Gendered predictors of the impact of COVID-19 on cross-border fish trade in Zambia and Malawi

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Abstract

Purpose – While the literature has highlighted the impacts of COVID-19, there is limited evidence on the gendered determinants of the impact of COVID-19 among small-scale rural traders in developing and emerging economies.
Design/methodology/approach – Cross-border fish traders who had operated before and during the COVID-19 pandemic were interviewed in a survey conducted in Zambia and Malawi. Logistic regressions among male and female traders were employed to assess the gendered predictors.
Findings – Heterogeneous effects in geographical location, skills, and knowledge were reported among male cross-border traders. Effects of household structure and composition significantly influenced the impact of COVID-19 among female traders. Surprisingly, membership in trade associations was associated with the high impact of COVID-19.
Research limitations/implications – Due to the COVID-19 pandemic and the migratory nature of cross-border fish traders, the population of cross-border fish traders at the time of the study was unknown and difficult to establish, cross-border fish traders (CBFT) at the landing sites and market areas were targeted for the survey without bias.
Originality/value – This paper addresses a gap in the literature on understanding gendered predictors of the impacts of COVID-19 among small-scale cross-border traders.

Keywords Cross-border trade, Gender, COVID-19, Zambia, Malawi
Paper type Research paper

1. Introduction

COVID-19 and its associated containment measures have severely disrupted food supply chains affecting nutrition, incomes, livelihoods and well-being of most people across the globe. Small businesses and traders have faced negative impacts from the pandemic, further aggravating existing vulnerabilities and inequalities in access to employment and economic livelihoods (Hadjielias *et al.*, 2022; Adams-Prassl *et al.*, 2020; Alon *et al.*, 2020). There have been fears that COVID-19 will likely exacerbate existing gender inequalities in employment opportunities, livelihoods, food security, and, well-being (Dang and Nguyen, 2021; Ragasa *et al.*, 2021; Alon *et al.*, 2020). Therefore, applying a gender lens in examining the impacts of COVID-19 and mitigation strategies will guide in designing appropriate and effective policy measures to promote gender equity.

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Fisheries and aquatic food value chains play a critical role in food security, nutritional well-being, employment and livelihoods provision (Byrd *et al.*, 2021; FAO, 2020). The global fisheries employ an estimated 120 million people; developing countries account for 97% of the global small-scale fisheries workforce, engaging an estimated 104.4 million people (World Bank, 2012). Almost half of the workforce comprises women mainly involved in post-harvest activities (World Bank, 2012). Fish provides an essential source of animal proteins, micronutrients and omega-3 fatty acids (FAO, 2020). During a global health pandemic, as in the case of COVID-19, vital nutrients are important for nutritional well-being. Despite the important role played by fisheries and aquatic value chains, they have experienced significant disruptions due to COVID-19. These disruptions have particularly affected small-scale fish traders in developing economies (Belton *et al.*, 2021; Lau *et al.*, 2021).

Small-scale fish traders mainly trade in domestic markets and some through cross-border fish trade (Kakwasha *et al.*, 2020). Cross-border trade is characterized by crowding in fish landing sites and in market areas. Physical distancing is, therefore, difficult to implement, which further poses risks of COVID-19 infection (FAO, 2020; Okyere *et al.*, 2020). During COVID-19, the general public adhered to set sanitary measures like physical distancing to mitigate the spread of COVID-19. COVID-19 mitigation strategies like border closures and mandatory quarantine have been implemented in various countries. Cross-border fish traders (CBFT) who derive their livelihoods by crossing neighboring countries for trade may face vulnerability to such measures. Therefore, there is a need to assess the impact of such measures on CBFT and their adaptive strategies.

Literature has highlighted the various impacts of COVID-19, for instance, on food security (Kansiime *et al.*, 2021; Sharma *et al.*, 2021), employment and jobs (Adams-Prassl *et al.*, 2020; Alon *et al.*, 2020), agricultural productivity (Irawan *et al.*, 2021; Ragasa *et al.*, 2021), input and output market access (Belton *et al.*, 2021). Some strands of literature have also shed light on the adaptive capacity and resilience of the populace to COVID-19 (Ouoba and Sawadogo, 2022; Love *et al.*, 2021); with some literature focused on the impact of COVID-19 on fisheries and aquaculture (Bassett *et al.*, 2021; Belton *et al.*, 2021; Lau *et al.*, 2021; Love *et al.*, 2021). However, there is limited evidence on gendered predictors of the impact of COVID-19 among small-scale rural traders in developing and emerging economies.

This study fills this gap by assessing gendered predictors of the impacts of COVID-19 on cross-border fish traders. We apply logistic regression models for male and female CBFT to assess the differential effects. The next section reviews literature on small-scale cross-border trade and the gendered impacts of COVID-19. The subsequent section presents the data and methods, results and discussion. Finally, the paper concludes with key recommendations to guide COVID-19 mitigation strategies and recommendations for further studies.

2. Literature review

2.1 Small-scale cross-border trade

Cross-border trade provides a main source of income and livelihoods for households in border areas of most African countries (World Bank, 2011). Small-scale cross-border trade involves the physical movement of goods and traders across neighboring countries' borders, contributing to social and economic exchanges (Kahiya and Kadirov, 2020). In the Southern African Development Community (SADC), of which Malawi and Zambia are members, small-scale cross-border trade is estimated at US$17.6 billion per year, representing 30–40% of the total regional trade (World Bank, 2011). Agricultural goods form the majority of trade exchanges in cross-border trade (UNCTAD, 2019; Njiwa *et al.*, 2012). Studies have shown that cross-border traders across Africa are mainly women, ranging from 65% to 85% (Kahiya and Kadirov, 2020; Mbo'o-Tchouawou *et al.*, 2016; Brenton *et al.*, 2011; World Bank, 2011; UN Women, 2012). Therefore, the gender dimension to the assessment of cross-border trade cannot be over-emphasized.

