Cross-sectional Study in China for the Management of Fish Production by the Evaluation of Socio-Demographic Aspects of Farmers and Best Practices Techniques for Fish Farming

Sidra Fatima[1], Zhang Ying[1], Abbas Sheer[2]

Abstract

Background: Food security for humans is an increasingly important issue on a worldwide basis. A multitude of problems, such as insufficient fisheries management services, tainted fish food products, exorbitant building expenses, and a shortage of irrigation water, contribute to low fish productivity.

Purpose of the Study: The current study's objective was to evaluate the socio-demographic aspects of farmers in China who adhered to the regulations for fish production and management.

Methodology: Using a reliable and verified interview schedule, the data was collected from 30 fish farmers in China. Data was analyzed using SPSS in order to compute results and make judgments. The results show a significant relationship between fish farmers' socioeconomic characteristics, such as age, education level, and quantity of land owned, and their level of expertise, and adoption and awareness about best practices for fish farming. The majority of interviewees were young, educated, and in possession of sufficient resources for farming and fishing.

Results: The majority of the participants (n=14, 46.7%) were aged 30-50 years. Out of the 30 candidates chosen for this study, 16 (53.3%) were graduates in China, 14 (46.7%) were associated with the profession of only fish farming, and thus the majority of the candidates, 17 (56.7%), earned more than 70,000 yen per year from trading fish and stock management. The chi-square value (12.9) and significant difference (0.012) indicated a positive relationship between land size and adoption of fish production practices. The chi-square value (12.51) and significant difference (0.007) indicated a substantial positive relationship between Education and Awareness of suggested fish production practices.

Conclusion: There are still a number of significant issues with China's catch fisheries due to the nature of its fisheries and the intricate and unpredictable nature of fishing in general. The study's finding suggests the possibility that pertinent fisheries development plans may have an impact on China's management of capture fisheries resulting in complete catch management of the fisheries resources and an intensification of resource protection.

Keywords: Food Security, China’s Management, Fisheries Development, Socio-demographic aspects, Law-Based Governance

[1]College of Economics and Management, Beijing Forestry University BFU, Beijing, China
[2]College of Law, University of Sharjah, United Arab Emirates

***Corresponding author:** Sarahqueen10@yahoo.com

Introduction

Assessment for the management of marine resources in the twenty-first century are challenging for fishery scientists and managers(Hastein, Hjeltnes et al. 2006). Concern over problems like bycatch is growing. Agencies have developed more comprehensive approaches to resource evaluation and management as a result of species and gear impacts on habitat, as well as the realisation that climate may have a significant impact on population regulation naturally. The goal has been to switch from stock assessment of single species to ecosystem management. Every country that engages in fishing has struggled with management of catch fisheries(Andreassen 2012).

Fisheries management refers to a collection of legal, social, economic, and political agreements made with the goal of managing fisheries on a global, national, and local scale. It not only entails legally binding norms like local or international agreements on fisheries, but also social arrangements for fishermen and associated national economic frameworks for orderly fishing activity(Idoje, Dagiuklas et al. 2021). Since fisheries resources are dwindling and the industry is beset by economic and social issues, capture fisheries management has garnered the attention of both the world community and national governments in recent years(Andreassen 2012). China has a long history of being the greatest fisheries state in the world, which means there is never a shortage of fisheries chaos or disorder (Tang, 2018). Before becoming involved in the management of global fisheries in the middle of the 1980s, the Chinese government started managing catch fisheries in the 1980s, or perhaps earlier in the 1950s (Han, 2018).

The growth of China's fisheries has always been in line with the country's level of political, economic, and social development, and the nation's fisheries production has always been actively impacted by and supported by these policies(Lu and Li 2006, Lindkvist, Trondsen et al. 2008). The degree of fisheries management has been raised and the goals for fisheries development have been further clarified along with the implementation of each fisheries management strategy or plan. The emancipation of fisheries productivity and the greater clarity of fisheries development goals have followed the establishment of every major fisheries strategy(Xie, Qin et al. 2013).

