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KNOWLEDGE, ATTITUDE AND PRACTICES RELATED TO WATER QUALITY AND FISH PARASITES AMONG RESIDENCE COMMUNITIES OF WARWADE RESERVOIR DUTSE, JIGAWA STATE, NIGERIA

***[1]Hamisu Idris Miga, [2] Armaya'u Hamisu Bichi and [2]Akeem Babatunde Dauda**

[1]Department of Fisheries and Aquaculture, Faculty of Agriculture, Federal University Dutse, Jigawa State, Nigeria.
[2]Department of Fisheries and Aquaculture, Faculty of Renewable Natural Resources, Federal University Dutsin-Ma, Katsina State, Nigeria.

*Corresponding authors' email: hi.miga@fud.edu.ng Phone: +2348030821259

ABSTRACT

Indigenous knowledge, attitudes, and practices (KAP) about fish parasitic and water quality parameters are poorly understood, such information is essential for preventive and sustainable management of water bodies. A community based cross-sectional study was carried out to assess the knowledge, attitudes, and practices (KAPs) of the resident communities of Warwade reservoir on water quality and fish parasites. One hundred and twenty questionnaires were administered to the respondents from the three randomly selected locations (Warwade, Zuwan-hawa and Tsauni-arewa) around the water body. The data was presented using descriptive statistics. The result showed that most of the respondents were aged between 21-30 years, representing 31.67%. Gender participation indicated that 66.67% of the respondent were male. The respondents in this study had a good level of knowledge on changes of the water quality of the reservoir, with a mean score of 68.33% with 75% of the participants had insufficient knowledge of entering pollutant/sewage into the reservoir. Some believed (41.67%) the pollutants are from agricultural and domestic wastes. Majority of the respondents (84.17%) had insufficient knowledge of fish parasites, while 75% strongly believed fish parasites is harmful for health. Majority (60%) of the respondents had sufficient knowledge that eating undercook fish/raw can result in acquiring fish parasites while 87.5% of the respondents had bad attitude and practice of washing their clothes in the reservoir and 81.66% swim/bath/paly around the reservoir. The study recommended health education activities in the communities, in order to change the perception of risks associated with changes of water quality and fish parasites transmission.

Keywords: Attitude, Fish parasites, Knowledge, Practices, Water Quality, Warwade

INTRODUCTION

Fish plays a vital role in providing food and income for many people in developing countries (Shadyeva *et al*., 2022). It is an affordable source of animal protein with a very long list of dietary and health benefits even over muscle meat (Tossavi *et al*., 2014). Fish is a nutrient-dense, affordable, available and much appreciated animal-source food commonly consumed across all income strata in Nigeria (National Bureau of Statistic, 2018). On average, fish accounts for about 50 percent of total protein intake in Nigeria (NBS, 2018). Consumption and demand for high fish protein is increasing due to its affordability (Sani *et al*., 2019). Also fishing is a means of livelihood for many people. Some countries earn foreign exchange and overcome food shortages faced by their growing populations through fish farming (Otor *et al*., 2016). Nigeria is a fish-eating country (Subasinghe *et al*., 2021). Between 1980 and 2013, the proportion of fish in animal-source food consumption increased from 36 percent to 42 percent (Liverpool-Tasie *et al*., 2018). This increased, makes it imperative to study the parasites of fish as it can constitute a public health problem for people who consume improperly processed fish meat, reduce fish marketability, employment opportunities and economic productivity.