Though cross-border trade addresses important livelihood issues for small-scale traders, its contribution to countries' economies appears to be neglected by mainstream trade policies and institutions (Kahiya and Kadirov, 2020; UNCTAD, 2019). Measuring the magnitude and extent of cross-border trade remains a pressing challenge (UNCTAD, 2019). The trade exchanges through cross-border trade are usually not recorded by customs offices, making it difficult to track the traded volumes (Bensassi and Jarreau, 2019; Mbo'o-Tchouawou *et al.*, 2016). Although each consignment is typically small, thousands of traders cross borders daily and at times, multiple times a day, to purchase and sell wares. Therefore, the aggregate volumes traded are substantial (World Bank, 2011; Mbo'o-Tchouawou *et al.*, 2016). The small consignments are majorly transported by bicycles, hand carts, motorcycles, and physically by foot across the borders.

Some strands of literature refer to this trade as informal cross-border trade (ICBT) (Kahiya and Kadirov, 2020; World Bank, 2011). As highlighted by UNCTAD (2019) and World Bank (2011), the informality of the cross-border trade does not imply illegality. In its purest form, small-scale cross-border trade involves importing and exporting goods by non-formally registered sole traders through legal channels (Kahiya and Kadirov, 2020). The traders go through official border posts and pay border fees to the immigration office (World Bank, 2011). However, some studies have reported pockets of illegal activities like smuggling goods across the borders and corruption (Bensassi and Jarreau, 2019; Amankwah-Amoah *et al.*, 2018).

Access to credit is a key challenge in cross-border trade (Njiwa *et al.*, 2012). Due to their small-scale and informal nature of operations, access to credit from financial institutions is limited (World Bank, 2011). The start-up capital in cross-border trade is usually small, ranging from $30 to $50, primarily sourced from family, friends, and own savings (Kahiya and Kadirov, 2020; Njiwa *et al.*, 2012; Titeca and Kimanuka, 2012; World Bank, 2011). Literature has also shown that most small-scale businesses control adversity and avoid risks related to external debt by soliciting funds from family and friends (Gill *et al.*, 2018). Despite the perceived informality, trade associations are a common feature in cross-border trade. The associations play an important role as liaison bodies with border authorities; in offering savings and credit, marketing, trade information and training (Mbo'o-Tchouawou *et al.*, 2016; Njiwa *et al.*, 2012; Titeca and Kimanuka, 2012).

The heterogeneity of cross-border trade has been linked to geographic factors, skills, resource endowments and household structure (Kahiya and Kadirov, 2020; Mbo'o-Tchouawou *et al.*, 2016; Njiwa *et al.*, 2012). Household dependents have been associated with increased responsibilities and a low trade intensity by cross-border traders (Njiwa *et al.*, 2012). Similarly, family members' roles in providing finance, advisory services and social support to small-scale businesses have been highlighted (Chua *et al.*, 2011; Gill *et al.*, 2018). The level of experience in the trade may positively impact business longevity due to established networks and goodwill (Gill *et al.*, 2018; Kahiya and Kadirov, 2020). Well-educated traders may survive business risks because of diversified incomes and the knowledge of maneuvering formal and informal divide in trade exchanges (Kahiya and Kadirov, 2020; Titeca and Kimanuka, 2012).

2.2 Gendered impacts of COVID-19

COVID-19 has resulted in heightened mitigation measures, including border closures, market closures, lockdowns and mandatory quarantines, impacting both men and women. Rapid price fluctuations for inputs and outputs have similarly been reported in the wake of the pandemic (Belton *et al.*, 2021; Irawan *et al.*, 2021). The measures have disrupted transportation (Belton *et al.*, 2021; Liverpool-Tasie *et al.*, 2021), which may have severe implications for traders of fresh products like fresh fish. High business losses during COVID-19 have been experienced among traders of perishable products (Ouoba and Sawadogo, 2022). Rebounding from the losses occasioned by COVID-19 may be daunting especially among women traders whom literature has shown to have low access to capital and credit (Chaudhuri *et al.*, 2020).

Prior to COVID-19, studies had shown that women fish traders faced a myriad of challenges including gender-based violence, resource constraints, household care burdens and socio-cultural exclusion (Manyungwa *et al.*, 2019; Nagoli *et al.*, 2019). There is a risk that the COVID-19 pandemic could further aggravate these constraints. COVID-19 has caused major disruptions in intra-household roles and schedules due to, for instance, school closures and taking care of sick family members ailing from COVID-19. These roles hugely fall on women (Manyungwa *et al.*, 2019). Women have reported increased workload related to household chores and child care during COVID-19 (Ragasa *et al.*, 2021; Alon *et al.*, 2020). Despite the increased demand for time on care and household chores, cultural beliefs and attitudes on the role of men and women shape intra-household harmony and participation in productive activities, particularly during shocks and crises (Peterman *et al.*, 2020; Nagoli *et al.*, 2019).

Strong social networks can help with resilience during crises by offering market information, market connections and credit (Mwema *et al.*, 2021; Mwema and Crewett, 2019; Gill *et al.*, 2018). Strong social networks are particularly important for female-managed enterprises, which often have less access to resources, financial services, technical assistance, and market connections; experiencing low productivity rates (Chaudhuri *et al.*, 2020; Rijkers and Costa, 2012). Social networks like associations have been used to ease market disruptions arising from COVID-19 (Love *et al.*, 2021; Bennett *et al.*, 2020). In South Africa, fish associations have facilitated online marketing and home deliveries (Bennett *et al.*, 2020). Producer organizations have offered a ready market for their members, easing the effects of low demand arising from the COVID-19 pandemic (Love *et al.*, 2021).

