





BMJ Open Enhanced women's decision-making power after the *Suchana* intervention in north-eastern Bangladesh: a cluster randomised pre-post study

Md Ahshanul Haque ¹, Nuzhat Choudhury ¹, S M Tanvir Ahmed,² Fahmida Dil Farzana,¹ Mohammad Ali,¹ Farina Naz,¹ Towfida Jahan Siddiqua,¹ Mohammad Jyoti Raihan,¹ Sheikh Shahed Rahman,² A S G Faruque ¹, Tahmeed Ahmed ¹

To cite: Haque MA, Choudhury N, Ahmed SMT, *et al.* Enhanced women's decision-making power after the *Suchana* intervention in north-eastern Bangladesh: a cluster randomised pre-post study. *BMJ Open* 2022;**12**:e054148. doi:10.1136/bmjopen-2021-054148

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-054148>).

Received 05 June 2021
Accepted 23 July 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Nutrition and Clinical Services Division, icddr,b, Dhaka, Bangladesh

²Child Poverty Sector, Save the Children Bangladesh, Dhaka, Bangladesh

Correspondence to
Nuzhat Choudhury;
nuzhat@icddr.org

ABSTRACT

Objectives Women's decision-making power is a dimension of empowerment and is crucial for better physical and psychosocial outcomes of mothers. *Suchana*, a large-scale development programme in Bangladesh, actively provided social interventions on behaviour change communication to empower women belonging to the poorest social segment. This paper aims to assess the impact of the *Suchana* intervention on various indicators related to women's decision-making power.

Design, setting and participants The evaluation design was a cluster randomised pre-post design with two cross-sectional surveys conducted among beneficiary women with at least one child aged <23 months from randomly selected poor or very poor beneficiary households in Sylhet division.

Outcome measure Decision-making indicators included food purchases, major household purchases, food preparation, children's healthcare as well as women's own healthcare and visiting family and relatives.

Results Our findings suggest that 45% of women were able to make decisions on food purchases, 25% on major household purchases, 78% on food preparation, 59% on children's healthcare, 51% on their own healthcare and 43% on visiting family and relatives at baseline in the intervention group, whereas the results were almost the same in the control group. In contrast, at the endline survey, the respective proportions were 75%, 56%, 87%, 80%, 77% and 67% in the intervention group, which were significantly improved when compared with the control group. The prevalence of those outcome indicators were 64%, 41%, 80%, 71%, 68% and 56%, respectively, in the control group. As per multiple logistic regression analysis and structural equation modelling, the *Suchana* intervention had a substantial influence on the latent variable of women's decision-making power.

Conclusion In terms of food purchases, major household purchases, children's healthcare, their own healthcare and visiting family and relatives, the *Suchana* intervention favourably influenced the decision-making power of rural women living in a vulnerable region of Bangladesh.

Trial registration number RIDIE-STUDY-ID-5d5678361809b.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The cluster randomised pre-post design provides compelling evidence for the favourable impacts of the intervention on the outcome indicators.
- ⇒ Structural equation modelling as an appropriate technique was used to investigate the individual effects of the *Suchana* intervention on each of the six measurable variables as well as the effect on the composite indicator.
- ⇒ Since data on the indicators of decision-making power were acquired through maternal responses, the possibility of recall bias exists.
- ⇒ When necessary, we replaced unavailable households by selecting the immediately previous household in the sampling frame in an anticlockwise direction to survey the required number of households by phase and by age group according to the randomly generated listing.