To effectively support wild fish production, it is necessary to regularly assess fish for the presence of parasites. This practice can help to mitigate the negative impacts of parasites on fish populations and support the overall health and sustainability of capture fisheries. Thereby, serving as an indicator that the fish is healthy for consumption. In addition to the negative effects they can have on fish populations, parasites can also serve as environmental indicators to monitor the quality of aquatic environments (Unger *et al*., 2014). Certain anthropogenic activities have been well-known to promote water quality decline in aquatic environment. These activities comprise agriculture, application of manures, fertilizers, herbicides as well as pesticides, animal husbandry, fish farming, wrong irrigation practices, deforestation, indiscriminate release of industrialized wastes in addition to home sewage, mining, and entertaining actions (Khatri & Tyagi, 2015). Continuous anthropological activities coupled with seasonal variation in the quantity and quality of water runoffs and tributaries that supply the reservoir may alter the physical and chemical constituent of the water and may invariably affect the wellbeing of the fish (Abba *et al*., 2018). It has been reported that global warming and climate change could contribute to the alteration of the quantity and quality of the runoffs and tributaries (Abba *et al*., 2018). Health status of the aquatic ecosystem directly or indirectly influences fish health, thereby affecting immunity of fish and leading to disease susceptibility. Fish in poor water quality increases disease susceptibility (Biswas & Pramanik, 2016), by lowering the defense and immunogenic status of the fish (Noor El-Deen *et al*., 2015).

Fish-borne zoonotic parasites (FBZPs) have been part of the food-borne zoonotic diseases and are often endemic in certain regions of the world (Odoh *et al*., 2019; Cong & Elsheikha, 2021). In recent years, FBZP has emerged as major food safety concern which can impose significant public health and economic impacts (WHO, 2021b). Among parasites of seafood, in particular, helminthic parasites are of significant concern, and due to their abundance and diversity in tropical

aquatic ecosystems, their transmission to fish is a frequent occurrence (Ogbeibu *et al*., 2014). According to Shamsi (2019), over 40 taxa of fish parasites are capable of causing human infection. It has been estimated that helminthic parasites may put the health of more than half a billion people at risk (Dos Santos & Howgate, 2011). With global warming, this number is expected to be increased (Fiorenza *et al*., 2020).

People who work with fish, utilizing fish or engaged in fish related occupations need to know about zoonotic illnesses as well as how to stop them (Sadauki *et al*., 2024). Several parasitic worm species, numerous infectious to human being, may possibly be discovered in numerous types of eatable fish (Alsulivany *et al*., 2024). In the developing countries where fish parasites infestations are widespread, precautionary chemotherapy is the important approach for morbidity control. On the other hand, indigenous knowledge, attitudes, and practices (KAP) of parasitic worms, and water quality parameters are poorly understood, even though such information is essential for sustainable as well as preventable control (Acka *et al*., 2010). Community knowledge, attitudes, and practices (KAPs) are vital in establishing successful control/elimination strategies for various infections (Acka *et al*., 2010). KAP survey data can help to recognize gaps in knowledge, cultural beliefs, or behavioural patterns that may facilitate understanding and action, as well as pose problems or create barriers against the disease (TSCT) control/elimination efforts (Acka *et al*., 2010). A community-based study at the level of individual villager could potentially explore Knowledge of the respondents on fish parasites and water body, Attitude and practices of the respondents towards the water body and fish parasites in Warwade Reservoir. Therefore, this study was carried out to assess the knowledge, attitudes, and practices (KAPs) of the resident communities of Warwade reservoir, Dutse, Jigawa state on water quality and fish parasites.

MATERIALS AND METHODS

Study area

Warwade reservoir is located about 20 Km from Dutse town, Jigawa State, Nigerian (Figure1) (FMWR, 2018). The reservoir, is located at latitude 11°45'N, and longitude 9°13'03E, 1.4 kilometres long, and 7 meters deep, with a total storage capacity of 300 million cubic meters. It was built in the 1970s by the military sole administrator of old Kano State, late Audu Bako (Federal Ministry of Water Resourses, 2018).The dam offers water for a variety of domestic purposes, including irrigation, fishing, recreation, and livestock (FMWR, 2018).

Study design and period

A community based cross-sectional study was carried out between July to September, 2024. The study targeting various communities residing around the vicinity of the reservoir. One hundred and twenty (120) questionnaires were administrated to respondents from three locations at 40 respondent per location (Warwade, Zuwan hawa and Tsauni arewa) around the reservoir.