In crises, social protection programs are policy tools that may avert adverse impacts among vulnerable groups (FAO, 2021). In developing economies, these programs do not always reach the most vulnerable groups (Hidrobo *et al.*, 2020; Ragasa *et al.*, 2021). The amounts of money disbursed are, at times, minimal (Belton *et al.*, 2021). The wide informality of the small-scale cross-border traders, may further impede access to social protection programs (FAO, 2021; Love *et al.*, 2021).

Men and women have employed several coping mechanisms to remain in business and sometimes to diversify and spread their risk. For example, due to limited mobility resulting from COVID-19, the use of ICT and mobile money has been critical in facilitating marketing and making payments (Belton *et al.*, 2021; Lau *et al.*, 2021; Manlosa *et al.*, 2021). Use of personal savings or selling personal items to cope with shocks from COVID-19 have been reported as coping mechanisms (Kansiime *et al.*, 2021; Lau *et al.*, 2021; Ragasa *et al.*, 2021). Bribery cases have been reported as coping strategies to circumvent lockdown measures (Belton *et al.*, 2021). In other studies, small-scale traders have been found to adjust more quickly to market demand by providing direct sales to consumers during the COVID-19 period (Love *et al.*, 2021; FAO, 2020).

3. Data and methods

3.1 Study area

The study was conducted at the border sites of river Luangwa in Zambia and Lake Chilwa in Malawi. In Zambia, River Luangwa is the third largest water basin bordering Malawi to the east and Mozambique and Zimbabwe to the south. The river covers 145,690.33 km^2 within the Zambian territory and stretches over five provinces in Zambia. Lake Chilwa is Malawi's second-largest lake, covering an estimated 2,000 km^2. The Lake Chilwa Basin covers three administrative districts and borders Mozambique to the east. Zambia, Malawi and Mozambique are members of the SADC, which has witnessed phases of regional integration, including a customs union and a common market - facilitating cross-border trade (UNCTAD, 2019).

Cross-border fish traders at the Luangwa border in Zambia and Chunguma Center in Malawi were interviewed. These sites were selected as they border Mozambique and have large numbers of CBFT.

3.2 Data collection

A survey was conducted in November 2021, using a semi-structured questionnaire administered in the KOBO toolbox. A total of 252 CBFT, 127 from Zambia and 125 from Malawi were physically interviewed.

This study follows a reconnaissance survey conducted in the study areas to establish the sampling procedure as well as other objectives beyond the scope of this paper. Before COVID-19, 190 and 110 CBFT were estimated to trade across the borders of Luangwa and Chunguma, respectively, every week. Most traders would travel across the border once a week for trade. Due to the COVID-19 pandemic and the migratory nature of cross-border traders, the population of cross-border fish traders at the time of the study was unknown and difficult to establish. Given that the population was abstract, it was impossible to obtain a list of all members of the focal population. The participants were therefore screened for inclusion based on criteria associated with the target population. All the CBFT at the landing sites and market areas were eligible and targeted without bias in the study. The following selection criteria were used to screen the respondents for the interviews:

(1) Must be a cross-border fish trader

(2) The cross-border fish trader must have operated for a minimum of two years to capture the period before and during COVID-19

(3) Must consent to be interviewed

For the scope of this paper, the questionnaire covered questions on trader's characteristics, COVID-19 impact on trade activities, coping strategies, trade and market characteristics, social protection and social networks.

3.3 Data analysis

The data was analyzed using STATA 16.0. Descriptive statistics and logistic regression models were used. The various factors that could influence the impact of COVID-19 were assessed for both male and female CBFT. These factors included traders' characteristics, market characteristics, coping strategies for COVID-19, social networks and social protection.

This study predicted the occurrence of high impact of COVID-19 among CBFT, or otherwise. The logit model was used as it predicts the likelihood of occurrence of a binary categorical variable (Greene, 2000). The model predicts the logit of the response variable (y) from the explanatory variables (x). The logit is the natural logarithm (ln) of odds of y. Odds are ratios of probabilities of y occurring to probabilities of y not occurring.

The general logit model is expressed as follows:

$$\text{Logit}\left(\mathrm{y_i}\right) = \ln\left(\frac{p(y_i = 1)}{1 - p\,(y_i = 1)}\right) = \alpha + \beta_1 \mathrm{x_{1i}} + \beta_2 \mathrm{x_{2i}} + \beta_3 \mathrm{x_{3i}} \ldots\ldots\ldots \beta_k \mathrm{x_{ki}} + \varepsilon_i \quad (1)$$

Where, $\mathrm{y_i}$ is the dependent binary variable, coded as 1 if the CBFT reports high impact of COVID-19, and 0 if otherwise, α is the intercept. β_1, β_2, $\beta_3 \ldots \beta_k$ are the coefficients of the explanatory variables. $\mathrm{x_1}$, $\mathrm{x_2}$, $\mathrm{x_3} \ldots \mathrm{x_k}$ are the explanatory variables, and ε is the error term.

This study estimated two logit models; the first model was for female CBFT and the second for male CBFT. The significance of the two logit models and how well the data fits the models were assessed by log-likelihood ratios (Greene, 2000). Variance inflation factor (VIF)

was used to determine the level of multi-collinearity between the explanatory variables. All the explanatory variables in the models reported VIF ranging from 1.05 to 3.32 indicating no multi-collinearity.

4. Results

4.1 Descriptive statistics

This section presents the descriptive statistics, comparing the results of the male and female CBFT. Pearson correlation tests were used for categorical variables and ANOVA tests for continuous variables.

4.1.1 Impact of COVID-19 on cross-border fish trade. We asked the respondents to mention the severity of the impact of COVID-19 on their cross-border trade: 60.47 and 58.75% of the females and males, respectively, reported a high impact of COVID-19. The remaining proportions (39.53% of the females, 41.25% of the males) reported moderate to no impact.

