



Research article

Economic well-being induced Women's empowerment: Evidence from coastal fishing communities of Bangladesh

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ABSTRACT

Women's empowerment is an important policy agenda that is critical for developing countries like Bangladesh to achieve sustainable development goals (SDGs). The prime objective of this paper was to examine whether community savings groups can truly improve the economic conditions of women which turns into women's empowerment in fishing communities or not. The propensity score matching (PSM) and logistic regression technique were incorporated, and required data were collected from Community Savings Groups (CSG) interventions and non-CSG villages of coastal Bangladesh. Quantitative data were collected from 615 women comprising 306 CSG participants (treatment group) and 309 non-participants (control group). The results affirm CSG group members were economically more solvent and less dependent on borrowed money than non-CSG group members. Improved economic indicators (savings, income and expenditure) of CSG households make the foundation of attaining women's empowerment for the intervened group. The findings revealed that CSG women performed better in various dimensions of leadership capacity than non-CSG women. Econometric analysis confirmed positive impacts of CSG interventions on savings, gross household income, earning from catching fish, alternative income-generating activities (AIGAs), expenditure, and women's empowerment. The initiatives of CSG not only generate economic well-being but also contribute to women's empowerment. Financial access, improved literacy and an enabling environment for the productive engagement of women reduce gender inequality in fishing communities. To sustain the benefits of CSG, establishing institutional linkages (advisory and financial), legality/registration of CSGs from the government authority, and facilitation of alternative IGAs are crucial.

1. Introduction

In many developing countries around the world, financial access for all socio-economic groups, particularly the poor, has become a key weapon for eliminating poverty and inequality. In Bangladesh, as a developing country, rural households have access to informal

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credit through traditional credit, savings arrangements, and self-selected savings groups. In rural Bangladesh, community savings groups are assisting in the recovery of regional economies that have been affected by shocks like COVID-19 or other natural catastrophes. Additionally, it gives their members—mostly women working in the unorganized sector—economic support and securing them additional assistance in emergencies. The credit and savings services are provided by formal and informal institutions including Non-governmental organizations-microfinance institutions (NGOs-MFIs). The NGO-MFIs successfully overcame the previous problems of adverse selection with formal lenders by inventing alternative models (group lending or individual lending with joint liability). It also has created and improved several novel techniques such as group-based security, savings, and monitoring to support the poor while retaining financial sustainability, defying traditional wisdom.

One of the most crucial financial services that people with low incomes require is savings. Many people save in unconventional ways (e.g. hiding savings at home or investing in livestock or jewellery). Nevertheless, savings groups or community savings groups recognize the importance of savings services and allow savings amounts based on individual desire. Savings groups, also known as community savings groups, are often made up of 15–25 self-selected persons who gather regularly to save; amounts are determined by each member's abilities [1]. This organization aims to assist individuals, families, and communities by providing small start-up cash for microenterprises to generate income, foster self-reliance, create jobs, enhance wealth and reduce poverty [2,3]. Individual pass-books or a central ledger are used to record the amount of savings and loans. Savings groups have been shown to increase women's access to financial services and help them accumulate assets, reduce their vulnerability to major shocks, minimize daily life risks, invest in children's education, and increase enterprise investments.

Bangladesh has made noticeable success with respect to developing innovative microcredit models, service diversification, financial sustainability, and reaching the poor [4]. The study of Rahman [5] identified multiple reasons for the success of microfinance programs in Bangladesh. Thus, globally, Bangladeshi lending techniques have been copied to make credit accessible to the poor in both urban and rural areas. Most NGO-MFIs, on the other hand, place a higher priority on 'moving money' through loans and loan repayment than on individual and group savings [6–8]. Alternatively, some NGO-MFIs introduced savings products that are not tailored to individual requirements, and some poor folks are excluded because of the nature of the product [9].

Considering the tangible and intangible benefits of savings groups, the Enhanced Coastal Fisheries in Bangladesh (ECOFISH) project introduced fisherwomen Community Savings Groups (CSGs) to reduce dependence on the high-interest non-formal loans in the fish value chain, and train CSG members through Business Literacy Schools (BLS). Through CSG, BLS training on saving management and leadership are provided to the women who promote alternative income-generating activities (AIGAs). It is argued AIGA enhances a household's well-being and women's empowerment, but that is yet to be scientifically investigated.

Several studies in underdeveloped nations have found that savings groups have a favourable impact on improving livelihoods. In three countries (Ghana, Malawi, and Uganda) [10], conducted a major randomized study of a savings-led microfinance program. This study examines the effects of a popular development intervention on the lives of low-income households in rural communities, focusing on financial services usage, microenterprise activity, income, female empowerment, consumption, and the ability to cope with shocks. A comprehensive review of savings groups across Asia, Africa, and Latin America identified several impacts at members' level including savings, use of credit, IGA investment, food consumption and security, resilience, solidarity with savings groups' members, and self-confidence [11]. The study also finds other evidence of the impact of such groups, albeit not as much, on increasing asset accumulation, consumption, education expenditure, female decision-making power, leadership capacity, collective activities, and income [11]. Similarly, the Village Savings Initiative of Char livelihood program (CLP) finds an increase in income levels that positively affect social outcomes such as improved health, sanitation, nutrition, and overall well-being of vulnerable households and individuals [12]. According to Duflo [13], women's empowerment and economic development are bi-directional: when poverty is decreased, everyone's situation improves, including women's. Additionally, gender inequality decreases as poverty decreases, thus women's conditions improve faster than men's. Economic growth, by eliminating poverty and expanding opportunities, has been shown to impact women's empowerment significantly. The most promising avenue to women's emancipation is a formal/semi-formal paid job [14].

