'whether you are fishing, or just living or driving a car, you are not safe. Anything could happen to anyone engaged in something else as much as it could happen to a fisher'*. This finding contradicts some studies like those of Davis (2012) and Branch et al. (2002), which show that fishers do not believe fishing is dangerous and those from fishing communities tend to see fishing as less risky than most occupations. A majority (88.6%) of the fishers strongly agreed that safety training is important, while only 2.3% agreed and 9.1% strongly disagreed. While most (90.6%) fishers strongly disagreed that '[t]here is no weather condition that would stop me from fishing', only 4.5% of them disagreed. Nonetheless, only 4.5% strongly agreed with it. Also, most (84.1%) of them either strongly agreed or agreed that they would not fish if there is equipment failure. Only 13.6% either strongly disagreed or agreed with the statement. The fishers during the FGD session, indicated that *'[w]e believe that it is a delicate balance act though. When it's your livelihood and your family depends on you for food, a lot of times you take chances'*.

As noted by McDonald and Kucera (2007), fishers make decisions on staying safe by weighing the implications of weather conditions, value of the catch, and concerns about risk. A majority (93.2%) of the fishers either strongly agreed or agreed that they know how to take precautionary measures against any fishing hazard without depending on anybody or government official's guidance. Almost all (97.7%) the fishers either strongly agreed or agreed that when embarking on fishing expeditions, they knew how to discern when to fish in relation to adverse weather conditions while only 2.3% disagreed. This finding agrees with Loewenstein, Weber, Hsee, and Welch

(2001) who affirm that people comprehend risk through either analytical or experiential analysis. While the 'analytic system', which is relatively slow, effortful and requires conscious control, uses logic, reason and scientific deliberation in risk assessment, the 'experiential system' is an intuitive and instinctive reaction to danger, and is sometimes referred to as the *affect heuristic* (Loewenstein et al., 2001). A majority (95.5%) of the fishers either strongly agreed or agreed that they had to promptly deal with consequences of fishing hazards whenever they occurred; otherwise their family's livelihood would be jeopardized. For the fishers, a considerable processing of information has to take place before making any decision. Once they have completed the analysis of the situation, a mental computation of the components then lead to an overall affective judgment (see Zajonc, Fazio, & Petty, 2008).

Discussion

In this study, we analysed socio-economic, psychosocial and cultural-related issues to determine fishers' perceptions of the hazards associated with fishing in the Okavango Delta, Botswana. Our findings showed that most fishers in the study area were men. Many reasons may have been responsible for this. Besides the physical strength required at the fish harvesting point, social roles in small-scale fishing may be influenced by a number of factors. Based on McGoodwin's (2001) observation, social norms in a majority of the world's small-scale fishing communities prescribe that the primary producer be men, while women perform other key supplementary roles in the households. For instance, case studies on the socio-economic characteristics and lifestyles of subsistence and informal fishers in South Africa showed that there was a greater overall propensity for men to be fishers (Branch et al., 2002).

Findings also revealed that almost two-thirds of the fishers who aged 20 years and above had either attended primary school or had no schooling at all; none among them had any form of tertiary education. It has been acknowledged that education (knowledge acquisition), and not per capita, is the most important resource and ingredient for socio-economic development of any country (BFTU, 2007). Education improves a person's capacity to use existing assets and create new opportunities. Based on the findings, therefore, fishing households in the study area may have had a weak human capital base, which could possibly constrain fishers' ability to effectively engage in fishing-related ventures. Most of the fishers were not married. A study on awareness of occupational hazards and associated factors among welders in Ethiopia shows that higher odds of hazard awareness were observed among married and single workers as compared to those who were divorced (Tadesse, Bezabih, Dewstaw, & Assefa, 2016). Other studies have not linked marital status to perception but the risk itself. For example, Whitlock, Norton, Clark, Jackson, & Macmahon (2004) in their study of vehicle drivers observed that after taking age, sex and other variables into account, people who were not married had a substantially higher risk of driver injury than married people. Unlike the unmarried fishers who might be a bit more daring and willing to take risks, fishers who have marital commitments may perceive risk differently as they might jeopardize their family's wellbeing by risking their lives when [weather] conditions are not suitable for fishing. The strong association between fishers' marital status and their perceptions further buttresses this claim. Also, the strong