INTRODUCTION

Women's participation in economic and non-economic decisions at the family level is a critical issue that holds great importance in both high-income and low-income and middle-income countries. However, even at the household level, women's non-participation or inability to make decisions is a public health and social concern.¹ A study previously claimed that inclusion of wives and husbands in decision-making may have better reproductive health outcomes than men who make decisions alone, which could be owing to the fact that joint decision-making allows the husband and wife to share responsibility for the decision.² In Bangladesh, it is very crucial to understand the decision-making process as a negotiation between husbands and wives. When it comes to his wife's healthcare, the husband is frequently involved, especially when it requires her to leave the

house. This is ostensibly owing to Bangladeshi women's limited mobility as well as educational and economic prospects.² Women's healthcare decision-making power is critical for enhancing maternal physical and psychological outcomes, as well as the well-being of their children.³ Researchers have demonstrated that women's decision-making related to their own healthcare strengthens their healthcare-seeking behaviour, which implies that women's decision-making and healthcare-seeking behaviour should be recognised as a cultural norm and prioritised as a component of the health system's design.⁴ Women's empowerment is now widely valued and acknowledged; they play a vital role in social and economic development, and it is also an essential precondition for poverty alleviation and the upholding of human rights.⁵

One of the features of women's empowerment is decision-making power.^{3,6} The ability of a woman to make decisions that influence her own personal circumstances is an important facet of empowerment and an important contributing element to her general well-being. To assess decision-making autonomy of women who are currently married, the Bangladesh Demographic and Health Survey (BDHS) collected information on women's participation in several types of household decisions—including the use of the woman's and spouse's incomes, major household purchases, food purchases, food preparation, their own healthcare, children's healthcare and visiting their family or relatives.^{7,8}

According to a recent survey, 61%, 70%, 65% and 62% of ever-married women in Bangladesh had decision-making power (along with or jointly with their husband) on significant household purchases, children's healthcare, their own healthcare and visits to the women's family or relatives, respectively, with 44% of women being involved in all types of decision-making in their households.⁷ However, when compared with the national average, the proportion of women in the lowest wealth quintile with decision-making power was low in the Sylhet region.

The literature suggests that many factors which affect a woman's ability to make their own decisions, including better socioeconomic status (SES), higher education level, older aged women, female household head, degree of household food security status and not experiencing domestic violence.^{3,9–11} Domestic violence is a challenging and complex social issue for women as it has been reported to be strongly linked to the lack of women empowerment.^{12–16} Correspondingly, previous studies also indicate that there is a significant relationship between domestic violence and decision-making power.¹⁷ Another crucial indicator that has a detrimental impact on women's empowerment is the degree of household food insecurity, as well as several health issues, including nutrition, child feeding practices, health-seeking behaviour and domestic violence.^{11,17,18} Despite Bangladesh achieving a significant decline in the rate of household food insecurity,¹⁹ it is still alarming among Bangladesh's most vulnerable households in the north-eastern region.¹⁷ Moreover, other

indicators including maternal healthcare practices and maternal and child nutritional status are relatively low in this region when compared with other regions of Bangladesh. Interventions addressing these challenges have not been previously done in a community with such low levels of empowerment as the study population.

The large-scale *Suchana* programme followed a gender transformative approach to empower women, which included technical training on agriculture, aquaculture, nutrition and market development.²⁰ Additionally, one of the most essential nutrition-specific interventions of the programme was courtyard sessions with mother and child groups, with the themes sequentially discussing the significant role of women in family decision-making. Furthermore, for better decision-making outcomes, structured home counselling with beneficiaries and family members was established, emphasising on the importance of safe feeding habits, the role of male members and the role of the agency. Additionally, the gender components integrated across the *Suchana* intervention activities were designed to help the beneficiaries understand selected domains of empowerment and practices to improve their own health and that of their children.²⁰

This article assesses the changes in women's decision-making power using the *Suchana* evaluation data. We addressed the hypothesis that the *Suchana* intervention achieved a significant improvement in recognised dimensions of women's empowerment. This study also elucidates the knowledge gaps related to women's empowerment, with a particular emphasis on determining the factors associated with women's decision-making power.