One of the stated objectives of Bangladesh's national development agenda is the emancipation of women, and microfinance is essential to achieving this aim. However, studies on women's empowerment through community savings are rare. Most empirical research does not track the empowering process component [15–17]. Furthermore, these studies frequently lack a pertinent conceptual framework and are particularly inadequate at quantifying agency. Thus, it is pertinent to investigate the association between women's empowerment and group saving in the context of Bangladesh using household-level primary data. Investigations at the household level can make tremendous strides in defining indicators and constructing larger, context-specific frameworks. However, extended literature reviews indicate an apparent gap in our understanding of the interaction between economic well-being and women's empowerment. Therefore, this paper makes an important contribution to re-confirm the relationship between women's empowerment and economic well-being through a community savings intervention.

2. Operational mechanism of community savings groups (CSG)

CSG were established with the facilitation of ECOFISH BD. Until the end of the project (a 5-year project ended on December 31, 2019), it facilitated the establishment of 148 women-led CSGs that involved 4125 women, with savings of US\$159,210 [18]. The basic features of CSG are (i) poor fishers' like-minded women form a group consisting of 30–35 members; (ii) at least one fishers' women CSG is formed in each fishing village; (iii) compulsory but flexible amount of savings; (iv) does not require any collateral for lending; (v) small loans repaid in monthly instalments; (vi) eligible to borrow three times higher amount of individual savings. The operation of CSG is guided by a written management and financial guidelines for CSGs.

To understand the regular activity of an organization, it is essential to assess the processes and corresponding tools used. The present study tries to unpack the financial (saving, lending, supervising, repaying, and exemption) provisions and benefits incurred by the clients through engagement with CSG.

The importance of savings services is well recognized as it allows savings provision based on individual desire. All CSGs are regulated with a compulsory saving provision with a minimum of BDT 50 to BDT 100 per month. The amount is deposited into their respective name in the register book and also recorded in the individual passbook. Any interested group member can borrow from the group savings individually. The CSG members follow a very simple procedure for lending the money, in accordance with the CSG management and financial guidelines. It does not require collateral, mortgage or other assets for borrowing money. All CSGs lend money for a 10-month duration with a 5% rate of interest. Till now they only lend money to the CSG members. Borrowers usually live in the same village, within about 1.5 km. radius distance. A formal application is required for borrowing the money. In addition, some CSGs have followed the process of taking NID (National Identification Number) cards and legal documents (stamp paper) for security purposes. CSGs typically disburse credit within 15 days of receiving the application.

Nevertheless, every applicant does not get the desired amount of loan due to a shortage of funds. In principle, a single member can borrow a maximum three times of her own savings. The office bearer of CSG resolves it by checking the previous lending history, the purpose of borrowing, making investigation, and consultation with the borrower or others, with the motivation of enlisting clients for the next round.

Generally, CSG members repay their loans through monthly instalments. The CSG member pays the due installment at the time of the monthly meeting. In a few cases, the CSG’s president, secretary, and cashier jointly collect the instalment. In certain CSGs, loan repayments are suspended, for example during the fishing ban period and Covid 19 pandemic, to facilitate better coping with the associated hardships. The CSG members consider it is an advantage of CSG membership over MFIs. Even in a normal situation, there is flexibility to repay the instalment if someone fails to pay her dues for personal reasons. This provision is truly absent in the case of NGO-MFIs. Hence, the CSG initiation in the community is highly praised by the group members and other community members.

Regarding financial strength, raising funds was the first step of the CSG. These studied groups mainly raised their funds through the ECOFISH project matching funds and clients’ monthly savings. ECOFISH provided the matching fund of BDT 25,000 when the CSG reached the equivalent fund level through the collection of monthly savings. The members of CSGs raise their funds through monthly savings and the interest received through lending money. On average, each CSG keeps about 25% of savings in the bank as a precaution from the total savings. There is a provision to include a new member in the group who is highly motivated and agrees to follow all principles of CSGs. Similarly, a member can leave the group with a valid reason, and her actual savings are returned immediately without any interest or any benefits of a seed grant.

3. Materials and methods

3.1. Conceptual framework

Economic well-being is one of the most popular concepts in social science. It includes both subjective and objective dimensions. Economic well-being can be regarded as the financial strength of an individual or household today and for the future. It is the ability to meet the needs and feel safe, comfortable, and satisfied with the earnings and savings [19]. An individual with higher well-being is also said to be more productive and creative, thus contributing to the community’s development and the country’s economy in general [20]. Considering the importance of finance, the ECOFISH project provides financial literacy training and seed grants to the CSG. Higher financial literacy leads to greater economic well-being and less financial concerns [19]. Economic well-being has positive and direct associations with financial satisfaction, behaviour, and perceived financial capability [21]. In fact, financial stability and savings directly influence the overall well-being of people [22]. Accordingly, a conceptual framework is presented in Fig. 1.

