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INCREASED AWARENESS OF SHARK KNOWLEDGE AND PERCEPTION AMONG CHILDREN IN GHANA: AN EDUCATIONAL APPROACH

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Abstract

The significant increase in shark catches has made shark conservation a global problem. Although several studies on sharks have been conducted in Ghana, there is a dearth of information on the use of educational approaches for shark conservation. This study aimed to assess schoolchildren's knowledge of sharks and shark fisheries, attitudes toward shark conservation, and the factors that affected their knowledge and attitudes. From March to April 2023, two basic schools from the Western region of Ghana were visited. These schools were two Primary and Junior High Schools. From these schools, 99 students were given questionnaires to fill out with the help of a local teacher. According to the survey, more than 60% of students were aware of sharks' predatory function in the ecosystem but oblivious to their ecological significance. From the study, schoolchildren demonstrated a fair amount of understanding of shark fisheries and fishing in Ghana due to their proximity to the fishing community. However, the misunderstandings that some of these children hold about sharks may lead to poor participation in shark conservation activities. Correlation analysis between knowledge and attitude indicated an increase in knowledge about sharks would increase the attitude of children towards shark conservation. Therefore, it is crucial to incorporate shark conservation topics into the curriculum of these children, establish shark conservation groups, and engage them in citizen science projects to foster their desire for shark conservation.

Key words: Fishermen, Junior High School, Marine Protected Areas, Primary School, Shark catches,

Introduction

Shark populations have dramatically decreased over the past ten years because of increased catches in global shark fisheries, climate change, overfishing, ocean mining, and pollution from the dumping of ocean waste, among other factors (MacKeracher et al., 2021; Ferretti et al., 2020). Since sharks are crucial to maintaining

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the equilibrium of marine ecosystems, these circumstances have had an impact on them (Amponsah et al., 2023).

In Ghana, where many fishermen rely on shark meat and fins for a living, shark fishing is still a common activity (Seidu et al., 2022). Just two of the measures the government has implemented to regulate shark fishing in Ghana include the institutionalization of the closed season and the prohibition of shark finning. Illegal fishing is still a significant problem because management measures are usually ineffectively enforced (Gulmira et al., 2022). Developing effective conservation and management strategies is also difficult due to insufficient information on shark population dynamics in Ghana (Ackah et al., 2022). Because of this, there are a few management measures specifically made for species like sharks in Ghana (Sekey et al., 2022). Even though shark fishing may have a short-term financial benefit (Brobbey et al., 2021), fishing of these marine species at an unsustainable level may have long-term effects on the marine environment and the livelihoods of dependent fishing communities. Sekey et al. (2022) suggest that initiatives aimed at shark conservation in Ghana should take into account educating and raising awareness of sharks among fishermen.

Though many people enjoy the benefits accrued from the maritime environment, when it comes to learning how they feel about protecting the habitat, many people are unsure of the necessity of conservation (Garla et al, 2015). Community support for protecting aquatic resources is necessary for the implementation of measures for the conservation of aquatic biodiversity, and stakeholder participation is also essential for the management of these resources. There is a need for public engagement, which may be accomplished through classroom interaction, outdoor as well as outreach activities, and public support for any applicable biodiversity conservation and management strategies (Thu & Minh, 2013). By promoting an improved understanding of and attitudes toward local environmental preservation, nature-based educational programs aim to influence children's attitudes and behaviour toward the environment (Pooley & O'Connor, 2000). Though education in biodiversity conservation programs can increase knowledge, and skills, and develop critical thinking, information alone does not necessarily transfer into changes to more ecologically aware behaviour (Smith-Sebasto and Cavern 2006). In contrast to their peers in Western schools, some African children do not learn about marine animal ecology, the types of marine resources found locally, or the importance of these resources (Erhabor and Don 2016). This is true even though their community or family livelihoods may be heavily

dependent on the local environment (Kioko, Kiringe, and Wahungu 2010). The absence of formal education about knowledge of the ecology of animals and the natural resources in their local surroundings is of concern in this respect (Erhabor and Don 2016). Nevertheless, children must have access to this type of information as well, both in educational institutions and other contexts like the tourist sector (Hariohay et al. 2018). The constructivist hypothesis states that children's ideas and interpretations of a subject will affect how they comprehend reality. There is a wide range in the public's acceptance of and attitudes regarding sharks. In order to boost support for conservation efforts, a fuller understanding of public attitudes and behaviour toward sharks is urgently required in view of the dire situation facing many shark populations worldwide (Acuna-Marreo et al., 2018). According to research (Garla et al., 2015), one's level of knowledge can strongly determine their unique attitudes and behaviours regarding conservation. According to some studies, adults' environmentally aware decisions are based on lessons they obtained as children (Ajiboye and Silo, 2008). In Ghana and other rural parts of Africa, little is known about children's attitudes toward and engagement in environmental conservation concerns (Kioko & Warui Kiringe, 2010).