Methodology

For this research study, 30 participants were chosen, including fish growers, fish watchers, and fish managers. The respondents were interviewed and given a specially crafted questionnaire to complete in order to get accurate information. The interview schedule had a pre-test to ascertain its validity and reliability on 15% of the total respondents. Although the interview questions were delivered to the respondents in their native languages, the interview schedule was prepared in English to make it easier for them to gather the necessary information as accurately as possible.

Statistical Analysis

The data were analysed using the statistical software for social sciences (SPSS). Descriptive analysis was used to calculate percentages and frequencies in order to draw conclusions and offer suggestions.

Results

Age

Results revealed that most of the participants were having the age range from 30-50 years (n=14, 46.7%). However, 8 (26.7%) respondents were having the age of 30 years and 8 (26.7%) participants were above 50 years (represented in Fig. 1a).

Education

Out of 30 respondents of this research study, 16 (53.3%) farmers were graduate in China,8 (26.7%) participants had completed high school education and 6 (20%) candidates were illiterate (represented in Fig. 1b).

Size of land hold by the farmers practicing fishing in China

Results showed that 6 (20%) farmers had land size of upto 12.5 acre, 8 (26.7%) respondents

had 12.5–25 acre land size and 16 (53.3%) had above 25 acres.

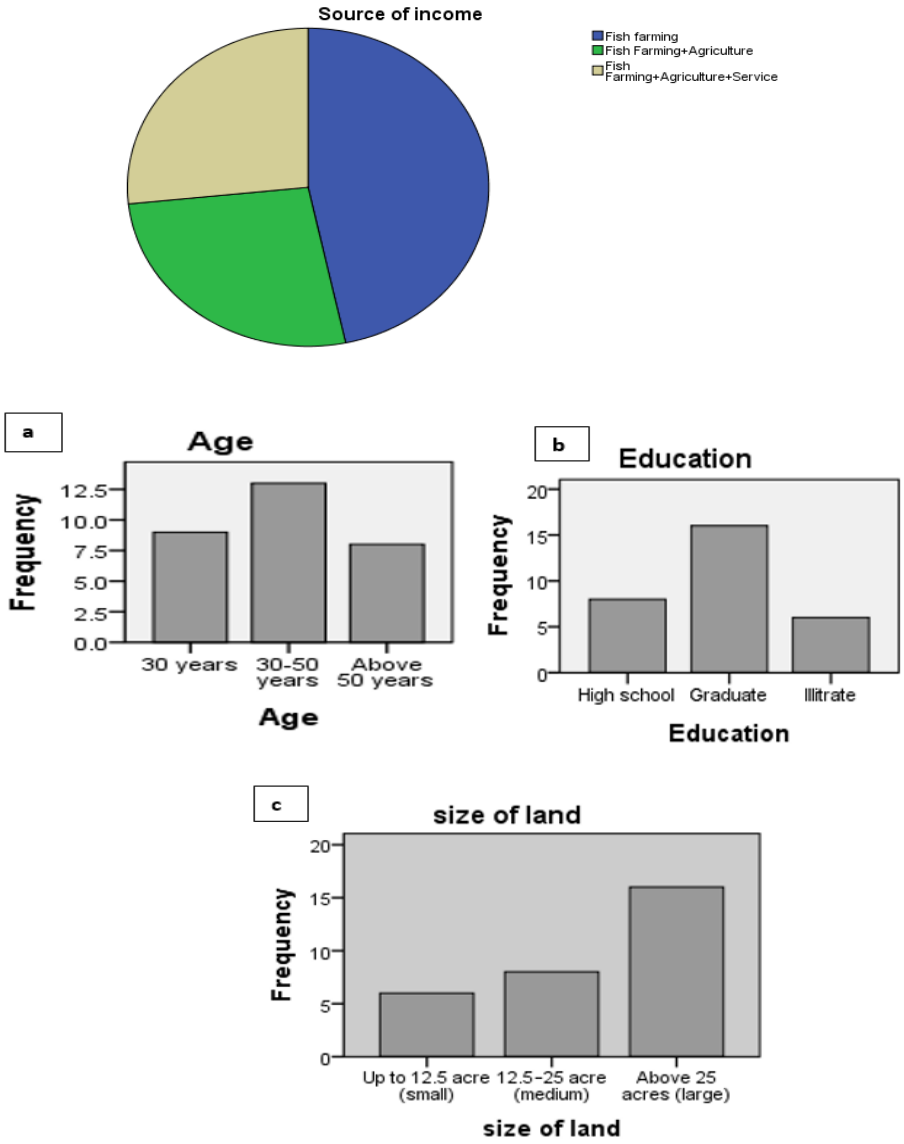


Fig. 1.1: Socio-demographic (Age= a, Education= b, and size of land= c) aspects of Chinese Fish workers

Socio-economic aspects of this result study showed that 14 (46.7%) farmers were associated with the profession ofonly fish farming, 8 (26.7%) participants were doing fish farming and 8 agricultural (26.7%) were practicing farming, Agriculture and also used to provide Service to the locals as shown in Table 1.

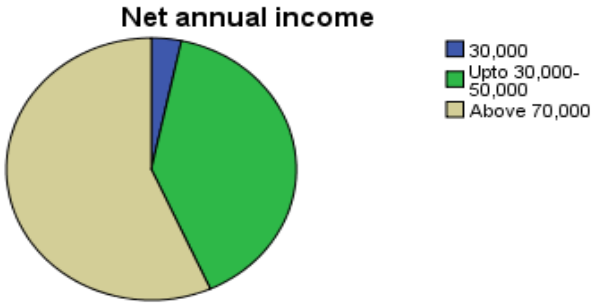
Source of Income