It is hypothesized that economic well-being leads to women’s empowerment. Economic well-being is measured based on women’s involvement in alternative income-generative activities, more savings, earnings, and expenses on health and child education (Fig. 1).

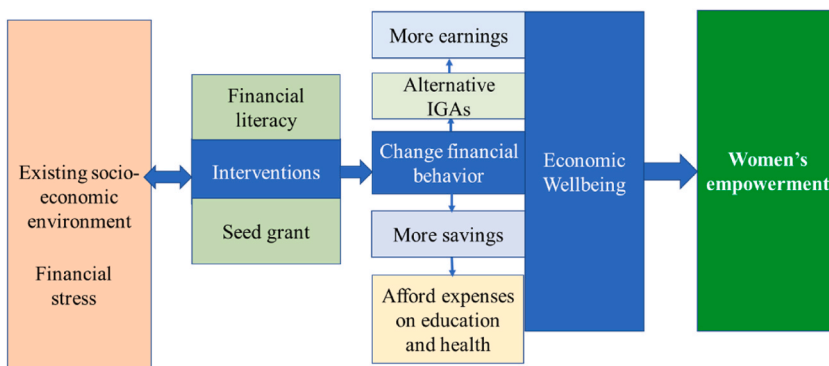


Fig. 1. Conceptual framework on economic well-being leads women’s empowerment.

The application of the mixed method, especially the econometric model, helps to determine women's empowerment.

3.2. Study area and sampling

The ECOFISH BD project intervention was carried out in Shariatpur, Chandpur, Laxmipur, Barishal, Patuakhali, and Bhola districts of Bangladesh. Three districts were selected randomly from the six intervention districts. These are Shariatpur, Chandpur, and Bhola. A total of six *Upazilas* (sub-administrative areas) consisting of two from each district were selected based on the concentration of CSG interventions. For measuring the impacts, both control and treatment villages were selected. A list of CSG intervention villages were collected from the ECOFISH team for gathering necessary information and data. The sample villages are known as Primary Sampling Units (PSUs). Similarly, control villages were selected from the same selected *Upazilas* (sub-administrative areas) maintaining distance to avoid any spillover effects.

Conducting a census covering all coastal fishing communities living in the control and treatment villages is not worthwhile. In general, there is a greater homogeneity of coastal fishing communities. The fishing families tend to live in a single village due to their low social status [23]. After selecting the villages mentioned above, a list of CSG participant women was collected from the ECOFISH team. The target population of this study are those households who engaged with the selected CSGs and borrowed money at least once from their savings. In contrast, non-participants or control households are those who live in the same *Upazilas* but are not members of any CSG and did not receive any support and services from the CGSs. A list of non-participant households was collected from the respective Department of Fisheries (DoF) local staff and community leaders. From each selected PSU, around 100 women were interviewed randomly from the list provided by the ECOFISH and a similar number from the list provided by DoF or the local community. Hence, the total survey participants comprised 615 comprising 306 CSGs and 309 non-participants.

3.3. Methods of data collection

To collect the required data, an interview schedule was prepared in accordance with the objectives set for the study. Major questions are related to socio-demographics, women's empowerment (widely used five domains of women empowerment i.e., production, resources, income, leadership and time), and livelihood activities. The interview schedule was transferred into *Kobo* software for tablet-based data collection. The prepared interview schedule was then pre-tested in the field before final data collection. In addition, a FGD guide was prepared before the collection of qualitative data and information.

A total of 12 post-graduate students were recruited as data enumerators. A comprehensive three-day training workshop on "Data Collection Procedure" was performed in which enumerators spent one day in the field (pre-testing the interview schedule). Attempts were made to ensure a uniform pattern in administering the survey. The training plan emphasized skill training in real situations more than classroom training. Data were collected by the enumerators through face-to-face interviews under the direct supervision of the research team (physical and virtual). The research team travelled to all study sites to ensure the quality of the data. In addition, there was a regular virtual meeting with the enumerators (mostly in the evening) to discuss any survey-related concerns. Data were collected in October 2021.

Besides quantitative surveys, FGDs were performed to collect narratives of how and why questions related to gender norms and attitudes. FGDs were conducted with the women's groups. A total of twelve FGDs were carried out in which, three in each Shariatpur and Chandpur and 6 in Bhola districts. The number of FGDs varies considering the level of saturation of the information. For performing FGDs, an extensive note and audio recording were done for greater authentication. The research team members performed the FGDs as facilitators and note-takers and sometimes took help from research associates as note-takers.

3.4. Data processing and analyzing

Data were collected using a digital device and uploaded to the server. However, uploaded data were regularly checked to avoid any technical difficulties. Stored data were downloaded and handled carefully by the researcher. Accordingly, digitized data were arranged as per analytical requirements. In case of inaccuracy, inconsistency and incompleteness identified in any data, communication was made with the respondent immediately. If the problems could not be resolved, then the specific household/respondent was omitted from the analysis. Descriptive statistics generated statistical measures such as averages, percentages, ratios, frequency, etc. The differences between CSG participants and similar people who did not participate in the CSGs were compared so that the differences could be attributed only to the CSG intervention. Fisher-women are believed to have two options: participate or not participate in CSGs. The two alternatives are mutually exclusive [24,25]. Hence, an econometric analysis was performed for measuring the impacts.