The study aimed at i) evaluating school children's knowledge of sharks and shark fisheries, ii) their attitudes towards sharks and perspective on shark conservation, and iii) any factors that would have an impact on their knowledge and attitudes towards shark conservation to promote education on sharks among children for the management and conservation of these globally endangered species. The knowledge acquired from this study will help in developing the necessary methods for increasing involvement in and generating the necessary support for shark conservation along Ghana's coast.

Material and Methods

Study Area

The study was carried out in two landing communities along the coast of Ghana. These include Axim and Dixcove (Figure 1). Ghana is a Western African nation bordered by Burkina Faso to the north, the Republic of Côte d'Ivoire (Ivory Coast) to the west, the Togolese Republic (Togo) to the east, and the Gulf of Guinea to the south. Axim is located in the Nzema East District (N 04.8665° N, N 04.2409° W). There are 13,509 households in the district with a household population of 59,250, Axim alone has about 5,001 households with 2,951 houses with a population size of over 9,623

(GSS, 2014). Axim consists of 12 landing beaches with over 5,405 fishermen (Dovlo, 2016). Dixcove community falls within the Nzema East Municipality and Ahanta West. The artisanal fishing port of Dixcove located in Ghana's Western Region (N 04.79368°, W 01.94612°) consists of three landing beaches namely the Upper Dixcove, lower Dixcove, and Eurom with over 1,081 fishermen (Dovlo, 2016). Farming is an important source of livelihood, with about 90% of men engaged in fisheries. Most women process and sell fish.

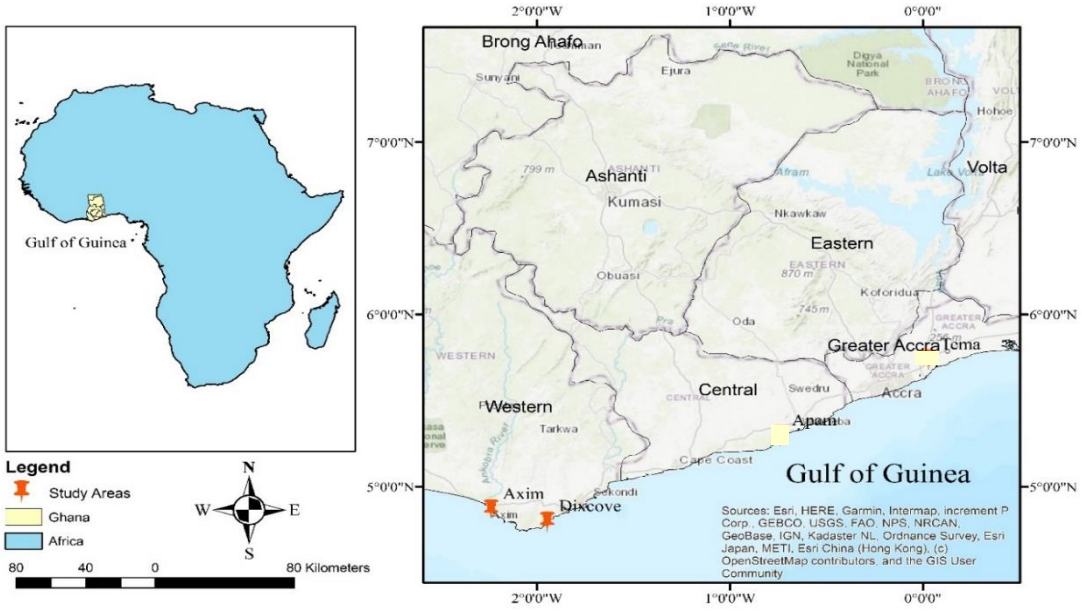

Figure 1. A map showing the study areas

Research technique

The content of the questionnaire for the study was validated by considering the following precautions, namely; i) that all questions cover all the areas under research, ii) absence of grammatical errors, iii) test items for likert scale are in one direction and iv) the instructions on the headings agree with the test items. The validated questionnaire was administered to students from two primary and Junior High Schools from March to June 2023. The schools were selected based on their location (i.e. within the sampling communities).. In determining the sample design, the question of the specific population parameters, which are of interest, were considered (Kothari, 2004). The criteria for selection of respondents included i) must be a student at the primary or Junior high school level and ii) must be between the ages of 10 years to 18 years. . From the study, 99 respondents were interviewed with the assistance of their class