As presented in Table 1, border closures posed the greatest impact on the cross-border trade activities. 68.75 and 70% of males and females, respectively, reported being affected by border closures. Due to border closures, rampant corruption and harassment by police officers was experienced by the traders. Physical distancing was mentioned by 41.25% of male and 40.12% of female CBFT. The CBFT mentioned that it was almost difficult to maintain physical distancing resulting in harassment by the authority enforcing the measures. A higher proportion of males were affected by restrictions in in-country movement than females (Table 1).

4.1.2 Trader's characteristics. As presented in Table 2, 53.49% of the female traders were from Zambia and 56.25% of the male traders were from Malawi. The average years of education across the male and female CBFT was six years, corresponding to grade six of primary education. Male traders reported significantly (p-value<0.05) more years of experience in cross-border trade compared to the female traders. On household type, half of the males (50%) reported that their households were managed by both a male and a female head, while only 38.37% of the females were managed as so. The male traders reported a slightly higher family size (6.3) than females (6.04).

4.1.3 Social networks and source of capital. The respondents were asked if they were members of a trade association, a trade group or a cooperative; 40% of the males and 44.18% of the females were members of a trade group or association. Regarding the source of capital (Table 3), most traders used their savings to start-up cross-border trade. A higher proportion of males (85%) than females (56.4%) used their personal savings. Almost 20% of the females accessed capital from their spouses; none of the males reported accessing capital from their spouses. A higher proportion of female CBFT accessed capital from associations as compared to male traders.

4.1.4 Trade and market characteristics. On the type of fish traded (Table 4), all the respondents traded in processed fish (smoked, dried, salted). Additionally, some of the CBFT also traded in fresh fish. A slightly higher proportion of female (54.07%) than males (42.5%) traded in fresh fish.

Table 1. Effects of COVID-19 containment measures

	Female (n = 172)	Male (n = 80)	p-value
Mandatory quarantine	16.25	18.6	0.726
Border closures	68.75	70.35	0.883
In-country travel restrictions	16.25	11.63	0.321
Physical distancing	41.25	40.12	0.891
School closure	12.5	16.28	0.571

A majority of both male and female CBFT reported increased purchase prices of fish during COVID-19 (>75%). To assess the competition levels, we asked if male and female CBFT have increased during the COVID-19 period. At least 40% of both female and males reported an increased number of female CBFT. More than half of the females (54.07%) and 42.5% of the males reported an increased number of male CBFT. We asked the study participants about their cross-border trips before COVID-19 pandemic. The results show that females and males took almost a similar number of trips in a year to source fish, 34.64 and 33.58 trips, respectively.

4.1.5 COVID-19 coping strategies and social protection. Respondents were asked to mention the coping strategies they used to avert the impact of COVID-19 on their trade activities (Figure 1). The majority of the traders bribed border officials to cross the border during border closures and to cross without a COVID-19 certificate. A larger proportion of females (49.42%) than males (35%) engaged in bribery. Some traders reported to use undesignated border points to avoid the border officials; a larger proportion of males (12.50%) than females (6.98%) used undesignated border crossing. Similarly, a higher proportion of female traders used middlemen to cross the borders whilst a higher proportion of male traders diversified into other businesses. On average, both the male and female CBFT applied one coping strategy to avert the impact of COVID-19 on their businesses.

The proportion of those who accessed social protection was below 5%; more females (6%) than males (2.5%) accessed social protection programs. The social protection programs comprised of cash transfers, food aid, and funds disbursement for SMEs. Due to the low numbers, the social protection variable was omitted from the logistic regression models.

	Female (n = 172)	Male (n = 80)	p-value
Country (1 = Zambia)	53.49%	43.75%	0.150
Experience (Years)	8.76	11.06	0.017
Household type (1 = Male and female-headed)	38.37%	50%	0.082
Household size	6.04	6.3	0.466
Education (Years)	6.05	6.34	0.542

Table 2. Trader's characteristics

	Female (n = 172)	Male (n = 80) (%)
Own savings	85.0%	56.4
Spouse	–	19.2
Relatives and friends	10.0%	11.6
Associations	2.5%	8.1
Microfinance and banks	2.5%	4.7

Table 3. Sources of capital

	Female (n = 172)	Male (n = 80)	p-value
Fish type (1 = Fresh)	54.07%	42.5%	0.486
Price increase	76.16%	75%	0.841
Increase in female competitors (1 = yes)	42.44%	40%	0.087
Increase in male competitors (1 = yes)	54.07%	42.5%	0.714
Trips to source	34.64	33.58	0.817

Table 4. Market and trade characteristics

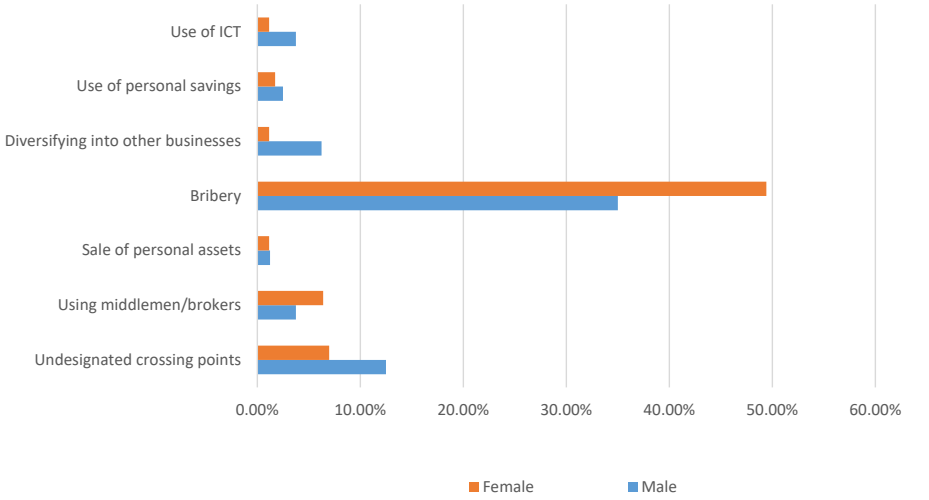

Figure 1.
COVID-19 coping strategies among male and female cross-border fish traders

4.2 Logistic regression estimates

Logistic regression models for male and female cross-border fish traders were used to assess predictors of high impacts of COVID-19. Table 5 presents the odds ratios and *p*-values of the explanatory variables in predicting the likelihood of high impact of COVID-19.