METHODS

Study design and population

Suchana, a large-scale development programme, was conducted among the vulnerable households from susceptible villages in Sylhet division, located in the north-east region of Bangladesh. The evaluation design was a cluster randomised controlled trial with a two-arm pre-post design followed for the evaluation, with two cross-sectional surveys (baseline and endline) conducted among beneficiary women with at least one child aged <23 months from randomly selected poor or very poor beneficiary households. Union, which is the smallest rural administrative and local government unit in Bangladesh, was categorised as a cluster. The programme covers 235 500 poor and very poor households across 157 unions in the 20 subdistricts over four phases, with each phase receiving 3 years of the intervention. The first and fourth phases were selected for the evaluation following a pre-post design. The evaluation diagram is given in the online supplemental figure 1. Randomisation was performed before the unions were allocated to one of the four phases. For the evaluation, baseline and endline surveys were carried out among beneficiaries of the first phase of *Suchana* in 40 unions (which were treated as the intervention group) and future potential beneficiaries of the

fourth phase in 40 unions (as the control group).^{17,20} The baseline survey was conducted between November 2016 and February 2017 and the endline survey was carried out after 3 years and followed the same time period.

Data for 5440 households with children aged 0–5, 6–11 and 12–23 months of age from the baseline survey and 10 722 households from the endline survey were assessed in the present analysis. The sample size was calculated based on exclusively breastfed infants aged 0–5 months, the minimum acceptable diet for children aged 6–11 months of age and stunting in children aged 12–23 months of age. However, for evaluation purposes, the sample size at endline was increased in recognition of the fact that very poor households benefited from asset transfer, while poor households did not. This segregation of asset transfer group from non-asset transfer group at the endline survey was based primarily on a household's poverty status. Regardless of household poverty status, all *Suchana* beneficiaries received women's empowerment-related programme interventions (eg, courtyard sessions, counselling, skill development training). Therefore, for this paper, we did not present our findings as per poor versus very poor households.²⁰

Data collection

Twelve highly vulnerable villages were randomly selected from each union using a list of vulnerable villages provided by Save the Children Bangladesh. Once the villages were identified, wealth ranking sessions were completed in each village. The most vulnerable households were identified, listed and verified following the *Suchana* programme inclusion criteria (online supplemental table 1) and, if eligible for the study, given an identification number. Following this, required number of eligible households were systematically selected for the endline survey, using a systematic sampling approach stratified by the child's age and type of beneficiary household (poor or very poor). A complete sampling frame for all beneficiary households in the selected clusters was constructed by one or more wealth ranking sessions in each village and, later on, at the household level within the unions. The wealth ranking enumerators prepared a hand-drawn map for each selected union to identify the distribution of the households in rural settlements. We replaced the unavailable households in the sampling frame by selecting the immediate previous household in an anticlockwise direction to complete the number of households surveyed by phase and by age group according to our randomly generated listing. Even then, 158 respondents were not included from the actual sample size due to unavailability of any child from the age group of 0 to 5 months. The primary reasons for replacing households were unavailability of eligible respondents in the household despite repeated visits or age group mismatches due to the time gap between the verification/screening and collection of data from the targeted households. Android tablets complemented by custom-developed Java software were employed for data collection during the surveys. The

mobile-based data collection process reduced the data entry burden, as the data were entered at the interviewer level and the records were uploaded to a server at icddr, b using the built-in internet connectivity of the devices. This allowed the data analysis team to review the consistency of the data every day. The Java software-based electronic questionnaire was designed as survey forms in both Bengali and English languages, which were interchangeable at any time during the data collection process. The enumerators used the Bengali form on the personal digital assistants (PDA) while interviewing the respondents and recording anthropometric measurements. A standard operating procedure was provided to all staffs.

Outcome variables

The outcome variables were women having decision-making power on food purchases, major household purchases, food preparation, children's healthcare, their own healthcare and visiting family and relatives. Each variable was categorical as a nominal measurement with four options, such as (a) mainly women, (b) women and husband jointly, (c) mainly husband and (d) others. Based on the programme objective and BDHS guidelines, all outcomes were treated as binary variables, indicating (yes=1) if the woman had the ability to take decisions herself (or jointly with her husband) and (no=0) if only the husband or the other members took the decision.⁷ Moreover, we created a composite variable that encompassed all six dimensions of decision-making. On positive responses for all six indicators, the variable was converted into binary form (if all were *yes*, then the composite variable=1 otherwise, the composite variable=0).