teachers. The respondents were discreetly and amiably asked whether they would mind doing a quick survey for a few minutes. A likert scale and yes/No type of quantitative questionnaire was constructed in a single language, English. There was a total of four sections contained in the questionnaire, each representing Section A-Socio demographics, Section B-shark knowledge, Section C- shark fisheries knowledge and Section D-attitudes. These sections were adapted and revised to suit the local study sites.

Data analysis

The normality test was carried out before data analysis to ascertain if the sample data was normally distributed. After the interviews, open-ended quantitative questions were coded to offer a quantitative analysis of the responses collected. By analyzing all response frequencies, the study's objectives were satisfied. The proportion of binary replies (Yes/No) was examined using Pearson chi-square. Given the goals of the study and the survey's methodology, this was more suitable. All analyses were performed using the SPSS version 26, and Pearson correlation was utilized to evaluate the link between attitudes and knowledge among students at a significance level of 5%.

Results

The mean age of 50 Junior High School (JHS) students was 15 ± 0.2 years with a range of 12 years to 17 years. For the 49 students at the Primary level, the mean age was 13 ± 0.2 years, spanning between 11 years – 15 years. The mean difference in ages between students JHS and Primary students was significant ($t = 9.503$, $df = 97$, p-value < 0.001, two-tailed). The magnitude of the difference in the means was very large (eta squared = 0.48). From Figure 2a, a little less than 50% of the respondents from the primary schools were females while almost 50 % of JHS students were found to be females. On the contrary, more than 50 % of males were found at the primary level whereas the male students at the JHS level were less than 50 % (Figure 2a). For both JHS and Primary levels, less than 30 % reported not staying close to the beach while more than two-thirds of the students affirmed staying close to the beach (Figure 2a).

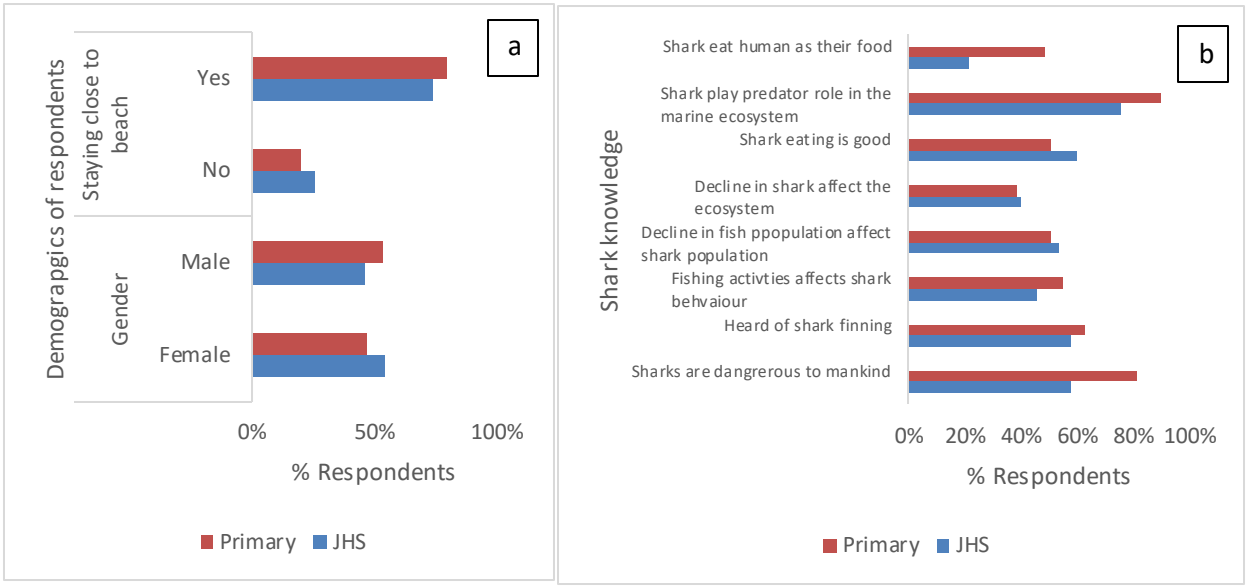

Figure 2. a) Demographics of respondents b) Knowledge of sharks among school children