association between income and fishers' perceptions implies that fishers who earned more money from fishing might perceive risk as worthwhile when compared to those who earned less from the business. The number of years in which fishers have been engaged in fishing activities and how they perceive occupational hazards are not mutually exclusive; the strong association between fishing experience and fishers' perceptions of occupational hazards is directly linked to the number of years of engagement in the business. Findings have shown that the extent of experience acquired in any occupation has a link with perception, awareness and knowledge of the hazards associated with the job. Tadesse et al. (2016) found that the odds of hazard awareness among employees who had longer work experience were nearly six times higher as compared to those who served for less than five years. Another reason is that individuals having longer working experience might be exposed to different safety trainings, which may probably have improved their awareness. About half of the fishers did not engage in any other livelihood activities. However, Mmopelwa and his colleagues opined that a strategic way of dealing with vulnerability and uncertainties is for people to diversify their means of livelihoods. For instance, livestock disease outbreak is a commonplace in the study area such that traditional pastoralists no longer see the need to continue living a pastoralist lifestyle. The household size of the fishers was relatively large as majority of them had more than five people living and feeding together under the same roof. There are possibly two reasons for the strong association, which existed between fishers' perceptions and the number of their dependants. On the one hand, a fisher could be risk averse because they have a higher number of dependants, which might influence them to be unwilling to take too much risk. On the other hand, some fishers may be willing to accept risk because their dependants might be impoverished if they do not embark on fishing expeditions regardless of whether or not the venture is risky. While lack of physical infrastructures and remoteness may have engendered the small percentage of fishers who had access to television sets, lack of education (as earlier observed) may have been largely implicated in the low population, which had access to newspapers in the area. Fishers' current standard of living might suggest that the average household cannot afford television sets, or their houses are not connected to the national grid. All things being equal, the strong association between access to information and fishers' perceptions implies that fishers who had access to many sources of fishing information were likely to be more knowledgeable in fishing activities than those who did not.

Findings also revealed that a majority of the fishers in the study tended to exhibit less fatalistic dispositions. Fatalism as a form of value-orientation acquired by certain people who believe that all events are predetermined and therefore unpredictable, has been used in explaining risk perceptions of certain groups. The fatalists are quite indifferent about risk and would rather be unaware of dangers, since they are assumed to be unavoidable anyway (Oltedal et al., 2004). In general, fatalists try to not know or worry about things they think they cannot influence. Findings also showed that most fishers were prone to risk acceptance. The strong association between risk acceptance and fishers' perceptions implies that people who have already accepted the risks involved in fishing would perceive hazards differently from those who are risk-averse; risk may be seen as a normal part of fishing and hence cannot be avoided after all.

Culture, which is a way of life of any people, has a vital role to play in peoples' narratives and how they perceive their world (Kolawole, 2014). Findings showed that while most fishers directly linked cultural practices with fishing, they also affirmed that their cultural beliefs were closely associated with sustainable fisheries management. Studies on the influence of culture on perception show that perceptual processes are influenced by culture; human cognition and perception in information-processing are not fixed and universal (Kastanakis & Voyer, 2012; Nisbett & Miyamoto, 2005). Participating in cultural practices, therefore, shapes cognitive and perceptual processes. The importance of traditional knowledge in the protection of biodiversity and achievement of sustainable development has been recognized internationally and advocated for by various authors (e.g. Gadgil, Berkes, & Folke, 1993; Mazzocchi, 2006). For example, Article 8 of the Convention on Biological Diversity urges development practitioners to '...respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity...' (United Nations, 1992). Mazzocchi (2006) also opined that traditional environmental knowledge emphasizes the symbiotic character of humans and nature. Nonetheless, Kolawole (2012, 2015) noted that no single knowledge can independently exist on its own; both local and Western knowledge need to complement each other to provide holistic solutions to different development problems.