Covariates

A list of several covariates was finalised through the descriptive analysis, supported by literature review. The conceptual framework of this paper is presented in figure 1.

Household sociodemographic characteristics

Information on religion, the level of education and occupation of the head of the household and the number of members in the household were assessed as household demographic characteristics. Ownership of household assets, flooring material, main roof material, external wall material, type of latrine and drinking water source(s) were all considered key indicators of SES. All asset-related variables were converted as binary variables which indicated presence (1) or absence (0) and household material variables were converted as improved (1) or unimproved (0). Tetrachoric correlation was applied to construct the correlation matrix using these binary data.²¹ From the estimated correlation matrix, factors were generated to create an asset index based on these variables to indicate SES. The Kaiser-Meyer-Olkin (KMO) test was used to assess the measure of sampling adequacy. The KMO measure of sampling adequacy was 0.769. The first factor was predicted and categorised as five quintiles, such as

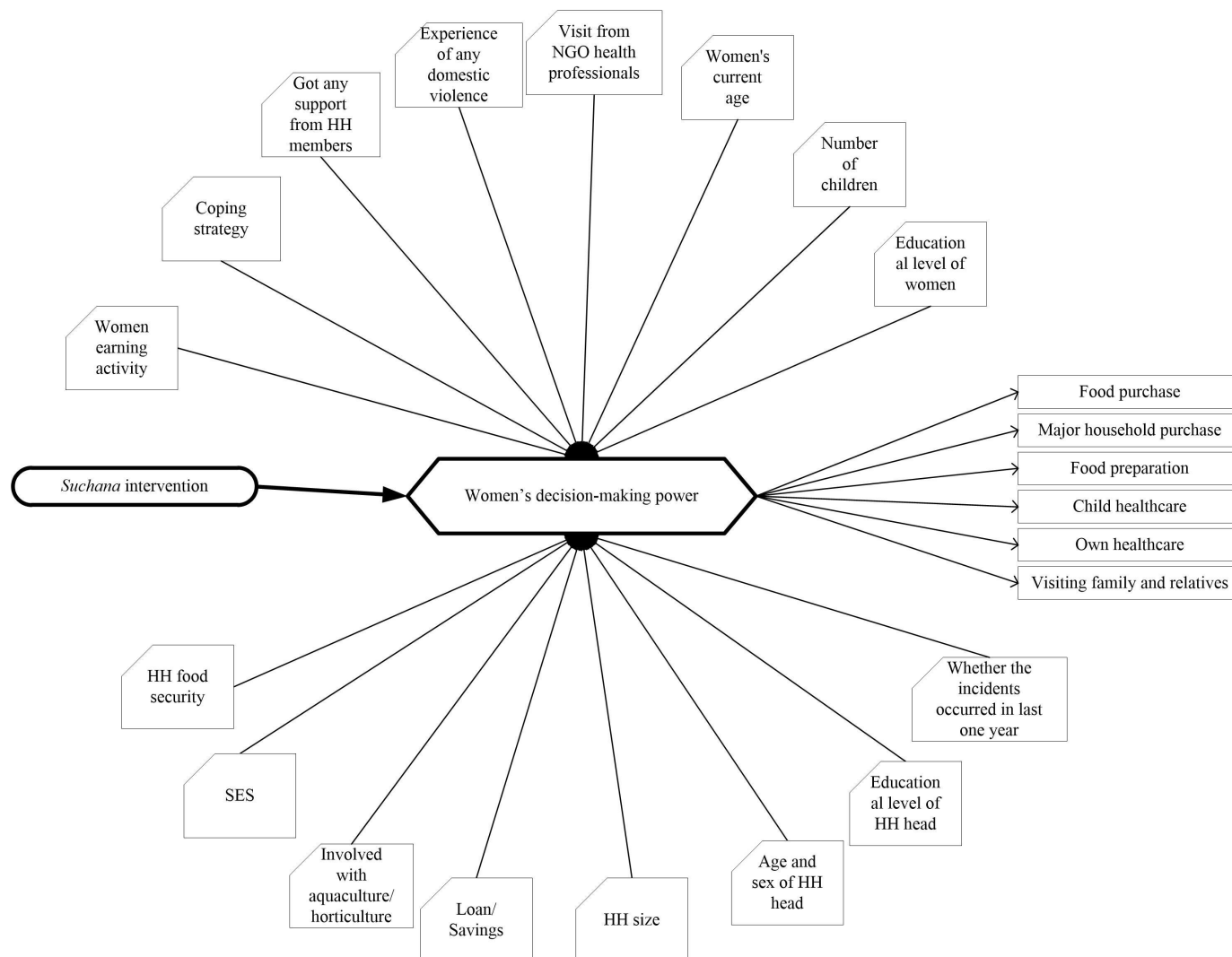


Figure 1 Conceptual framework for assessing the changes in indicators related to women's decision-making power indicators among *Suchana* beneficiaries. HH, household; SES, socioeconomic status.

fifth quintile, fourth quintile, third quintile, second quintile and first quintile.

Household Food Insecurity Access Scale