3.5. Women's empowerment index

The University of Oxford developed the measurement of Women's Empowerment in Agriculture in collaboration with the United States Agency for International Development (USAID) and the International Food Policy Research Institute (IFPRI). It measures women's empowerment relative to men within households, providing a more robust undertaking of gender dynamics within household communities. The measure was based on how women were involved in agriculture across five different areas, including production, resource usage, income, leadership, and time use. Each responder from the treatment group and the control group was estimated using the weighted indexing approach.

The cut-off level for indexing was set in different arrays for different domains. In the production domain, women should have at

least one ownership/decision-making power for productive resources solely/jointly with husbands/other family members. In the case of income and resource domains, we considered women to be empowered if she has control over at least two entities from each domain. The cut-off point is escalated to three entities for the domain of leadership, and women had access to different individual and institutional groups. Finally, the time domain was calculated based on their overall satisfaction of spending time on different productive and leisure activities.

3.6. Propensity score matching

Propensity Score Matching (PSM) was used to evaluate the impact of participation in the CSG on family well-being (i.e. saving, income and expenditure) leading to women's empowerment. Because of the lack of baseline data and the nature of the program, PSM is a popular method for quickly measuring impact [26]. The CSG impacts were evaluated in this study using two categories of families: CSG participant (treated) and non-CSG participant households (control). The project's participation is endogenous, resulting in selection bias (OLS fails to offer unbiased estimates). Bias can come from two origins, according to Ravallion [27]: first, variations in unobservable features, and second, disparities in observable characteristics due to a lack of an adequate comparison group, i.e. a lack of common support between the treated and control groups. We employed the PSM method to assess the impact on saving, income, expenditure, women's empowerment, and dietary diversity to solve the problem of bias. The logit model is more extensively used than the Probit model because it is easier to compute [28], as a result, the propensity scores were estimated using the logit model. The dependent variable in the logit model is CSG participation, which has a value of 1 if the household took part in the program and 0 otherwise. Following Gujarati and Porter [29], the Logistic distribution function for participation in the CSG program is specified as:

$$P_i = \frac{e^{z_i}}{1 + e^{-z_i}} \quad 1$$

Where, P_i is the probability of women participating in CSG, e^{z_i} represents the irrational number of e to the power of Z_i , Z_i is a function of n-explanatory variables which is also expressed as:

$$Z_i = \beta_0 + \sum_{i=1}^n \beta_i X_i + \varepsilon_i \quad 2$$

Where, X_i is the explanatory variable, β_0 is the intercept, β_i is the Logit parameters (slopes), and ε_i is the disturbance term.

If P_i in equation (1) above is the probability of women's participation, then $1 - P_i$, is the probability of women not participating in CSG. Odds ratio ($\frac{P_i}{1-P_i}$) is the probability of a household engaging in CSG divided by the probability of not participating. Odds ratio (considering natural logarithm) can be written as:

$$L_i = \ln \left[\frac{P_i}{1 - P_i} \right] = z_i = \beta_0 + \sum_{i=1}^n \beta_i X_i + \varepsilon_i \quad 3$$

Where, L_i is a natural log of the odds ratio in favour of participation in the CSG, which is not only linear in X_i , but also linear in the parameters, and β_0 is the propensity score of the observable individuals. The logit model PSM estimate should incorporate predictor factors that influence the selection procedure, program participation, and the desired outcome [30,31]. There are different matching algorithms in implementing PSM, including Nearest Neighbour Matching (NNM) matching, Caliper or Radius matching (RM), Stratification or Interval matching, and Kernel and Local Linear matching [32]. This study uses the Nearest Neighbour (NN), Kernel and Radius matching methods. No approach is without flaws, but combining several methodologies allows the robustness of impact estimations to be assessed [33].

3.7. Average treatment effect on the treated (ATT) estimation

There are various matching estimators of PSM are available. Average Treatment on the Treated (ATT) is the most commonly applied matching estimator. The PSM estimation technique concludes with ATT estimation. Caliendo and Kopeinig [28] explain its empirical specification, which can be stated as:

$$ATT = E_{P(X|D=1)} \{E[D = 1, P(X)] - E[D = 0, P(X)]\} \quad 4$$

For propensity score matching to be valid, balancing qualities must be met, which means that two homes with the same likelihood of participating in the project will be placed in equal proportions in the treated and control groups [34]. The common support or overlap criterion is another prerequisite for the propensity score. It means that people with the same X values are more likely to be both participants and non-participants [35]. A two-sample t -test (before and after matching) can be used to examine for significant differences in covariate means between the treatment and comparison groups [36]. As a rule of thumb, no significant differences in means should exist after matching. Furthermore, Sianesi [37] proposes comparing Pseudo- R^2 before and after matching as a measure to assess covariate balancing; Pseudo- R^2 must be very low after matching to show that the matching procedure was successful.

4. Results

4.1. Socio-demographic profile of the survey respondents

The age structure of the sample respondents was classified into four age groups including 18–35, 36–50, 51–65, and above 65 years (Table 1). It was obliged to participate in CSG after 18 years old, therefore, the category started from that age point. The remaining categories were imposed arbitrarily, having the sense that a span of fifteen years is a good age to make a significant decision in productive activities.