Socio-economic aspects of this result study showed that 14 (46.7%) farmers were associated with the profession ofonly fish farming, 8 (26.7%) participants were doing fish farming and 8 agricultural (26.7%) were practicing farming, Agriculture and also used to provide Service to the locals as shown in Table 1.

Table 1: Analysis of frequency of respondents in association with source of income

Source of Income	Frequency	Percent
Fish farming	14	46.7
Fish Farming+Agriculture	8	26.7
Fish farming+Agriculture+Service	8	26.7
Total	30	100.0

Net annual Income



Out of 30 selected farmers from Chinese association, 30,000 yen as Net annual income was earned by only one (3.3%) individual, 12 (40%) farmers earned upto 30,000-50,000 yens and 17 (56.7%) farmers earned above 70,000 yens annually from trading fish and management of fish stock Table 2.

Table 2: Analysis of frequency of respondents in association with Net Annual income

Net annual income (Yen)	Frequency	Percent
30,000	1	3.3
Upto 30,000-50,000	12	40.0
Above 70,000	17	56.7
Total	30	100.0

Adoption of fish production practices

Results showed that out of 8 (26.6%) participants working in the fish farming area (upto 12.5 acre), 1 (12.5%) farmer had low, 2(25%) had medium, and 5 (62.5%) had high adoption of fish production practices with 95% Cl (1.87-3.13) and Std. 0.756. Out of 10 (33.3%) participants working in the fish farming area (12.5–25 acre), 6 (60%) farmers had medium, and 4 (40%) had high Adoption of fish production practices with 95% Cl (1.87-3.13) and Std. 0.756.Out of 12 (40%) participants working in the fish farming area (Above 25 acres), 5(12.5%) farmer had low, 2(25%) had medium, and 5 (62.5) had high Adoption of fish production practices with 95% Cl (1.51-2.82) and Std. 1.030.The chi-square value (12.9) and significant difference (0.012) showed that there is positive relation between the size of land and adoption of fish production practices. As demonstrated in Table 3, the adoption level of the fish production practise will greatly rise with the expansion of land.