From the study, more than two-thirds of the students at the Primary level i) agreed that sharks are dangerous to mankind; ii) they have heard of shark finings and iii) sharks play the predator role in the ecosystem (Figure 2b). At the Junior High School (JHS) level, i) more than two-thirds believed that shark eating is good and ii) sharks play predator roles in the ecosystem (Figure 2b). However less than half of the students at both levels of education, i) believed that sharks eat humans as food and ii) the decline in sharks affects the ecosystem (Figure 2b). From Figure 3a, more than half of the students at the Primary and JHS level agreed that the main food item for sharks is fish with a few selecting seaweeds and humans as the food items for sharks. More than 70 % of the students at the Primary and JHS level believed that i) shark fishing occurs in Ghana, ii) shark population affects the catch of fishermen and iii) shark products are consumed locally (Figure 3b). In addition, two-thirds of the students pointed out that shark catches by fishermen are the main cause of the decline in shark population (Figure 3c). Almost all the students (i.e. > 80.0%) knew that creating MPAs will aid in the conservation of sharks (Figure 3d). More than 50% of the students did not agree to stop shark fishing in Ghana (Figure 3d). When asked about which brings more money, almost all the students (90 %) believed that shark ecotourism will generate more revenue than fishing for sharks (Figure 3d). Concerning stopping shark fishing, a little over 50 % of the Primary students agreed while only 22% of the students at the JHS level did not give an affirmative answer (Figure 3d).