In analysing fishers' perceptions of occupational hazards, we used cultural perception (Douglas & Wildavsky, 1982) and risk and benefit perception (Frewer et al., 1998) theories to explain how and why fishers perceive hazards associated with fishing in the way they do. More often than not, fishers base their fishing expedition decisions on the degree of benefits that fishing confers on them regardless of the risk involved in the activities. Thus, socio-economic pressures and demands largely influence fishers' perceptions of the hazards associated with fishing. Sensitive to probabilities and outcome, the analytic system of understanding risks, on the one hand, is reason-oriented and the behaviour is mediated by conscious appraisal of events; it also requires justification through logic and evidence, and largely ignores the role played by emotions during the decision-making process. It rather considers the aftermath effects of the decision, which could be either good or bad outcome (Loewenstein et al., 2001). The experiential system, on the other hand, is associated with the experience of 'affect' and relies on images and associations, and it also considers the impact of emotions experienced during the decision-making process and is sensitive to imagery and time. It is pleasure-pain oriented and behaviour is mediated by past experiences. Slovic et al. (2004), however, noted that both systems are not mutually exclusive as they continually interact and influence each other. The foregoing explains the reason why most fishers '...have to learn to live with the risks associated with fishing'. It is indeed a matter of survival at a cost. This suggests that future planned change programmes meant to enhance fishing safety need to pay attention to the thinking patterns of fishers.

Conclusion

The article analysed how fishers perceived occupational hazards associated with fishing in the Okavango Delta, Botswana. The study revealed that fishers prioritised economic gains over fishing hazards including boat accidents. Although not directly investigated in this

study, water borne diseases like malaria (which is also an occupational hazard), were not identified by the fishers as one of the commonest occupational hazards. The fishers may not have considered malaria as a major occupational risk due to their inability to connect the contraction of the ailment with the timing of exposure to the malaria vector during fishing expeditions. They may also have trivialized water-borne diseases as a commonplace in the region. Such predispositions towards and familiarity with certain phenomena may be the reason why major occupational hazards are disregarded.

While the fishers treated fisheries resources as part of their culture and identity, they largely depended on them for their livelihood survival. Adhering to cultural taboos is the most important safety precautions observed by the fishers. It is, however, noteworthy that the fishers' cultural understanding enabled them to incorporate certain sustainable management practices in natural resources conservation; the fishers opined that their cultural taboos should be included in the national safety regulations. This implies that any community development and poverty alleviation initiatives need to build on peoples' cultural perspectives when planning for and implementing development programmes. Kaplan and Kite-Powell (2000) had advised that 'fishermen need to be given legitimate power in the management process and work with the government in the formulation of the regulations that guide their lives'. Findings also revealed that the fishers acknowledged the risks associated with their occupation, affirming that fishing is dangerous but could be as dangerous as any other occupation. Although fishers were of the opinion that there was need for trainings on fishing safety (whether from other fishers or the government), they felt they did not only know how to take precautionary measures against fishing hazards but also have the ability to promptly deal with the consequences of such hazards so as to prevent jeopardising their families' source of livelihood.

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1. US\$1.00 exchanged for BWP10.22 at the time of writing this paper.

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References

- BFTU. (2007). *Botswana federation of trade unions policy on education in Botswana*. Gaborone, Botswana: Author.
- Bock, J. (1998). Economic development and cultural change among the Okavango Delta peoples. *Botswana Notes and Records*, 30, 27–44.
- Botswana, S., 2015. Ngami West Sub-District, population and housing census 2011. Statistics Botswana, Vol. 8.1, p. 43. Available from: <http://www.statsbots.org.bw/sites/default/files/publications/Ngami%20West.pdf>
- Branch, G. M., May, J., Roberts, B., Russell, E., & Clark, B. M. (2002). Case studies on the socio-economic characteristics and lifestyles of subsistence and informal fishers in South Africa. *South African Journal of Marine Science*, 24, 439–462.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.