4.2.1 Traders' characteristics. Heterogeneous effects in geographical location, experience and education level were reported among male CBFT. Among female CBFT, effects of household structure and composition were reported. Coded as 1 for Zambia and 2 for Malawi, the odds of male CBFT in Zambia facing high impact of COVID-19 were significantly lower than in Malawi (p-value = 0.081). Male CBFT in Malawi were more likely to face high impact of COVID-19 compared to Zambia. An increase in a year of experience significantly decreased the odds of facing high impact of COVID-19 at 90% confidence level (p-value = 0.074), among males. Therefore, more experienced male CBFT were less likely to be impacted by COVID-19.

	Female (n = 172)			Male (n = 80)		
	Odds ratio	Z	$p>\|z\|$	Odds ratio	Z	$p>\|z\|$
Country	0.424	−1.13	0.260	4.706*	1.74	0.081
Experience	1.022	1.02	0.307	0.875*	−1.78	0.074
Household size	1.204**	2.13	0.033	0.860	−1.31	0.191
Education	0.968	−0.52	0.604	0.852*	−1.81	0.070
Household type	0.349**	−2.43	0.015	0.543	−1.08	0.281
Membership to associations	8.366***	3.98	0.000	1.118	0.16	0.876
Fish type	0.522	−1.29	0.196	0.807	−0.34	0.735
Price	5.736***	3.69	0.000	1.117	0.17	0.866
Trips to source	0.998	−0.37	0.709	1.000	0.02	0.986
Coping strategy	0.586**	−1.93	0.050	0.917	−0.24	0.812
Constant	0.204	−1.47	0.143	87.417	2.71	0.007
	Prob > χ^2 = 0.000			*Prob* > χ^2 = 0.011		
	log likelihood = −90.070			*log likelihood* = −46.430		

Note(s): Significance levels: *** 0.001 **0.05 *0.10

Table 5.
Logit estimates on the likelihood of high impact of COVID-19

Among female CBFT, an additional family member increased the odds of being adversely impacted by COVID-19 (p-value = 0.033). Female CBFT with larger family sizes were more likely to face higher impacts of COVID-19 than those with smaller family sizes, at 95% confidence level. Female CBFT in households managed by both male and female heads were less likely to face high impact of COVID-19 as compared to those in single-headed households (p-value = 0.015). This implies that female CBFT in households with shared household management were less likely to face high impact of COVID-19, at 95% confidence level.

4.2.2 Social networks. Membership in trade associations as a proxy for social networks significantly influenced the impact of COVID-19 among female CBFT at 90% confidence level. Beyond *apriori* expectations, the odds of facing high impact of COVID-19 were higher for female association members than for non-members.

4.2.3 Trade and market characteristics. On market effects, increases in purchase prices of fish significantly increased the odds of high impact of COVID-19 among female CBFT (p-value = 0.000). Female traders who reported increased fish purchase prices were more likely to face high impacts of COVID-19 than those who did not.

4.2.4 COVID-19 coping strategies. The number of coping strategies employed by female CBFT significantly influenced the impact of COVID-19 at 99% confidence level. Female CBFT adopting more coping strategies were less likely to face high impact of COVID-19.

5. Discussion

This paper presented a gendered analysis of the predictors of high impact of COVID-19, using a case of cross-border fish traders in Zambia and Malawi. We found out that both male and female CBFT were vulnerable to COVID-19. However, a higher proportion of female CBFT reported facing high impact of COVID-19 than males. Border closures were largely associated with the high impact of COVID-19 faced by cross-border traders. Border closures and bans have had far-reaching effects on cross-border trade. In West Africa, trade barriers and import bans contributed to bribery cases and limited trade opportunities for cross-border traders (Bensassi and Jarreau, 2019). The impact has been found severe for CBFT solely depending on cross-border trade for their livelihoods, most of whom are women (Manyungwa *et al.*, 2019; Njiwa *et al.*, 2012; Titeca and Kimanuka, 2012; Brenton *et al.*, 2011; World Bank, 2011).

The logit model depicted a negative association between the number of coping strategies employed and the high impact of COVID-19 among female traders. To continue with the trade, female CBFT predominantly engaged in costly coping strategies such as paying bribes and using middlemen – further eroding the profits. Male CBFT paid bribes, used undesignated border crossing points and diversified into other businesses. Diversifying income sources has been highlighted as a coping strategy which men, in particular, have applied to cope with the effects of COVID-19 (Kansiime *et al.*, 2021). Bribery has been reported as a coping strategy to facilitate the transportation of goods during COVID-19 lockdowns (Belton *et al.*, 2021; Liverpool-Tasie *et al.*, 2021). Households with diversified income, personal savings and food sources have been found to cope better during COVID-19 (Manlosa *et al.*, 2021; Kansiime *et al.*, 2021; Ragasa *et al.*, 2021).

Contrary, other studies have found escalated use of ICT during COVID-19, for instance, online marketing and mobile money (Belton *et al.*, 2021; Manlosa *et al.*, 2021). In this study, use of ICT was not a widespread coping strategy. Low ICT usage could be associated with a not-well-developed ICT infrastructure in the study areas, for instance, the poor network connectivity.