The education level of the respondents has been grouped into six categories: (i) illiterate (who has no formal education), (ii) Primary (who has attained some classes (up to five years) in formal education), (iii) Secondary (refers to class six to 10 but not completed the Secondary School Certificate), (iv) SSC (refers to who obtained the Secondary School Certificate after appearing in a public examination system), (v) HSC (Higher Secondary Certificate, it is also a public exam degree offered after successful completion of 12 years of schooling), and (vi) Higher education (more than 12 years of schooling). It is observed from Table 1 that the majority of the members from CSG and Non-CSG were illiterate (CSG 43.79%, Non-CSG 40.13%) followed by the secondary level of education, which was 33.66% for CSG and 34.95% for non-CSG members. Besides formal education, experience is often reported as an important factor in ensuring productivity. The average experience of the respondents in catching fish was estimated at about 23.61 years (CSG 24.45 years, non-CSG 22.78 years), which is quite long for making a sustainable decision for both groups.

4.2. Economic engagement of studied household

Table 2 shows that the yearly average saving amount is higher for CSG group members. The average savings of all the respondents is about BDT 13,000. On average, the CSG members save about Tk. 15,000, whereas it is about BDT 11,000 for non-CSG members. The result confirms more solvency and awareness of saving of CSG group members. CSG group members are less dependent on borrowed money from *Mohajan* (an informal source that imposes a high-interest rate) but take more loans from other sources (mostly from friends/relatives, etc.) compared to the members of the non-CSG group. One of the principles of microcredit borrowing is that an individual can borrow money after paying his/her previous due. Hence, borrowing in the last cycle means the respondent's current borrowing status.

The average annual income of both households is around BDT 178,000, which is slightly higher for CSG groups (BDT 190,000) than for the non-CSG groups (BDT 166,000). The income of both households varies in terms of various sources. Actually, ECOFISH BD promotes alternative income-generating activities (AIGAs) so that participant households can earn money during fishing ban period. Beside financial literacy training, it provides hands-on training on homestead gardening, livestock and poultry rearing, fish processing and selling etc. The highest income is from catching fish, which are about BDT 136,000 and BDT 131,000, respectively for CSG and non-CSG households (Table 3). The CSG households earn more from fish trading and remittances than those of the non-CSG households. Other major earnings of both households come from small businesses, wages and salaries, crop production, and aquaculture.

Like the higher average income, CSG households spend more money than non-CSG households. The results show that CSG and non-CSG households' average yearly expenditure is about BDT 170,000 and BDT 114,000, respectively (Table 4). Monthly expenditures on food items and education are slightly higher for CSG households compared to non-CSG households. On average, about BDT 6500 of CSG households is spent as an investment in men's business, whereas this amount of expenditure is about BDT 4500 for non-CSG households (Table 4).

Table 1
Demographic profile of the treatment and control group (percentage).

Socio-demographic variable	Type of member		All average
	CSG	Non-CSG	
Age			
18–35 Years	49.67	57.60	53.55
36–50 Years	40.52	39.48	40.00
51–65 Years	9.48	2.91	6.18
65 above	0.33	0.00	0.16
Education			
Illiterate	43.79	40.13	41.95
Primary	17.97	21.04	19.51
Secondary	33.66	34.95	34.31
SSC	3.92	2.91	3.41
HSC	0.65	0.65	0.65
Higher education	0.00	0.32	0.16
Fishing Experience			
0–5 Years	4.25	3.88	4.07
6–10 Years	8.17	8.41	8.29
11–15 Years	9.48	17.15	13.33
16–20 Years	24.84	24.92	24.88
21 and above years	53.27	45.63	49.43

Table 2
Saving and borrowing information.

Estimated parameters	Type of member		All average
	CSG	Non-CSG	
Average saving amount (BDT/Year)	15168.24	10998.20	13073.05
Borrowed in the last cycle (BDT/last cycle)	12264.71	39220.07	25808.13
Borrowed from <i>Mohajan</i> (BDT/last year)	22790.85	27880.26	25347.97
Borrowed from any other sources (BDT/last year)	35130.72	14110.06	24569.12

Table 3
Average income from different sources.

Sources of income	Type of member		All average
	CSG	Non-CSG	
Income from catching fish (open body)	136318.00	131368.90	133831.4
Farm income from crop production	42089.23	37140.35	39777.05
Income from aquaculture	42750.00	10000.00	36200.00
Fishing gear preparing/repairing	17200.00	29200.00	22533.33
Fish trading	114800.00	98666.67	106000.00
Livestock & poultry	26590.35	23745.91	25772.58
Dry fish processing and selling	60000.00	0.00	60000.00
Tailoring/handicraft	20162.50	29000.00	21930.00
Small business	61178.57	38710.53	52095.74
Income from wages and salaries	43543.21	37443.10	40997.84
Income from remittance	167500.00	92307.69	116052.60
Govt. grants or support from safety net program	5265.72	5026.92	5163.93
Other income (specify)	57729.73	56828.13	57311.59
All sources	190480.07	166380.3	178371.40

Table 4
Yearly average expenditure on different heads in BDT.