Table 3: Cross-tab and descriptive analysis of size of land * adoption

size of land * adoption Cross-tabulation		Adoption of fish production practices			95% Confidence Interval for Mean	Std. Deviation	Chi-square	Significant difference
		Low	Medium	High				
size of land	Up to 12.5 acre (small)	1 (12.5%)	0	5 (41.6%)	Lower Bound=1.87 Upper Bound=3.13	0.756	12.9	0.012
	12.5–25 acre (medium)	2 (25%)	6 (60%)	0	Lower Bound=1.51 Upper Bound=2.82	0.516		
	Above 25 acres (large)	5 (62.5)	4 (40%)	7 (58.3%)	Lower Bound=1.51 Upper Bound=2.82	1.030		
Total		8	10	12				

Awareness of fisher men about the best practices of fish farming

For this analysis, data was categorized in to three levels (low, medium and high) according to the awareness level of recommended fish production practices. Results showed that out of 2 (6.66%) participants having low awareness level, 1 (50%) had completed high school studies and 1 (50%) was graduate studentpractices with 95% Cl (1.94-2.81) and Std. 0.518. Out of 18 (60%) participants having medium awareness level, 4 (22.2%) had completed high school studies and 9 (50%) were graduated and 5 (27.7%) were Illiteratewith 95% Cl (1.99-2.63) and Std. 0.602. Out of 10(33.3%) participants having high awareness level, 3 (30%) had completed high school studies, 6 (60%) were graduated and 1 (10%) was Illiteratewith 95% Cl (1.74-2.60) and Std. 0.408. The chi-square value (12.51) and significant difference (0.007) showed that there is strong positive relation between Education and Awareness of recommended fish production practices shown in Table 4.

Table 4: Cross-tab and descriptive analysis of Education * Awareness of best practicesfish production practices

Education * Awareness of best practices fish production practices Cross-tabulation		**Levels of awareness of best practices fish production practices**			**95% Confidence Interval for Mean**	**Std. Deviation**	**Chi-square**	**Significant difference**
		Low	**Medium**	**High**				
Education	**High school**	1 (50%)	4 (22.2%)	3 (30%)	Lower Bound=1.94 Upper Bound=2.81	0.518	12.15	0.007
	Graduate	1 (50%)	9 (50%)	6 (60%)	Lower Bound=1.99 Upper Bound=2.63	0.602		
	Illiterate	0	5 (27.7)	1 (10%)	Lower Bound=1.74 Upper Bound=2.60	0.408		
Total		2	18	10				

Discussion

The fishing sector, which contributes 0.4% of GDP, is supported by a sizable percentage of unproductive land and a wealth of freshwater and marine resources (GOP, 2013)(Lindkvist, Trondsen et al. 2008). However, the study's findings showed that, as a result of a lack of authentic information and inadequate fisheries management services, a significant portion of fish farmers did not completely adopt the recommended techniques of fish production(Lam, Remais et al. 2013).About 47% of farmers also engage in fish farming, although it is obvious that this is insufficient to provide for their financial needs(Ankrah Twumasi, Jiang et al. 2021). Each and every fish farmer utilised ponds with farmed fish and was informed. The federal and provincial fisheries departments were working on a number of projects, including improving extension services, educating consumers about new fish production technologies, improving goods with higher economic value, increasing per capita consumption of fish meat, and enhancing the social and economic conditions of stakeholders in fish farming.There is several different decorum available for the best management of Chinese fisheries production sectors which includes thirteenth 5 years National Development Plan for Fisheries commenced from 2016 to 2020, National Chinese Government Plan for Distant Fisheries, Native growth plans for the capture of Marine Fisheries and Guidance of General Yangtze Office of the State Council on Strengthening Aquatic Organism Protection. It is one of the targeted policy to ensure the growth Chinese fish industrial sector to the best possible level by setting effective management systems.

In reality, managing fisheries is an extremely challenging undertaking in a country with such a vast fisheries industry. The Chinese government has put in place a variety of programmes to constantly improve the management of catch fisheries since the founding of the PRC and promote the sector's sustainable expansion in accordance with its existing social and economic conditions(Huang, He et al. 2019, Yu and Han 2021).