The four dimensions of food and nutrition security are availability, accessibility, use and utilisation and stability. The accessibility dimension was assessed in this study to measure food insecurity. Household food insecurity status was measured according to the Food and Nutrition Technical Assistance's Guidelines and categorised as food insecure, mildly food insecure, moderately food insecure or severely food insecure.²²

General characteristics of women

Several maternal characteristics were adjusted as covariates in the multivariable models to assess the independent impact of the intervention on women's decision-making power. These indicators included general maternal characteristics such as age, number of children, education, occupation, receiving support from household members, non-government organisation (NGO) health professional visits, receiving loans and any experience

of domestic violence (husband threatening to divorce, taking another wife, verbal abuse by husband/other family member(s) and physical abuse by husband/other family member(s)).¹⁷ Maternal age was categorised as <25 years, 25–29 years and 30 years or above. The number of children was categorised as exact as one, two to three, four to five and six or above. All maternal characteristics were treated as qualitative variables.

Statistical analysis

Data management

Data were collected using electronic tablets/PDA on a custom-designed Android application. Maximum validation rules were set in the data system to prevent errors during data entry; editing and updates, range checks, duplication checks, consistency checks, frequency checks and cross tabulation were regularly performed during data entry. Any unusual observations were discussed and resolved daily. A secure web-based data management system was used to manage the data. After data collection was complete, the data were transferred into Stata