Questionnaire Survey

Structured questionnaires were used to generate data on communities' current status of Knowledge Attitude and Practices (KAP). The questionnaire was designed based on the WHO guide for developing KAP surveys (WHO, 2008). The questionnaire was divided into 3 sections: (1) sociodemographic characteristics, (2) level of knowledge on the water quality and fish parasites, (3) attitude and practices of the respondents towards the water body and fish parasites. The questionnaires were administered through face-to-face interview. Response with certainty (Yes) are scored were score as sufficient knowledge while, not sure and no were scored as insufficient knowledge. Also, yes are scored for good attitude while not sure and no were scored as bad attitude.

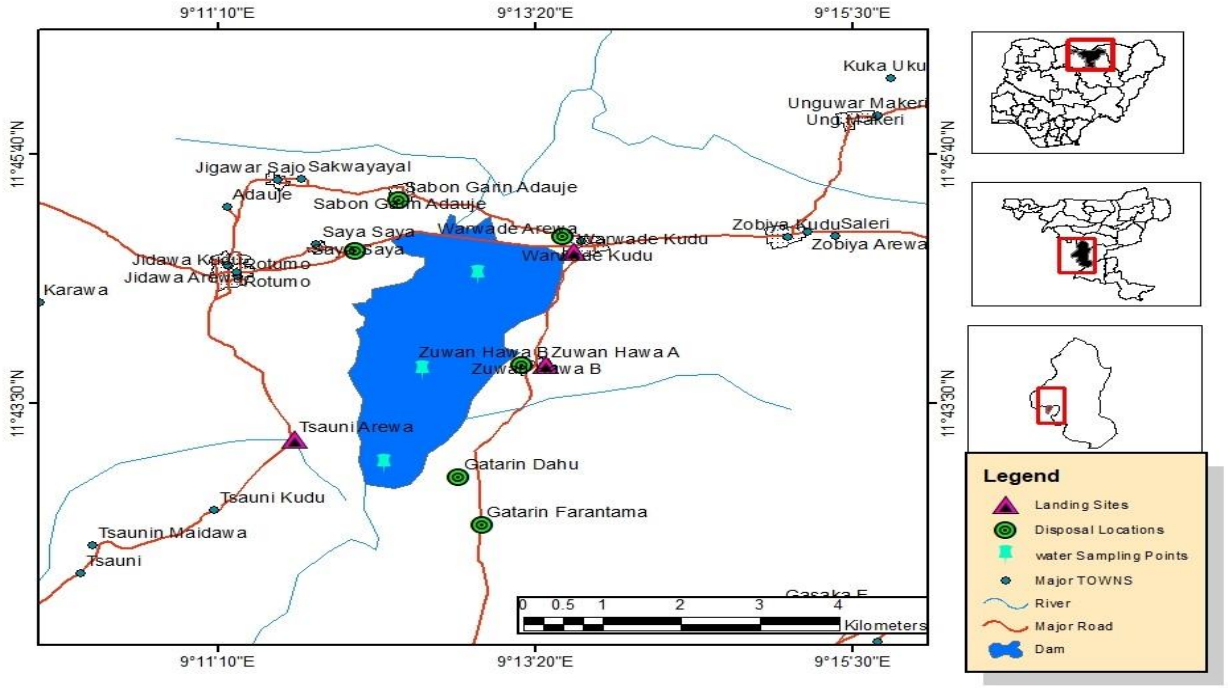

Figure1: Map of the Study Area

Data analysis

Data were presented using descriptive statistics, frequencies and percentages. Analysis was done using Microsoft excel 2013.

RESULTS AND DISCUSSION

Socio-demographic characteristics

The survey data showed that most of the respondents are aged between 21-30 years, representing 31.67%, with a percentage (3.33%) in 51-60 age group. Gender participation indicate that 66.67% of the respondent were male, and 63.33% were married with only two divorced and two widowed. Farming and fishing were the major occupation of the respondents representing 30.00% and 26.67% respectively, with only 13.33% involved in fish trading and schooling. The educational status of the respondents indicated that majority had Qur'anic education (55.00%) and 20% had secondary as the highest level of education (Table 1).