The majority of the participants (n=14, 46.7%) were between the ages of 30 and 50. However, 8 (26.7%) respondents were under the age of 30, and 8 (26.7%) participants were above the age of 50 (as shown in Fig. 1a).In China, 16 (53.3%) farmers were graduates, 8 (26.7%) participants had finished high school, and 6 (20%) applicants were illiterate (as shown in Fig. 1b).According to our findings, 6 (20%) farmers had up to 12.5 acres of land, 8 (26.7%) had 12.5-25 acres, and 16 (53.3%) had more than 25 acres.According to the socioeconomic aspects of this result study, 14 (46.7%) farmers were associated with the profession of only fish farming, 8 (26.7%) participants were doing fish farming, and 8 agricultural (26.7%) participants were practising farming, agriculture, and also used to provide service to the locals, as shown in Table 1. Findings on similar patterns were also demonstrated by (De Muro, Burchi et al. 2007)

Only one (3.3%) individual got 30,000 yen as net yearly income through trading fish and stock management, whereas 12 (40%) farmers earned up to 30,000-50,000 yens and 17 (56.7%) farmers made more than 70,000 yens. Results indicated a positive relationship between land size and fish production practises adoption. As indicated in Figure 2, the adoption of fish production practises will expand dramatically as land availability increases.

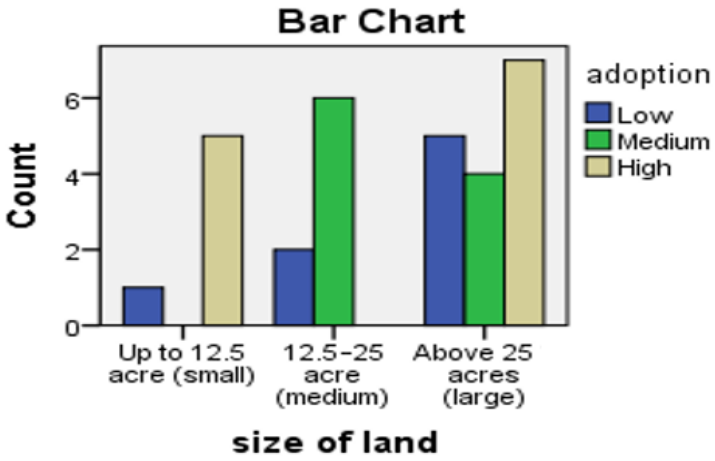


Fig 2: Association of size of fish farming land and Adoption of good fish production practices

Results demonstrated indicated that there is a substantial positive relationship between Education and Awareness of suggested fish production practices, as shown in fig 3. However, it was also recorded that the illiterate farmers were having medium to high level of awareness. This was because they were highly trained and experienced on the field.

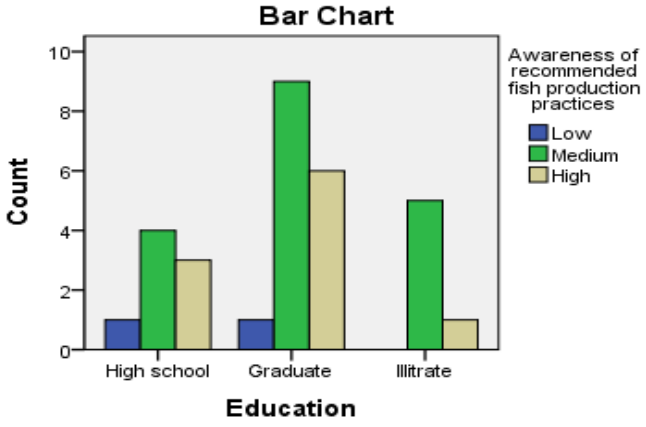


Fig 3: Association of Education and Awareness of suggested fish production practices

The following can be used to summarise the management strategies employed in China's capture fisheries: Input, output, technical management techniques, financial management techniques, distant water fisheries management systems, and mechanisms for international fisheries management collaboration(Huang, He et al. 2019, Hao, Wu et al. 2022, Zhao, Bao et al. 2022). However, study results revealed that the key limiting factors that ultimately resulted in low productivity and low adoption rate were market uncertainty, inadequate fisheries extension services, and a lack of knowledge about fish diseases. The Fisheries Department should provide new varieties to the agricultural community and expand production practises through the planned extension services(E-Jahan, Ahmed et al. 2010, Qian, Wang et al. 2016, Zhou 2023).