- Brooks, B. (2005). Not drowning, waving! safety management and occupational culture in an australian commercial fishing port. *Safety Science*, 43(10), 795-814.
- Davis, M. E. (2012). Perceptions of occupational risk by US commercial fishermen. *Marine Policy*, 36(1), 28–33.
- Douglas, M., & Wildavsky, A. (1982). *Risk and culture: An essay on the selection of technical and environmental dangers*. Berkeley: University of California Press.
- Eklöf, M., & Törner, M. (2002). Perception and control of occupational injury risks in fishery - a pilot study. *Work & Stress*, 16, 58-69.
- FAO/Government Cooperative Programme, 2010. Safety for fishermen: The way forward, September, Food and Agriculture Organization of the United Nations. Retrieved from: <http://www.fao.org/docrep/014/al960e/al960e.pdf> [Accessed 27 December 2017]
- Fidzani, B., Mlenga, W. S., Athlopheng, M., & Shatera, M. M. (1999). *Socio-economic effects of CBPP in Ngamiland*. Gaborone, Botswana: Division of Agricultural Planning and Statistics, Ministry of Agriculture.
- Frewer, L. J., Howard, C., & Shepherd, R. (1998). Understanding public attitudes to technology. *Journal of Risk Research*, 1(3), 221–235.
- Gadgil, M., Berkes, F., & Folke, C. (1993). Indigenous knowledge for biodiversity conservation. *Ambio*, 22(2), 151–156.
- Kaplan, I. M., & Kite-Powell, H. L. (2000). Safety at sea and fisheries management: Fishermen's attitudes and the need for co-management. *Marine Policy*, 24(6), 493–497.
- Kastanakis, M., & Voyer, B. (2012). Cultural effects on perception and cognition: Integrating recent findings and reviewing implications for consumer research. *Advances in Consumer Research*, 40, 966–967.
- Kgathi, D.L, Ngwenya, B.N, & Wilk, J. (2007). Shocks and rural livelihoods in the okavango delta, botswana. *Development Southern Africa*, 24(2), 289-308.
- Kolawole, O. D. (2012). Intersecting Western and local knowledge: Critical issues for development research in Africa. *Journal of Knowledge Globalization*, 5(2), 1–23.
- Kolawole, O. D. (2014). Habitus: How cultural values shape local communities' perceptions about flood in the Okavango Delta of Botswana. In M. R. Motsholapheko & D. L. Kgathi (Eds.), *Flooding: Risk factors, environmental impacts and management strategies* (pp. 87–107). New York: Nova Science Publishers, Inc..
- Kolawole, O. D. (2015). Twenty reasons why local knowledge will remain relevant to development. *Development In Practice*, 25(8), 1189–1195.
- Kolawole, O. D., Mogobe, O., & Magole, L. (2017). Soils, people and policy: Land resource management conundrum in the Okavango Delta, Botswana. *Journal of Agriculture and Environment for International Development*, 111(1), 39–61.
- Levin, J. L., Gilmore, K., Shepherd, S., Wickman, A., Carruth, A., Nalbone, J. T., & Nonnenmann, M. W. (2010). Factors influencing safety among a group of commercial fishermen along the Texas gulf coast. *Journal of Agromedicine*, 15(4), 363–374.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267–286.
- Marshall, S. W., Kucera, K., Loomis, D., McDonald, M. A., & Lipscomb, H. J. (2004). Work related injuries in small scale commercial fishing. *Injury Prevention : Journal of the International Society for Child and Adolescent Injury Prevention*, 10(4), 217–221.
- Mazzocchi, F. (2006). Western science and traditional knowledge. *European Molecular Biology Organisation*, 7(5), 463–466.
- McDonald, M. A., & Kucera, K. L. (2007). Understanding non-industrialized workers' approaches to safety: How do commercial fishermen “stay safe”? *Journal of Safety Research*, 38(3), 289–297.
- McGoodwin, J. (Ed.). (2001). Understanding the cultures of fishing communities: A key to fisheries management and food security. In *Fisherires technical paper no 401*. Rome: Food and Agricultural Organisation of the United Nations. www.fao.org/docrep/004/Y1290E/Y1290E00.HTM