Table 1: Socio-demographic Characteristics of Respondent

Variable	Categories	Frequency	Percentage (%)
Age	10-20	20	16.67
	21-30	38	31.67
	31-40	22	18.33
	41-50	18	15.00
	51-60	4	3.33
	61-above	18	15.00
	Total	120	100
Gender	Male	80	66.67
	Female	40	33.33
	Total	120	100
Marital status	Married	76	63.33
	Single	40	33.33
	Divorced	2	1.67
	Widowed	2	1.67
	Total	120	100
Occupation	Fishing	32	26.67
	Farming	36	30.00
	Fish trader	16	13.33
	Civil servant	0	0
	Student	16	13.33
	Others	20	16.67
	Total	120	100
Educational status	Qur'anic	66	55.00
	Tertiary	0	0.00
	Secondary	24	20.00
	Primary	20	16.67
	others	10	8.33
	Total	120	100

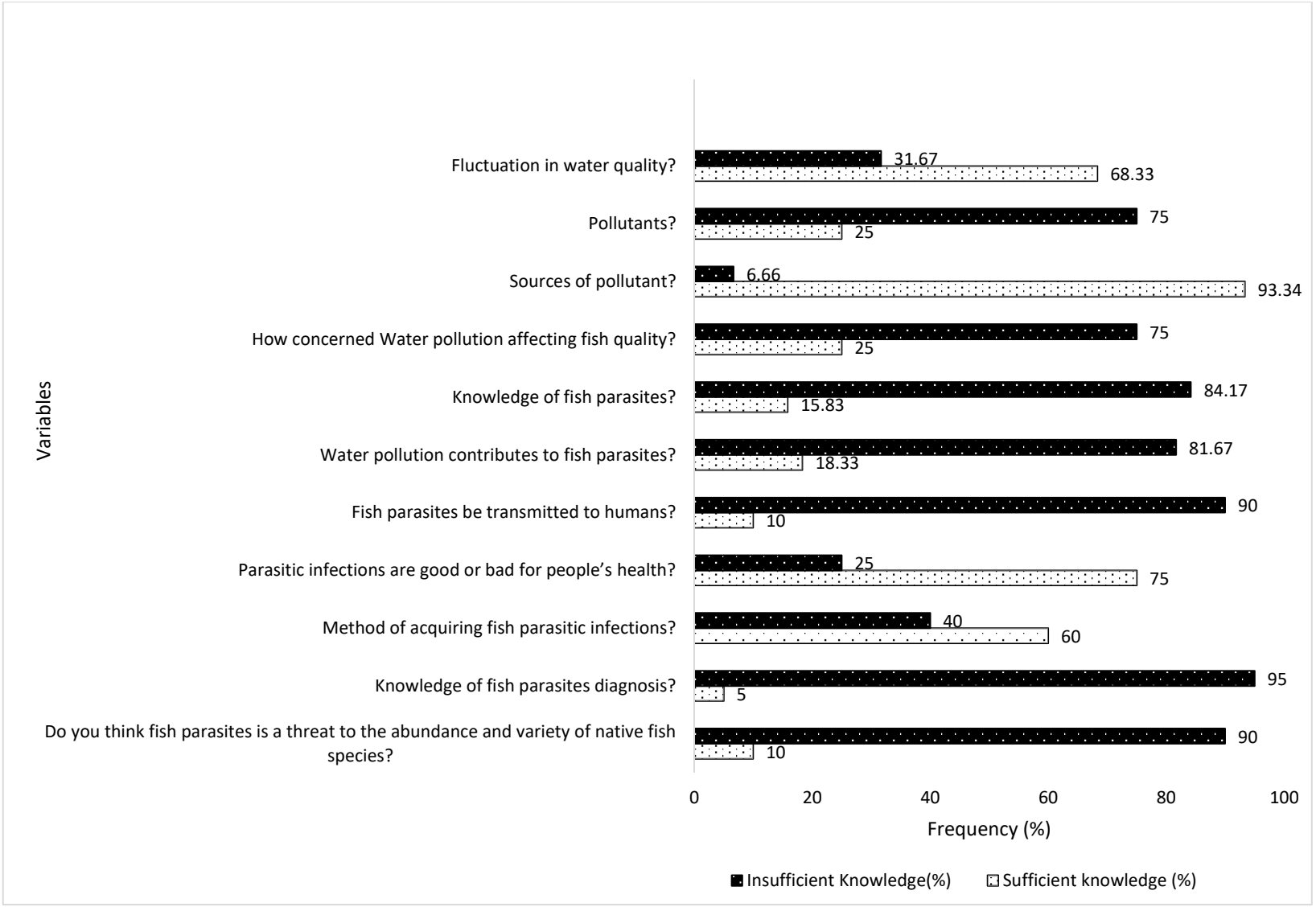

Figure 2: Percentage frequencies of correct (Sufficient knowledge) and incorrect (Insufficient Knowledge) of the Respondents on the Water Quality and Fish Parasites.