Conclusion

The intricacy of both marine and freshwater capture fisheries presents a number of management concerns for the Chinese government, which has been instrumental in tackling industrial issues and promoting the sustainable growth in capture fisheries through different regulatory measures(King, McFarlane et al. 2003, Keith, Kong et al. 2014, Huang, He et al. 2019). China's historical context and current political events are actually interwoven. Chinese catch fisheries management methods have their roots at a very early time when certain antiquated governmental systems enforced catch fisheries restrictions(Huang, He et al. 2019).The main elements of China's catch fisheries management practices include input control, output control, technical control and management measures, economic instruments, remote water fisheries management, and methods for international collaboration. As China develops a blue economy, its policies are turning in favour of extensive control, resource conservation, and ecological restoration(Qisheng 2018, Huang, He et al. 2019). The fundamental goal of the law-based practices is to effectively integrate and apply the system's main development track for fisheries management across the world.

References

1. Andreassen, O. J. R. P. (2012). "Sustainability in Fish Farming: Global and Local Challenges and Opportunities." (4): 78-84.
2. Ankrah Twumasi, M., et al. (2021). "The impact of cooperative membership on fish farm households' income: The case of Ghana." **13**(3): 1059.
3. De Muro, P., et al. (2007). "Education for rural people and food security."
4. E-Jahan, K. M., et al. (2010). "The impacts of aquaculture development on food security: lessons from Bangladesh." **41**(4): 481-495.
5. Hao, C., et al. (2022). "A critical review of Gross ecosystem product accounting in China: Status quo, problems and future directions." **322**: 115995.
6. Hastein, T., et al. (2006). "Food safety hazards that occur during the production stage: challenges for fish farming and the fishing industry." **25**(2): 607-625.
7. Huang, S., et al. (2019). "Management of China's capture fisheries: review and prospect." **4**(5): 173-182.
8. Idoje, G., et al. (2021). "Survey for smart farming technologies: Challenges and issues." **92**: 107104.
9. Keith, S., et al. (2014). "The Pacific halibut: biology, fishery, and management." (59): 60.
10. King, J., et al. (2003). "Marine fish life history strategies: applications to fishery management." **10**(4): 249-264.
11. Lam, H.-M., et al. (2013). "Food supply and food safety issues in China." **381**(9882): 2044-2053.
12. Lindkvist, K. B., et al. (2008). "Restructuring the Chinese seafood industry, global challenges and policy implications." **32**(3): 432-441.
13. Lu, J. and X. J. A. Li (2006). "Review of rice–fish-farming systems in China—one of the globally important ingenious agricultural heritage systems (GIAHS)." **260**(1-4): 106-113.
14. Qisheng, T. J. J. o. A. (2018). "Fisheries Science Knowledge System and Characteristic China Approach for Fisheries Development." **8**(1): 28.

15. Xie, B., et al. (2013). "Organic aquaculture in China: A review from a global perspective." **414**: 243-253.
16. Yu, J. and Q. J. F. R. Han (2021). "Exploring the management policy of distant water fisheries in China: Evolution, challenges and prospects." **236**: 105849.
17. Zhao, K., et al. (2022). "Spatial distribution of potentially harmful trace elements and ecological risk assessment in Zhanjiang mangrove wetland, South China." **182**: 114033.
18. Zhou, H. J. M. P. (2023). "Provincial variations and entrepreneurialism in the development of China's Distant Water Fisheries (2011–2020)." **147**: 105344.