Contrary to *apriori* expectations, membership in trade associations increased the odds of high impact of COVID-19 among female CBFT. In the study areas, trade associations have played a key role in facilitating cross-border fish trade in the pre-COVID period, including offering support in fish marketing and credit. Women form the majority of the members of the

associations. During COVID-19, the operations of the trade associations were adversely affected, resulting in limited or no operations. At the time of the interviews, operations of the main trade association at Luangwa were halted. Suspended trade associations' operations could explain why the members of the associations were more likely to be impacted by COVID-19. Contrary findings have been reported in other studies where members of trade associations and network groups have benefited in exploring new markets via the associations during COVID-19 (Bassett *et al.*, 2021; Bennett *et al.*, 2020). Savings and credit groups have also been found important in household access to loans for consumption smoothing during COVID-19 (Kansiime *et al.*, 2021).

Purchase price sensitivities among female CBFT were reported. Female traders were more likely to be adversely impacted by COVID-19 with increases in the purchase price of fish. COVID-19 has been associated with temporal fluctuation in retail fish prices (Belton *et al.*, 2021), affecting traders' profit margins. Studies show female traders to exhibit low price negotiation power (Rijkers and Costa, 2012), which could explain the findings. Similarly, the increased cost of operations due to bribery and the use of middlemen reported by most female traders in this study renders them increasingly sensitive to price increases.

This study predicted a negative association between years of experience in cross-border trade and the high impact of COVID-19 among male traders. This negative association could be attributed to accumulated skills, assets and resources over time among the more experienced traders, providing a buffer from adverse impact of COVID-19. Similarly, educated male traders were negatively associated with high impact of COVID-19. Studies focusing on the impacts of COVID-19 have reported similar results. Adams-Prassl *et al.* (2020) found that more educated workers faced a higher likelihood of job loss due to COVID-19.

Male traders from Malawi were more likely to be impacted by COVID-19 than those from Zambia. In Malawi, lockdowns and restricted movement were more severe than in Zambia. The government of Malawi similarly imposed restrictions on movements across districts. Other studies have reported country heterogeneity due to differences in severity of containment measures and COVID-19 infection rates across the countries (Dang and Nguyen, 2021; Adams-Prassl *et al.*, 2020). At the time of the interviews, some male CBFT reported having sent their female spouses to source and sell fish across the border due to increased physical harassment and violence against men. Some male CBFT had been reported to be killed by police enforcing COVID-19 mitigation measures. The increased physical harassment by the police and increased violence against men during the COVID-19 period could have plausible effects on the findings.

The logit model predicted a positive association between family sizes and high impact of COVID-19 among female CBFT. This is plausible as larger family sizes reflect an increased burden with regard to both managing household chores and livelihood provision. School closures have resulted in an increased need for taking care of the children, which has further increased the time allocated for household chores and care needs (Ragasa *et al.*, 2021; Alon *et al.*, 2020). This may have huge implications for CBFT who must be away from home for a period of time engaging in the trade. In Myanmar, female farmers were more likely to report increased workload related to household chores and care during COVID-19 (Ragasa *et al.*, 2021). Larger family sizes similarly imply the need for higher income for livelihood provision, which can be constraining in the wake of income erosion due to COVID-19. A study in Ethiopia showed that larger family sizes were associated with low participation in non-farm enterprises among women (Rijkers and Costa, 2012).

Female CBFT in households managed by both male and female heads were less likely to face high impacts of COVID-19, owing to possibly two income streams. Similarly, our data shows that a proportion of female CBFT sourced capital from the male spouses to finance the cross-border trade. Therefore, the important role of family members in financing businesses could explain the results (Chua *et al.*, 2011; Gill *et al.*, 2018). In cases where the female trader is

from a household solely managed by a male head, low stakes in decision-making and agency could hinder business continuity in the wake of COVID-19 impacts (Banerjee *et al.*, 2020; García *et al.*, 2021).

6. Conclusion and recommendations

Using logistic regressions, this paper analyses predictors of high impact of COVID-19 among female and male cross-border fish traders in Zambia and Malawi. The findings show heterogeneous effects of geographical, skills, knowledge and household factors in influencing high impact of COVID-19 on cross-border trade. Educated and experienced male traders were less likely to face high impact of COVID-19. Male traders from Malawi were more likely to face high impact of COVID-19 than those from Zambia. In contrast, female traders with larger family sizes and from households managed by single-heads were more likely to face high impact of COVID-19. Increased purchase prices were associated with high impact of COVID-19 among female traders. Surprisingly, members of trade associations were more likely to face high impact of COVID-19.

Male and female cross-border fish traders faced trade disruptions from COVID-19 containment measures, especially border closures. The traders engaged in costly and risky coping strategies like bribery, using middlemen and undesignated crossing points to continue with their business. Therefore, there is a need for favorable policy interventions in facilitating border crossing among cross-border traders, for instance, categorizing them as 'essential services'. This will greatly minimize women's vulnerability as they form the majority of cross-border fish traders and have less diversified income opportunities.

The need for empowering small-scale trade associations to cope with shocks like COVID-19 has been highlighted in this study. Due to disruptions in the operations of trade groups and associations, members received less support than usual and were, therefore, more likely to face high impact of COVID-19. Capacity building and financial empowerment of the associations could provide a pathway to offering a buffer to their members during a crisis.

This study similarly identifies the effects of household composition and structure on the impact of COVID-19. We recommend further in-depth qualitative studies to unpack the gender norms relating to cross-border trade and the impacts of COVID-19. This study's findings can inform policy discourse in similar regional contexts, including cross-border trade in other perishable items besides fish. Further research could delve into the actual income losses of small-scale trade due to COVID-19. In conclusion, this study offers an understanding of the gendered influences on the impact of COVID-19 among cross-border fish traders in Zambia and Malawi.

References

Adams-Prassl, A., Boneva, T., Golin, M. and Rauh, C. (2020), "Inequality in the impact of the coronavirus shock: evidence from real-time surveys", *Journal of Public Economics*, Vol. 189.