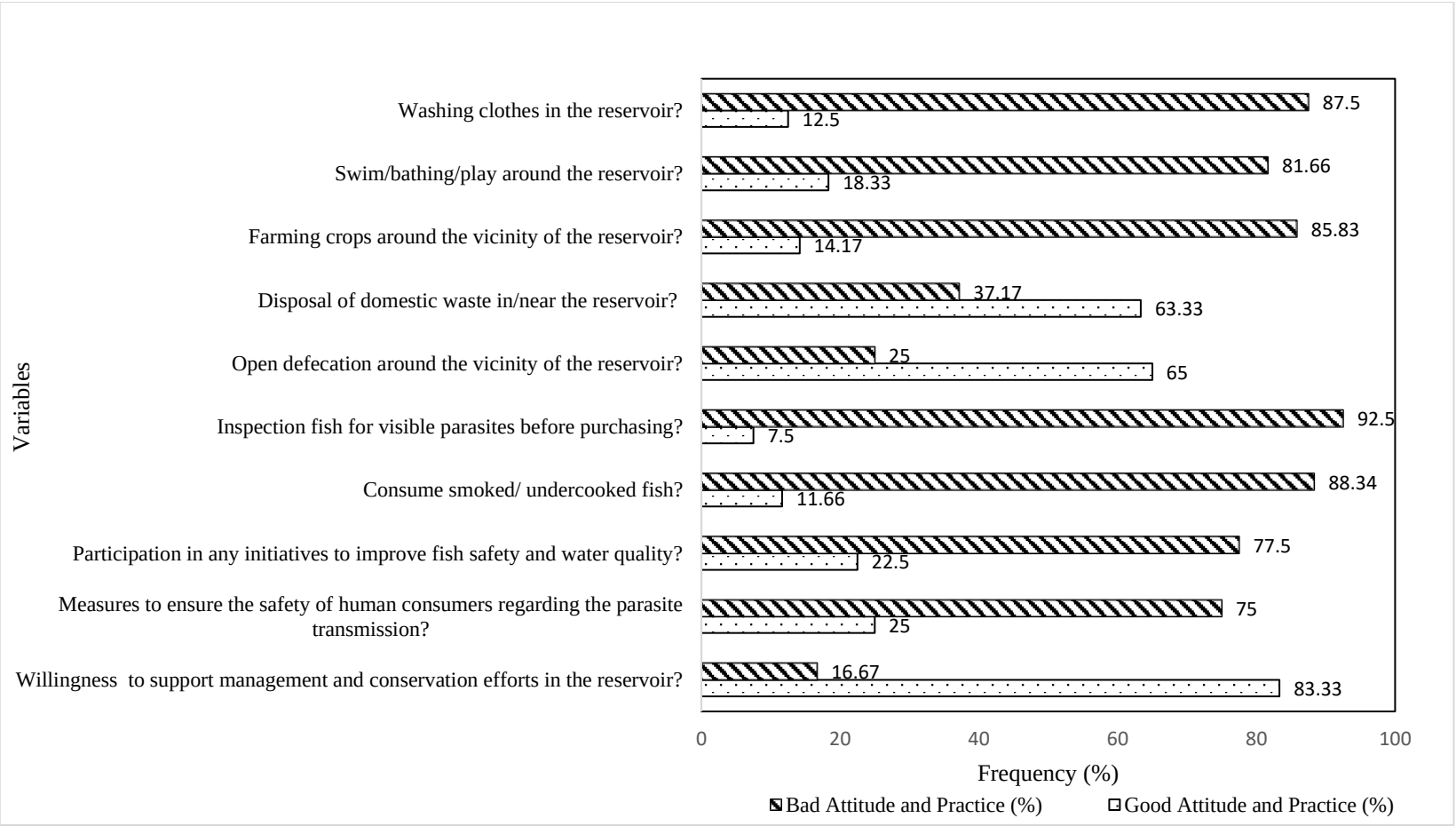

Figure 3: Percentage frequencies of correct (Good Attitude and Practices) and incorrect (Bad attitude and Practices) of the Respondents towards the Water Body and Fish Parasites from Warwade Reservoir, Jigawa State.

Discussion

In the present study on Knowledge, attitude and practices of resident communities of Warwade reservoir concerning water quality and fish parasites. The respondents in this study had a sufficient knowledge on fluctuations of the water quality of the reservoir, and majority of them are aware of entering pollutant/sewage into the reservoir which they believed they are from agricultural, domestic, bathing and washing which is in line with findings of Sadauki *et al*. (2024) who reported that there are several sources of entering pollutant/sewage in to the reservoir. The popular opinion among the respondents is that that pollutant/sewage exposure is harmful to the water body and users.

However, 25% had a sufficient knowledge that water pollution affect fish quality, the majority believed that it's harmless. This finding is not in line with that of Tesfaye *et al*. (2023), who reported 100% of the respondents believed that water pollution affects fish quality. Ecological alteration can have impact on parasites and host directly by altering the environmental sites in which the interaction takes place. It can harmfully affect fish hosts through changing its capability to manage the parasitic worms (Tesfaye, *et al*., 2023). In this study, majority of the respondents had insufficient knowledge of fish parasites, this is contrary to Sadauki *et al*. (2024) who reported that majority of the respondents (60.8%) in Mairuwa reservoir, Katisna state had knowledge on fish parasites. However, the result of the present study is better than that of Tesfaye *et al*. (2023) who reported that 100% of the respondents on Lakes of Haramaya District, Ethiopia are not familiar with fish parasites. Only 18.33% of the respondents had sufficient knowledge that water pollution contribute to fish parasites, also 10% of the respondents had sufficient knowledge that fish parasites can be transmitted to humans while 90% did not which is in contrast with the results of the studies by Sadauki *et al*. (2024) and Ngoshe *et al*. (2023) who reported 64.2% and 79.4% respectively with sufficient knowledge that fish parasites can be transferred from wildlife and other animals to humans. Therefore, there is a need to provide training to the farmers on locally relevant aspects of disease transmission at the human livestock wildlife interface, as this could be attributed to a lack of extension programs that focused on educating the farmers on zoonosis and limited veterinary and health workers in these communities (Ngoshe *et al*., 2023). Majority of the respondent believed that parasitic infection is harmful for health, this finding is similar to that Chaisiri *et al*. (2019).