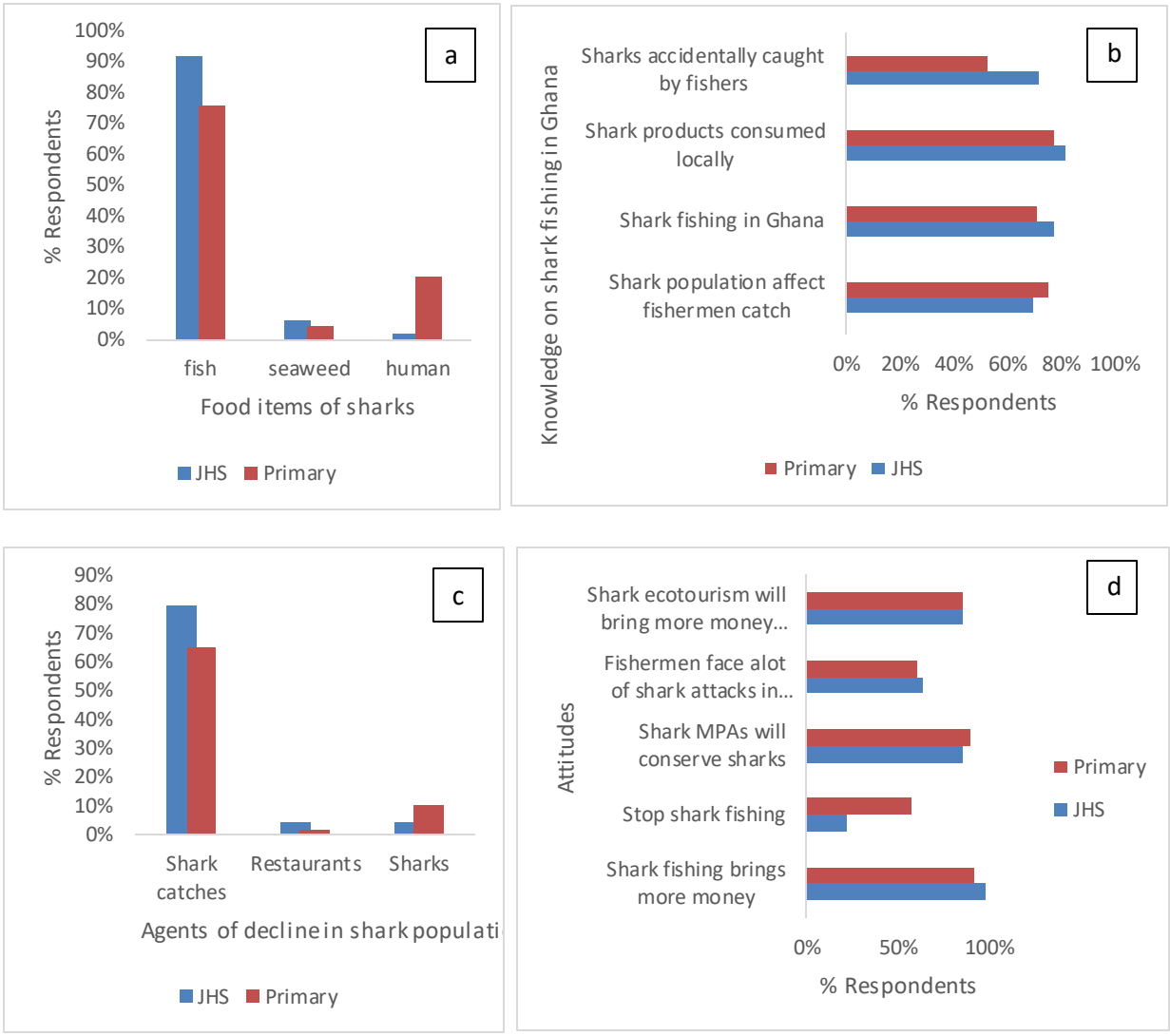

Figure 3. Children's knowledge of a) food items of sharks, b) shark fisheries, c) agents of shark population decline, d) attitude towards shark conservation

The mean index of knowledge and attitude was 66.6 ± 2.88 and 69.5 ± 13.08 respectively. Sample T-test analysis did not reveal any significant difference between the index of knowledge and attitude ([N (14,4)]; df = 3, t-stat = -0.213, p-value = 0.84). The correlation matrix showed a weak positive relationship between the index of knowledge and the index of attitude (Table 1).

Table 1: Correlation matrix between the index of knowledge and index of attitude

Index	Knowledge	Attitude
Knowledge	1	
Attitude	0.34	1

Discussion

This study offers the first data on how well-aware Ghanaian pupils are of shark ecology, biology and shark fisheries in Ghana, with a focus on Primary and Junior High Schools (JHS). From the study, students at both levels of education revealed that shark fishing is common in Ghana and that shark populations have an impact on the catches of fishermen. The majority also said that shark fishing is widely practised in Ghana and that shark populations have an impact on fishermen's catches. Furthermore, several of these students accurately identified how fishing and fish population loss affect shark behaviour. The fact that many parents of pupils are fishermen and that they live close to fishing towns may explain why so many of them have this knowledge.

Unfortunately, the majority of students believed that Ghana is where shark items are most commonly consumed. These kids' misunderstanding that shark items are consumed locally may have been aided by the availability of less expensive shark products like salted goods on the market. It is incorrect since important shark products, such as dried fin products, are widely consumed on a global scale (Brobbey et al., 2021; Sherman et al, 2022). When the majority of these students said that fishermen only inadvertently catch sharks in Ghana, it was once more clear that they had little awareness of the shark fishery there. On the contrary, shark fish on the coast of Ghana are highly targeted by local fishermen due to the high value of their fin at the international markets (Amponsah et al., 2023; Seidu et al., 2022; Sall et al., 2021; Agyeman et al., 2021). Additionally, the majority of these kids pointed out another misunderstanding, which was that sharks are harmful to humans. This misunderstanding may have been fueled by media outlets through the production of films in which sharks were represented as enormous, monstrous predatory monsters that preyed primarily on human flesh (Beall et al., 2022). According to research by Tsoi et al. (2016), the great white shark is regarded as one of the most mysterious and feared animals in the world, which lends weight to this conclusion. Furthermore, many JHS and elementary pupils agreed that sharks have a function as predators in the environment. Unfortunately, it seems that these pupils are unaware of the ecological significance of their predatory role. This result supports the contention made by Garla et al. (2006) that the ecological importance of sharks in the marine ecosystem is routinely disregarded. Many pupils may have been misled into thinking that the integrity of the marine environment will not be impacted by shark reduction due to a lack of information in this area. Unknown to most of these children, when the number of sharks