Items	Type of member		All average
	CSG	Non-CSG	
Household groceries, including food	72490.52	67567.96	70017.24
Education	13877.25	10062.46	11960.55
Health care	12802.61	11250.81	12022.93
Expenditure related to fisheries activities	33091.50	27387.06	30225.37
Investing on aquaculture	482.03	632.68	557.72
Dry fish production	98.04	0.00	48.78
Making/Repairing houses	8395.09	6458.58	7422.11
Investment in household capital – poultry, livestock, homestead gardening	8182.61	5490.46	6829.97
Investment in agricultural farm capital/expanding farm	6495.43	5189.25	5839.20
Investing for women's businesses (specify-tailoring, handicraft, etc.)	668.30	84.14	374.79
Investing in men's business	6503.27	4517.79	5505.69
Clothes and accessories	9349.67	8200.65	8772.36
Recreational/event purposes	2984.99	2667.31	2825.38
Others (specify)	7501.15	6821.73	7107.38
All household expenses	170708.90	1146534.20	158562.60

4.3. Impact of CSG on households' savings, income and expenditure

The family well-being of the CSG members was evaluated on whether they were significantly differentiated on different economic outcomes (income, expenditure, engagement in AIGAs, and savings) as a result of participating in the community savings program or not. Table 5 shows a statistically significant difference between the treated and comparison households in the above parameters.

A common support zone was chosen for the matching method, and the balancing property was satisfied for all result variables, which is a PSM (Propensity Score Matching) requirement (please see Appendix A for the detailed procedures). The first outcome variable was set as household savings to the CSG/MFI, women saved money every month at CSG/MFI. Although each group has the opportunity to save money, the CSG group had the benefit of saving more money than the counterpart with greater flexibility. Therefore, it is expected that the matching results are to be impressive. Table 5 shows that in all matching methods, the gross saving amounts are positive and statistically significant at below 1% level than that of the non-CSG group and it was BDT 5208.66, BDT 4210.99 and BDT 4135.19 in NNM, kernel and radius matching methods, respectively. Furthermore, gross savings have been delineated into CSG or/and MFI savings, this estimation shows it to be highly significant (at 1% level) in all three methods (NNM, kernel and radius matching). It

Table 5
Impact of CSG on fishing household's Saving, income and Expenditure and Women's Empowerment.

Matching method and outcome	No. of treated participant	No. of the control participant	Average treatment on treated (ATT)	SE	t-statistics
Gross Savings					
Nearest neighbour matching	306	156	5208.663	1940.638	2.684
Kernel matching	306	309	4210.909	1393.318	3.022
Radius matching	306	309	4135.194	1555.421	2.659
Savings in CSG or/and MFI					
Nearest neighbour matching	306	156	4090.324	546.247	7.488
Kernel matching	306	309	3504.914	424.384	8.259
Radius matching	306	309	3508.493	483.746	7.253
Household total income					
Nearest neighbour matching	306	160	32352.58	11885.79	2.722
Kernel matching	306	308	21530.54	9494.463	2.268
Radius matching	306	308	23091.94	9040.44	2.554
Income from catching fish					
Nearest neighbour matching	306	160	13955.23	10235.67	1.363
Kernel matching	306	308	3801.377	6927.756	0.549
Radius matching	306	308	4294.631	7515.637	0.571
AIGA					
Nearest neighbour matching	306	160	10546.69	4834.182	2.182
Kernel matching	306	308	13362.21	3473.205	3.847
Radius matching	306	308	14332.62	3737.123	3.835
Household expenditure					
Nearest neighbour matching	306	160	24204.69	7581.175	3.193
Kernel matching	306	308	22399.02	5567.319	4.023
Radius matching	306	308	22826.32	5994.959	3.808
Expenditure on basic needs					
Nearest neighbour matching	306	166	13894.93	3734.258	3.721
Kernel matching	306	308	12877.48	2871.722	4.484
Radius matching	306	308	13121.00	2815.948	4.660

Note: Significance level: t value from 1.64 to 1.95 = 10%; 1.96 to 2.57 = 5%; 2.58 and above = 1%.

can be said that establishing CSG has strong and positive outcomes to increase savings among CSG members.

Income was classified into multiple categories. It includes income from fishing and fishing-related activities such as aquaculture, fishing gear preparation/repairing, fish trading/sorting/processing, dry fish processing and selling. Also, it includes non-fisheries income-generating activities such as income from crop farming, livestock and poultry, tailoring/handicraft, small business, because of using the loan money from CSG (which has a reduced interest rate compared to other available loan sources). The impact of CSG on households' income was estimated as statistically significant at the 1% level for nearest neighbour matching and radius matching methods while kernel matching was estimated at the 5% level of significance (Table 5). In contrast, income from catching fish estimation shows a positive association but is statistically insignificant. As CSG has promoted alternative income-generating activities, earnings from enterprise were also estimated using three different methods. The estimation confirms statistical significance at the 1% level for all three methods. The average treatment on treated (ATT) of enterprise income (AIGAs) was found to be BDT 10546.69, BDT 13362.21 and BDT 14332.62 for NNM, kernel and radius matching methods, respectively.