- Mmopelwa, G., Ngwenya, B. N., & Sakwape, B. (2007). The dynamics of fishing as a natural safety net in the Okavango Delta, Botswana. In A. Ahmed (Ed.), *Managing science and technology for a sustainable future* (pp. 141–152). Brighton: World Sustainable Development.
- Mmopelwa, G., Raletsatsi, S., & Mosepele, K. (2005). Cost-benefit analysis of commercial fishing in Shakawe, Ngamiland, Botswana. *Botswana Notes and Records*, 37, 11–21.
- Mosepele, K., & Kolawole, O. D. (2017). Fisheries governance, management and marginalisation in developing countries: Insights from Botswana. *Cogent Food & Agriculture*, 3(1). doi:10.1080/23311932.2017.1338637
- Mosepele, K., Mosepele, B., Bokhutlo, T., & Amutenya, K. (2011). Spatial variability in fish species assemblage and community structure in four subtropical lagoons of the Okavango Delta, Botswana. *Physics and Chemistry of the Earth*, 36(14–15), 910–917.
- Mosepele, K., & Ngwenya, B. N., 2010. Socio-economic survey of commercial fishing in the Okavango Delta, Botswana. *Okavango Report Series*, 7.
- Ngwenya, B., & Mosepele, K., 2008. Socio-economic survey of subsistence fishing in the Okavango Delta, Botswana. *Okavango Report Series*, 6.
- Ngwenya, B. N., & Mosepele, K. (2007). HIV/AIDS, artisanal fishing and food security in the Okavango Delta, Botswana. *Physics and Chemistry of the Earth, Parts A/B/C*, 32(15–18), 1339–1349.
- Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture : Holistic versus analytic perception. *Trends in Cognitive Sciences*, 9, 10.
- Olatunji, A. E., & Olah, O. M. (2012). The socio-economic status of artisanal fishers in Cross-River state, Nigeria. *World Journal of Fish and Marine Sciences*, 4(6), 672–678.
- Olstedal, S. B., Moen, B.-E., Klempe, H., & Rundmo, T. (2004). *Explaining risk perception: An evaluation of cultural theory*. Trondheim: Rotunde Publishers. doi:10.1080/135753097348447
- Po, M., Kaercher, J. D., & Nancarrow, B. E., 2003. Literature review of factors influencing public perceptions of water reuse, *Technical Report 54/03*, December, 1–44. Available online: <http://www.clw.csiro.au/publications/technical2003/tr54-03.pdf> [Accessed 30 December, 2017].
- Rippl, S. (2002). Cultural theory and risk perception: A proposal for a better measurement. *Journal of Risk Research*, 5(2), 147–165.
- Siegrist, M., & Cvetkovich, G. (2000). Perceptions of hazards: The role of social trust and knowledge. *Risk Analysis*, 20(5), 713–719.
- Sjöberg, L. (2000). Factors in risk perception. *Risk Analysis*, 20(1), 1–11.
- Slovic, P., Finucane, M.L, Peters, E, & MacGregor, D.G. (2004). Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality. *Reason, Risk and Rationality. Risk Analysis: an International Journal*, 24(2), 311–322.
- Smith, M. D., & Wilen, J. E. (2005). Heterogeneous and correlated risk preferences in commercial fishermen: The perfect storm dilemma. *Journal of Risk and Uncertainty*, 31(1), 53–71.
- Tadesse, S., Bezabih, K., Dewstaw, B., & Assefa, Y. (2016). Awareness of occupational hazards and associated factors among welders in Lideta. *Journal of Occupational Medicine and Toxicology*, 1–6. doi:10.1186/s12995-016-0105-x
- United Nations. (1992). *Convention on biological diversity*. Rio De Janeiro, Brazil: United Nations.
- Whitlock, G., Norton, R., Clark, T., Jackson, R., & Macmahon, S. (2004). Motor vehicle driver injury and marital status: A cohort study with prospective and retrospective driver injuries. *Journal of Epidemiology and Community Health*, 57(7), 33–36.
- Wildavsky, A., & Dake, K. (1990). Theories of risk perception: Who fears what and why? *Daedalus*, 119(4), 41–60.
- 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.
- Wong, L. P. (2008). Focus group discussion: A tool for health and medical research. *Singapore Medical Journal*, 49(3), 256–261.
- Zajonc, R. B., Fazio, R. H., & Petty, R. E. (2008). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35(2), 151–175.