Alon, T.M., Doepke, M., Olmstead-Rumsey, J. and Tertilt, M. (2020), "The impact of COVID-19 on gender equality", NBER Working Paper No. 26947, National Bureau of Economic Research, Cambridge.

Amankwah-Amoah, J., Debrah, Y.A. and Nuertey, D. (2018), "Institutional legitimacy, cross-border trade and institutional voids: insights from the cocoa industry in Ghana", *Journal of Rural Studies*, Vol. 58, pp. 136-145.

Bassett, H.R., Lau, J., Giordano, C., Suri, S.K., Advani, S. and Sharan, S. (2021), "Preliminary lessons from COVID-19 disruptions of small-scale fishery supply chains", *World Development*, Vol. 143, 105473.

Banerjee, S., Alok, S. and George, B. (2020), "Determinants of women empowerment as measured by domestic decision-making: perspective from a developing economy", in Barnett, W.A. and Sergi,

B.S. (Eds), *Advanced Issues in the Economics of Emerging Markets (International Symposia in Economic Theory and Econometrics)*, Emerald Publishing Limited, Bingley, Vol. 27, pp. 1-12.

Belton, B., Rosen, L., Middleton, L., Ghazali, S., Mamun, A., Shieh, J., Noronha, H.S., Dhar, G., Ilyas, M., Price, C., Nasr-Allah, A., Elsira, I., Baliarsingh, B.K., Padiyar, A., Rajendran, S., Mohan, A.B.C., Babu, R., Akester, M.J., Phyo, E.E. and Thilsted, S.H. (2021), "COVID-19 impacts and adaptations in Asia and Africa's aquatic food value chains", *Marine Policy*, Vol. 129, 104523.

Bennett, J.N., Finkbeiner, E.M., Ban, N.C., Belhabib, D., Jupiter, S.D., Kittinger, J.N., Mangubhai, S., Scholtens, J., Gill, D. and Christie, P. (2020), "The COVID-19 pandemic, small-scale fisheries and coastal fishing communities", *Coastal Management*, Vol. 48 No. 4, pp. 336-347.

Bensassi, S. and Jarreau, J. (2019), "Price discrimination in bribe payments: evidence from informal cross-border trade in West Africa", *World Development*, Vol. 122, pp. 462-480.

Brenton, P., Bucekuderhwa, C.B., Hossein, C., Nagaki, S. and Ntagoma, J.B. (2011), *Risky Business: Poor Women Cross-Border Traders in Great Lake Region in Africa*, World Bank, Washington D.C.

Byrd, K., Thilsted, S. and Fiorella, K. (2021), "Fish nutrient composition: a review of global data from poorly assessed inland and marine species", *Public Health Nutrition*, Vol. 24 No. 3, pp. 476-486.

Chaudhuri, K., Sasidharan, S. and Raj, R.S.N. (2020), "Gender, small firm ownership, and credit access: some insights from India", *Small Business Economics*, Vol. 54, pp. 1165-1181.

Chua, J., Chrisman, J., Kellermanns, F. and Wu, Z. (2011), "Family involvement and new venture debt financing", *Journal of Business Venturing*, Vol. 26 No. 4, pp. 472-488.

Dang, H.H. and Nguyen, C.V. (2021), "Gender inequality during the COVID-19 pandemic: income, expenditure, savings, and job loss", *World Development*, Vol. 140.

FAO (2020), *How Is COVID-19 Affecting the Fisheries and Aquaculture Food Systems*, FAO, Rome.

FAO (2021), *The State of Food and Agriculture (2021). Making Agrifood Systems More Resilient to Shocks and Stresses*, FAO, Rome.

García, M.A., Godek, W. and Twyman, J. (2021), "Joint decision-making and women's agency on small-scale farms in Colombia and Nicaragua", CIAT Publication No. 521, International Center for Tropical Agriculture (CIAT). Cali, Colombia, p. 24.

Gill, A., Singh, C.H.M., Bathinda, G., Obradovich, J.D. and Mathur, N. (2018), "The impact of financial support from non-resident family members on the financial performance of newer agribusiness firms in India", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 8 No. 2, pp. 303-319.

Greene, W.H. (2000), *Econometric Analysis*, 4th ed., Macmillan, London.

Hadjielias, E., Christofi, M. and Tarba, S. (2022), "Contextualizing small business resilience during the COVID-19 pandemic: evidence from small business owner-manager", *Small Business Economics*.

Hidrobo, M., Kumar, N., Palermo, T., Peterman, A. and Roy, S. (2020), *Gender-sensitive Social Protection. A Critical Component of the COVID-19 Response in Low- and Middle-Income Countries*, IFPRI Issue Brief, Washington, DC.

Irawan, A., Saefudin, S., Suryanty, M. and Yuliars, Z. (2021), "Impact of COVID-19 pandemic on the economy of oil palm smallholder's household income", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 1, p. 12.

Kahiya, E. and Kadirov, D. (2020), "Informal cross border trade as a substratum marketing system: a review and conceptual framework", *Journal of Macromarketing*, Vol. 40 No. 1, pp. 88-109.

Kakwasha, K., Simmance, F.A., Cohen, P.J., Muzungaire, L., Phiri, H., Mbewe, M., Mutanuka, E., Nankwenya, B., Wesana, J., Byrd, K., Pincus, L., de Bruyn, J., Chan, C.Y., Mills, D. and Siamudaala, V. (2020), *Strengthening Small-Scale Fisheries for Food and Nutrition Security, Human Well-Being and Environmental Health in Zambia*, WorldFish. Program Brief, Penang, pp. 2020-2041.