Expenditure is a strong measurement of livelihood indices. Expenditure comparison is more appealing than income measurement because expenditure is a more accurate measure of standard of living. Table 5 shows that the impact of CSG on households' expenditure was statistically significant at 1% for all methods namely NNM, kernel and radius matching methods. Expenditure includes all types of food and non-food items and capital investment for different income-generating activities such as crop farming, fish catching and farming, livestock rearing, small businesses/enterprises, etc. The results reveal that participation in the CSG program allowed participating households to spend more. The average treatment on treated (ATT) of household expenditure was found to be BDT 24,204.69, BDT 22,399.02 and BDT 22,826.32 for NNM, kernel and radius matching methods, respectively. Encouragingly, expenditure on basic needs (food, clothing, shelter, education and health) were estimated highly positive and significant at the 1% level for all three methods. It can be ascertained that participation in CSG initiated by ECOFISH had a strong positive influence on meeting the basic needs of the households.

Table 6
Impact of CSG on fishing household's women's empowerment.

Matching method and outcome	No. of treated participants	No. of control participants	Average treatment on treated (ATT)	SE	t-statistics
Nearest neighbour matching	306	160	0.104	0.028	3.733
Kernel matching	306	308	0.122	0.021	5.687
Radius matching	306	308	0.122	0.020	6.120

Note: Significance level: t value from 1.64 to 1.95 = 10%; 1.96 to 2.57 = 5%; 2.58 and above = 1%.

4.4. Impact of CSG on Women's empowerment

Table 6 presents the non-parametric matching estimates of the average treatment effect of participation in the CSG program on the treated (ATT) (the outcome variable is the women's empowerment index; please see Appendix B for the method of the indexing procedure). Results show that the average women's empowerment index increases due to participation in CSG programs which were 0.10, 0.12, and 0.12 and these estimates were statistically significant at 1% levels based on the nearest neighbour, Kernel, and Radius matching methods, respectively (Table 6). These findings are well matched with FGD and KII consultation. It was revealed during the qualitative assessment that women participating in the CSG program ha greater mobility accesss, could raise their voice or speak in the public domain and participate in group meetings.

5. Discussion

Estimating socio-demographic details is necessary for many aspects while conducting social research, and is often also used to realize samples and determine sampling error. Socio-demographic variables also provide an overview to address the measurement of individual socio-demographic characteristics. This paper focuses on age, education, and experience, which are important attributes of an individual to decide participation in productive activities and community groups. More than 90% of the members from both groups were 18–50 years old, which is generally considered a highly productive age group; according to the labour force survey, the active labour force group is 15–60 years in Bangladesh. Previous research claims that higher education has a greater influence on decision-making, participating in new, innovative and risky income-generating activities, and in maintaining the enterprises worthwhile [38]. More than 50% of the respondents have primary or higher education which made it easier to be involved in CSG groups and/or in income-generating activities, which in turn enhanced women's empowerment in the community. Looking at the experience category, the majority of the members had more than 16 years of fishing experience (almost 75% in each group). Socio-demographic findings ensured the credibility of further testing of the hypothesis of measuring the CSG impact on economic well-being induced women empowerment of the fishers' communities.

In Bangladesh's rural areas, where access to conventional financial institutions is often limited, informal saving and borrowing are widespread [39,40]. The concept of a community savings group is tailored to the financial realities of members. Groups of 30–35 people, usually all neighbours who gather regularly, are a catalyst for increased social capital, better gender relations, women's leadership, and economic development. Overall, the promotion of the groups led to an improvement in financial literacy, household business outcomes, and women's empowerment. Although the community savings group is tied to the project authority, the members are free to save or borrow money from other places. The result revealed that dependency on Mohajan (an informal source that imposes a high-interest rate) has reduced at a certain point due to involvement in CSGs. Proper use of borrowing money from the CSG and persistent advocacy from the ECOFISH project personnel helped increase the household income level, enhancing the expenditure capacity of the women. The overall family well-being with respect to better income, savings and expenditure are estimated in CSG households. Similarly, a study in Vietnam reported positive and consistent impacts of microfinance loans on total expenditure and educational expenditure, which supports the welfare effects of microfinance loans on ethnic minorities [41].

Women's empowerment was measured in different domains following qualitative measurement. In the case of autonomy, differences in mean values indicate that more women of the CSG group believe that they should own valuable resources and participate in large household purchases than non-CSG women. Ownership of assets is an important indicator of empowerment. More particularly, ownership and rights to productive assets such as land, housing, and livestock are still directly linked to Bangladeshi women's economic emancipation [42]. Usually, women in Bangladesh own very few assets [43]. Most of the assets are owned by the male members of the household. The same scenario was observed in the study areas. Most of the important resources necessary for fishing and agriculture are owned by the men. The scenario is almost the same for both the CSG and non-CSG households. Women only own poultry and jewellery in most of the cases. Like ownership of assets, women have very little control over the resources of their households [42]. Unfortunately, despite having ownership of some resources, they do not have full control over those resources. For example, a lower percentages of women have control over livestock & poultry, jewellery, and sewing machines than the percentages of their ownership of those resources. This situation does not differ much between the women of CSG and non-CSG groups. However, women feel they should own some resources and have control over their resources as it will give them strength to overcome their financial problems and deal with other crises [44–46].

Individual leadership capacity and ability to influence the community are the important dimensions of women's empowerment [47]. The findings of this paper reveal that CSG women perform better in various dimensions of leadership capacity than non-CSG women. The change of the women is noticeable. Their confidence, speaking power, courage, and negotiation power has increased compared to before. Earlier they were afraid to talk with outsiders. They did not come out in front of a stranger. But now they are very flexible and confident. The leadership has been growing up into them and they are supporting to establish the group. They now go to the bank, attend meetings, and participate in dispute meetings. Therefore, the soft skills of the women have been enhanced.