Majority of the respondents had sufficient knowledge that they can be infected with eating raw or undercooked fish, while almost all are aware of the diagnosis of fish parasites. This finding is in agreement with the findings of Chaisiri *et al*. (2019) and Sadauki *et al*. (2024). Who reported (68.6–80.8%) and 64.2% raw fish consumption respectively. However, the communities residing nearby the locality of Warwade reservoir are under the threat of fish borne zoonotic parasites (FBZP), because ingesting of undercooked or raw fish is a main source of fish-borne parasitic infestations in humans (FAO, 2021). To decrease the risk of fish-borne parasitic disease, fish meat must treat by blistering or cold temperatures (≥70 or−20°C for 7 days) (FAO, 2021). Only 10% believed that fish parasites is a threat to abundance and variety of native fish species while 90% are not aware. This finding is not in agreement with the finding by Sadauki *et al*. (2024) who reported that 57.5% strongly agree that fish parasites is a threat to abundance and variety of native fish species. This perspective of underestimating the impact of fish borne parasites infection could stem from the neglect of continuous education and community sensitization.

Also, washing clothes in/near reservoir and swim/bathing in/near the reservoir was viewed as a bad attitude and practices with, 87.5% and 81.66% of the respondents wash and swim/bathing in/near reservoir respectively which is higher than findings by Sadauki *et al*. (2024) who reported that 40.0% of the respondents wash near reservoir regularly, while 28.3 % of the respondents often swim/bathing in/near the reservoir. Dominant majority of the respondents participate in farming crops around the vicinity of the reservoir which was viewed as bad attitude and practices which is higher than finding by Sadauki *et al*. (2024) who reported only 42.5%. Majority of the respondents never participated in domestic waste disposal and open defecation in/around the vicinity of the reservoir respectively. This finding is slightly better than that of Sadauki *et al*. (2024) who reported that 54.2% have never participate in defecation in/around the vicinity of the reservoir. A small minority (7.5%) had good attitude of inspecting fish for visible parasites before purchase which agrees with the finding by Sadauki *et al*. (2024) that showed 44.2% had not sure of encountered with fish parasites. An alarming 77.55% of the study participants never participated in any initiative to improve fish safety and water quality and 75% never taken any measure to ensure the safety of human consumers regarding the parasite transmission but majority (83.33%) always had good attitude to support management and conservation efforts in the reservoir. These findings is worse than that of Sadauki *et al*. (2024) who stated that 40.0% of the respondents had never participate in reservoir clean-up initiatives or conservation activities.

Findings from the present study are not only relevant for local stakeholders but also for the overall target of control/elimination of FBZP as outlined in the WHO roadmap for neglected tropical diseases 2021–2030 (WHO, 2021a). The roadmap also mentions four cross-cutting targets for 2030 which include (1) integrated approaches, (2) multisectoral coordination, (3) universal health coverage and (4) country ownership. Other important points made include the involvement of local communities by social mobilisation at the very basis of every health intervention, knowledge sharing, and prevention strategies targeted at local situations (WHO, 2021a). The present study demonstrated that knowledge, attitude and practices of communities shows clear potential for the engagement of the humans and environment beyond their boundaries, informing about the relevant FBZP. In addition, environmental services need to be promoted and brought into the big picture as most transmission happens because of a lack of hygiene and within various environmental compartments.

CONCLUSION

This study demonstrates knowledge gaps and adverse attitude and practices which may hinder and/or slow down the control/elimination of fish parasites. Findings from the study revealed that numerous of respondents had participated in several activities that may contribute to poor water quality and had not participated in initiatives to improve fish safety and water quality and had never taken any measure to ensure the safety of human consumers regarding the parasite transmission but majority always had good attitude to support management and conservation efforts in the reservoir. It is there recommended communities, social mobilisation at the basis of every health intervention, knowledge sharing, and prevention strategies targeted at local situations and control of ecological as well as water pollution need to be organized. It also identified a need to provide training to the communities on locally relevant aspects of disease transmission at the

human, livestock and wildlife interface, as this could be attributed to a lack of extension programs that focused on educating the farmers on zoonosis and limited veterinary and health workers in these communities.

Informed Consent Statement: Verbal informed consent to participate in the study was sought from each participant before being interviewed.
Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.
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