Kansiime, K.M., Tambo, J.A., Mugambi, I., Bundi, M., Kara, A. and Owuor, C. (2021), "COVID-19 implications on household income and food security in Kenya and Uganda: findings from a rapid assessment", *World Development*, Vol. 137, doi: 10.1016/j.worlddev.2020.105199.

Lau, J., Sutcliffe, S., Barnes, M., Mbaru, E., Muly, I., Muthiga, N., Wanyonyi, S. and Cinner, J.E. (2021), "COVID-19 impacts on coastal communities in Kenya", *Marine Policy*, Vol. 134, 104803, doi: 10.1016/j.marpol.2021.104803.

Liverpool-Tasie, L.S.O., Reardon, T. and Belton, B. (2021), "Essential non-essentials": COVID-19 policy missteps in Nigeria rooted in persistent myths about African food supply chains", *Applied Economic Perspectives and Policy*, Vol. 43, pp. 205-224, doi: 10.1002/aepp.13139.

Love, D.C., Allison, E.H., Asche, F., Belton, B., Cottrell, R.S., Froehlich, H.E., Gephart, J.A., Hicks, C.C., Little, D.C., Nussbaumer, E.M., Pinto da Silva, P., Poulain, F., Rubio, A., Stoll, J.S., Tlusty, M.F., Thorne-Lyman, A.L., Troell, M. and Zhang, W. (2021), "Emerging COVID-19 impacts, responses, and lessons for building resilience in the seafood system", *Global Food Security*, Vol. 28, 100494, doi: 10.1016/j.gfs.2021.100494.

Manlosa, A.O., Hornidge, A. and Schlüter, A. (2021), "Aquaculture-capture fisheries nexus under COVID-19: impacts, diversity, and social-ecological resilience", *Maritime Studies*, Vol. 20, pp. 75-85, doi: 10.1007/s40152-021-00213.

Manyungwa, C.L., Hara, M.M. and Chimatiro, S.K. (2019), "Women's engagement in and outcomes from small-scale fisheries value chains in Malawi: effects of social relations", *Maritime Studies*, Vol. 18, pp. 275-285, doi: 10.1007/s40152-019-00156-z.

Mbo'o-Tchouawou, M., Karugia, J., Mulei, L. and Nyota, H. (2016), "Assessing the participation of men and women in cross-border trade in agriculture: evidence from selected East African countries", Regional Strategic Analysis and Knowledge Support System, (ReSAKSS) Working Paper No. 38.

Mwema, C. and Crewett, W. (2019), "Social networks and commercialization of african indigenous vegetables in Kenya: a cragg's double hurdle approach", *Cogent Economics and Finance*, Vol. 7, 1642173.

Mwema, C.M., Crewett, W. and Lagat, J. (2021), "Smallholders personal networks in access to agricultural markets: a case of african leafy vegetables commercialization in Kenya", *Journal of Development Studies*, Vol. 57, p. 12.

Nagoli, J., Binauli, L. and Chijere, A. (2019), "Inclusive ecosystems? Women's participation in the aquatic ecosystem of lake Malawi", *Environments*, Vol. 6, p. 3, doi: 10.3390/environments6010003.

Njiwa, D., Nthambi, T. and Chirwa, J. (2012), "Reconnaissance survey report of informal cross border trade at STR implementing borders of Zambia, Malawi and Zimbabwe", Common Market for Eastern and Southern Africa, Lusaka, Zambia.

Okyere, I., Chuku, E.O., Ekumah, B., Angnuureng, D.B., Boakye-Appiah, J.K. and Mills, D.J. (2020), "Physical distancing and risk of COVID-19 in small-scale fisheries: a remote sensing assessment in coastal Ghana", *Scientific reports*, Vol. 10, 22407, doi: 10.1038/s41598-020-79898-4.

Ouoba, Y. and Sawadogo, N. (2022), "Food security, poverty and household resilience to COVID-19 in Burkina Faso: evidence from urban small traders' households", *World Development Perspectives*, Vol. 25, pp. 2452-2929, doi: 10.1016/j.wdp.2021.100387.

Peterman, A., Potts, A., O'Donnell, M., Thompston, K., Shah, N., Oertelt-Prigione, S. and Van Gelder, N. (2020), "Pandemics and violence against women and children", CGD Working Paper 528, Center for Global Development, Washington, DC.

Ragasa, C., Lambrecht, I., Mahrt, K., Aung, Z.W. and Wang, M. (2021), "Immediate impacts of COVID-19 on female and male farmers in central Myanmar: phone-based household survey evidence", *Agricultural Economics*, Vol. 52, pp. 505-523.

Rijkers, B. and Costa, R. (2012), "Gender and rural non-farm entrepreneurship", *World Development*, Vol. 40 No. 12, pp. 2411-2426, doi: 10.1016/j.worlddev.2012.05.017.

Sharma, J., Tyagi, M. and Bhardwaj, A. (2021), "Exploration of COVID-19 impact on the dimensions of food safety and security: a perspective of societal issues with relief measures", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 11 No. 5, pp. 452-471, doi: 10.1108/JADEE-09-2020-0194.

Titeca, K. and Kimanuka, C. (2012), "Walking in the Dark: Informal Cross-Border Trade in the Great Lakes Region", International Alert, United Kingdom.

UN Women (2012), *Final Report on the Assessment of Women Traders Engaged in Cross Border to Support Formation of Networks in Tanzania*, United Nations Entity for Gender Equality and the Empowerment of Women, New York.

UNCTAD (2019), *Borderline: Women in Informal Cross-Border Trade in Malawi, the United Republic of Tanzania and Zambia*, United Nations, Geneva.

World Bank (2011). "Facilitating cross-border trade between the DRC and neighbors in the great lakes region of Africa: improving conditions for poor traders", *Poverty Reduction and Economic Management Africa Region*, Report No.: 62992-AFR.

World Bank (2012), *Hidden Harvest: The Global Contribution of Capture Fisheries*, World Bank, New York.

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