The more institutional affiliations and social networks an individual maintains, the higher his/her ability to manage the external environment will be. Women, irrespective of their membership, have a very low level of participation in different institutions and social networks, such as agricultural/livestock/fisheries producer's groups, fisheries management committees, political and religious groups, local government, and other women's groups. The focus group discussion results confirm that women are usually involved in CSG and other MFIs. However, they are engaged with other institutions at a minimal level. Women can participate in social, religious or political organizations with separate seating arrangements. Interestingly, after involvement in CSG, they are joyfully participating in school annual programs, meetings and other social events. Husbands do not restrict them like before. The perception towards women is

changing day by day.

Econometric analysis (propensity score matching) affirmed that the CSG has strong and positive outcomes to increase gross savings, savings in CSG or/and MFI, gross income, alternative income generating activities (AIGAs), household expenditure and expenditure on basic needs (food, clothes, accommodation, education and treatment) among CSG members. This implies that inclusion under the umbrella of CSG certainly improves the treatment households' economic conditions, which is re-confirmed by the econometric analysis. It is ascertained that women's active participation in saving groups enhances their productive engagement (savings, earning, AIGA, expenditure etc.) leading to women's empowerment. The findings presented here are corroborated by Kebeer [14], who asserts that engaging in paid formal or semi-formal work holds significant promise for women's empowerment. Similarly, Ashraf et al. [48] investigated the impact of access to and promotion of an individually held commitment savings product on enhancing female decision-making authority within Philippine households, serving as a tool for empowering women. SANEM's [49] research in Bangladesh reveals that, concerning major household decisions, the opinions of beneficiary women carry more weight than those of non-beneficiary women, indicating a positive influence of community savings on women's empowerment. Waller [50] conducted a study in Malawi, aligning with the findings of this paper, showing that participation in savings groups facilitated easier access to financial, economic, and social benefits. Additionally, women reported heightened self-confidence and self-esteem, attributed to increased self-reliance gained through involvement in savings groups. In fact, ECOFISH promoted alternative income-generative activities through CSG, which was one of the major implicit intentions to empower the marginal women of the fishing community. It is considered a trickle-down effect and is expected to have a positive result. According to the World Bank, empowerment increases a person's or a group's ability to make decisions and turn those decisions into desired actions and outcomes [51]. In a patriarchal society, it entails the creation of an organization and political environment in which women can live without fear of oppression, exploitation, apprehension, discrimination, and persecution [52]. The result pronounced that the average women's empowerment index was significantly increased due to participation in the CSG program.

6. Conclusion and policy implications

Deep-rooted patrilineal norms restrict women's access to and control over productive resources (ownership of assets) and the decision-making process, which is crucial for participation in divergent communal activities. In fact, fisher women's contributions in productive domains (*economic activities*) are overlooked by society, which in turn limits their voices in public places and demotivates them to engage in livelihood initiatives. The prime goal of this paper was to examine whether community savings groups can truly improve the economic conditions of women which in turn improve women's empowerment in coastal Bangladesh or not. ECOFISH has facilitated the formation of CSG in the fishing community for women fishers. The major motivation for creating the CSG was to combat community poverty by saving and starting income-generating activities. This group formation reduced the dependency on *Mohajan* (an informal source that imposes a high-interest rate) for borrowing money from the CSG members. CSG women perform better in various dimensions of leadership capacity than non-CSG women. The majority of the CSG members felt comfortable to speak up in public regarding various issues like infrastructure development in the community, gender-based violence, and different regulatory measures, including the fishing ban, whereas this percentage was lower in the case of non-CSG members. A relatively higher percentage of CSG women can decide on their own while visiting outside their homes for various reasons than non-CSG women. It can be deduced that CSG women are more empowered to some extent than non-CSG women in the context of the ability to make decisions for going out.

A causal relationship between economic well-being and women's empowerment was determined by applying PSM methods. The results indicate that CSG intervention has a significant positive impact in terms of increasing income, savings, expenditure, and women empowerment in the fishers' community. Our findings re-confirm that women's participation in productive activities through savings groups positively impacts their empowerment. Financial access, literacy, and an enabling environment for women's productive engagement might reduce gender inequality in society, particularly among the fishing community. However, the findings should be used carefully as the study was carried out in only three districts (six sub-districts) of coastal Bangladesh, and the findings were generated based on 615 randomly selected samples and focus group discussions. Determining true economic wellbeing through CSG intervention is difficult despite adopting the advanced econometric model like PSM due to other external factors. So, these findings may not be generalized for the entire population of coastal Bangladesh. Future research can be carried out on a large scale by covering many locations and adopting a similar or advanced methodological approach. Accordingly, connecting CSG participants with government programs (i.e. Polli Sanchya Bank) that will have a double-fold effect is imperative. On the one hand, members will be able to expand their AIGAs and, on the other, take a huge step out of poverty.

CRedit authorship contribution statement

Md Salauddin Palash: Writing – original draft, Formal analysis. **A.B.M. Mahfuzul Haque:** Formal analysis, Conceptualization. **Md Wakilur Rahman:** Methodology, Data curation, Conceptualization. **Md Nahiduzzaman:** Writing – review & editing. **Akbar Hossain:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

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