reduces, the cascading impact on the ecosystem is enormous which has the propensity of throwing the trophic interactions out of balance (Dillion et al, 2021; Brown et al., 2021; Sherman et al., 2020; Zemah-Shamir (2021); Sabbagh et al., 2019). Less than half of the pupils felt that the shark population in Ghana is declining, demonstrating once more the students' lack of understanding of shark status. However, numerous studies done in Ghana (e.g. Seidu et al., 2022; Ackah et al., 2022; Sekey et al., 2021) have provided scientific proof that shark species in Ghana are declining drastically making their products more expensive (Agyeman et al., 2021). These youngsters do not have access to crucial information on the state of shark species in Ghana, even though recent fisheries capture shows the massive drop in shark populations caused by overexploitation (Ackah et al., 2023; Sekey et al., 2020). These pupils are likely to have a somewhat low level of interest in shark conservation due to several shark-related misconceptions they may hold. In order to effectively conserve sharks in Ghana, it is crucial to integrate conservation problems into the classroom. It is important to keep in mind that various populations have varying degrees of environmental awareness, attitudes, and values. As a result, public perceptions of conservation-related issues are not consistent while developing tactics to bring shark conservation to the doorsteps of children. To raise awareness for shark protection, several tactics must be designed for both elementary and JHS pupils, taking into account their level of comprehension. The majority of these students hold the opinion that shark ecotourism will be more profitable than shark fishing when it comes to attitudes toward shark conservation. Studies by Ziegler et al., (2021); Gonzales-Mantilla et al. (2021) and Zimmerheckal et al (2019) have documented the enormous benefit of shark tourism in the form of scuba diving to local communities, which have fostered shark conservation, largely in the form of protected areas.

This finding could be consistent with the alluring qualities that sharks have for people. Other research, such as those by Acuna-Marrero et al. (2018), and Knight (2008), found that a shark's morphological characteristics are among the most crucial factors in luring animals to people, predicting attitudes, and igniting support for species conservation. The need to portray sharks as majestic creatures with a significant ecological function in the environment, as opposed to the negative perceptions of savage man-eaters that already exist on social media (Johnson et al., 2023), is necessary to promote shark ecotourism among youngsters and the public. The fact that the majority of kids think Marine Protected Areas (MPAs) would help with shark

protection also shows how effective MPAs are in managing resources, as has been demonstrated elsewhere (Albano et al., 2021; White et al., 2017). However, further research is required to determine which regions are scientifically viable before shark MPAs may be established (van Zinnicq Bergmann et al., 2022;). MPAs for shark conservation in Ghana will not exist until such scientific studies are carried out. The concept of shark conservation may not be fully accepted given that the majority of students believe that Ghanaian fishermen frequently experience shark attacks. Children need to be taught that shark attacks on fishermen are almost non-existent. According to Shiffman et al. (2020), shark attacks are mostly rare. More than 90% of shark species do not attack humans, even fishermen (Kraft et al., 2021). The majority of pupils, especially JHS students, think that shark fishing earns more money, however, this assertion may be based on the fact that many of these kids help their parents with their shark trade during the pre- or post-fishing stages. These kids, therefore, have a decent understanding of the cost-benefit analysis of the shark trade. However, it's possible that the majority of these students rejected the idea of banning shark fishing in Ghana because they shared this perspective. It is necessary to provide youngsters with the scientific evidence—which is now unavailable to these students—that suggests that target fishes produce more money than sharks in an effort to dispel this impression. Studies by Seidu et al., (2022) revealed that over 60 % of fisherfolks in Ghana are dissatisfied with income from shark products because recently it has become very difficult to catch sharks. Pham (2007) suggested that factual information could be the most effective way to induce cognitive alterations. Scientists and Fisheries officials should work to educate the public about the fact that there is actually little chance that sharks would attack fishermen in Ghana.

According to the study, parents' occupations and proximity to the shore were the main factors that may have influenced kids' awareness of shark fishing, sharks, and attitudes toward shark conservation. Additionally, the slight positive correlation between the knowledge index and attitude index implies that if children have access to factual information supported by research, their attitudes about shark conservation will either significantly change or improve. The positive relationship between the index of knowledge and the index of attitudes towards the conservation of sharks has been supported by Papageorgion et al., (2022); Musiello-Fernades et al., (2021) and Guay et al., (2023).

Conclusion

Students generally have some understanding of sharks, according to the study, but several myths need to be dispelled to increase student awareness of shark protection. This research suggests that one's degree of education may not always affect their attitude toward shark conservation. However, more information about sharks may influence people's attitudes toward their protection and ethical use. According to Acuna-Marrero et al. (2018), education on the ecological importance of sharks and their susceptibility to overfishing can help build support for shark conservation. Finding ways to increase students' awareness of sharks and shark fishing in Ghana may thereby change their attitudes toward shark conservation.

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Conflicts of interest

The author(s) declare(s) that they have no competing interests.

Data availability statement

Data is available upon request.

Informed consent statement

The consent of all the students was sought verbally before the questionnaires were administered.

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