Table 1 Household (HH) and women's general characteristics

Indicators, % (n)	Baseline		Endline	
	Intervention* N=2720	Control N=2720	Intervention† N=5282	Control N=5440
HH characteristics				
HH head sex was male	95.99 (2611)	96.80 (2633)	92.41 (4880)	92.48 (5028)
HH head education was no 'schooling'	49.02 (1333)	48.86 (1329)	44.26 (2337)	40.68 (2212)
HH size‡	6.12±2.31	6.48±2.56	6.13±2.11	5.94±2.27
Religion was <i>Muslim</i>	89.62 (2438)	92.86 (2526)	91.67 (4841)	92.44 (5026)
HH food insecurity status				
Food secure	14.08 (383)	14.01 (381)	26.64 (1407)	20.18 (1097)
Mildly food insecure	11.21 (305)	10.96 (298)	16.66 (880)	14.22 (773)
Moderately food insecure	47.28 (1286)	45.48 (1237)	43.40 (2292)	46.66 (2537)
Severely food insecure	27.43 (746)	29.56 (804)	13.29 (702)	18.93 (1029)
Asset index				
First quintile	19.63 (534)	20.4 (555)	21.01 (1143)	19.15 (1011)
Second quintile	19.23 (523)	20.74 (564)	19.71 (1072)	20.13 (1063)
Third quintile	20.59 (560)	19.67 (535)	19.76 (1075)	20.27 (1070)
Fourth quintile	18.68 (508)	21.14 (575)	18.95 (1031)	21.06 (1112)
Fifth quintile	21.88 (595)	18.05 (491)	20.57 (1119)	19.39 (1024)
Involved with any loan	71.91 (1956)	71.43 (1943)	79.47 (4197)	74.77 (4065)
Women's general characteristics				
Women's current age in year				
<25	36.58 (995)	35.92 (977)	21.32 (1126)	36.98 (2012)
25–30	33.68 (916)	34.19 (930)	30.54 (1613)	26.67 (1451)
≥30	29.74 (809)	29.89 (813)	48.14 (2543)	36.35 (1978)
Number of children				
1	21.03 (572)	21.73 (591)	3.52 (186)	21.39 (1163)
2–3	44.23 (1203)	41.36 (1125)	51.73 (2732)	46.88 (2549)
4+	34.74 (945)	36.91 (1004)	44.75 (2363)	31.73 (1725)
Education				
No schooling	22.32 (607)	23.75 (646)	17.91 (946)	14.66 (797)
Primary incomplete	22.72 (618)	21.14 (575)	23.37 (1234)	22.51 (1224)
Primary complete	54.96 (1495)	55.11 (1499)	58.72 (3101)	62.83 (3416)
Not involved in any earning activities	97.06 (2640)	97.10 (2641)	87.29 (4610)	93.80 (5100)
Did not get any support from HH members	5.44 (148)	5.77 (157)	3.43 (181)	4.10 (223)
Involved with aquaculture	5.96 (162)	3.79 (103)	9.75 (515)	7.79 (424)
Involved with horticulture	33.16 (902)	31.21 (849)	64.41 (3401)	52.63 (2863)
Coping strategy	38.93 (1059)	39.41 (1072)	40.63 (2146)	43.8 (2383)
Whether the incidents occurred in last 1 year	69.3 (1885)	70.63 (1921)	69.81 (3684)	68.36 (3712)
Visit from NGO health professionals	27.50 (748)	17.1 (465)	39.92 (2108)	20.05 (1090)
Domestic violence and abuse				
Husband threatening divorce	7.46 (203)	6.80 (185)	9.35 (494)	11.44 (622)
Husband threatening to take another wife	7.87 (214)	6.99 (190)	10.68 (564)	12.31 (669)
Verbal abuse by husband/other family member(s)	33.79 (919)	31.32 (852)	43.14 (2278)	41.92 (2279)
Physical abuse by husband/other family member(s)	13.75 (374)	13.38 (364)	17.97 (949)	19.32 (1050)
Experienced any domestic violence	36.07 (981)	33.27 (905)	44.57 (2354)	43.65 (2373)

Continued

Table 1 Continued

Indicators, % (n)	Baseline		Endline	
	Intervention* N=2720	Control N=2720	Intervention† N=5282	Control N=5440
Women have decision-making power on				
Food purchase	44.56 (1212)	43.42 (1181)	74.66 (3943)	63.95 (3477)
Major household purchase	25.22 (686)	24.34 (662)	55.77 (2945)	41.14 (2237)
Food preparation	78.13 (2125)	75.77 (2061)	87.03 (4596)	80.38 (4370)
Children's healthcare	58.86 (1601)	56.32 (1532)	79.93 (4221)	71.07 (3864)
Own healthcare	51.25 (1394)	50.63 (1377)	76.96 (4064)	67.56 (3673)
Visiting family and relatives	42.65 (1160)	42.90 (1167)	66.50 (3512)	55.67 (3027)
All types of decision making	17.32 (471)	16.80 (457)	45.26 (2390)	31.38 (1706)

*Before intervention.
†After intervention.
‡Mean±SD.
NGO, non-government organisation.

software release 14 (StataCorp, College Station, Texas, USA) to define the variable labels and value labels and analyse the data.

Descriptive statistics

The data were visualised using bar diagrams. The data were summarised using descriptive statistics (frequencies and proportions for categorical variables; means and SD for symmetric quantitative variables; medians and IQRs for asymmetric quantitative variables). The descriptive analyses focused on the following indicators: age of the household head, sex, education, occupation, household size, SES, food insecurity and women's characteristics.

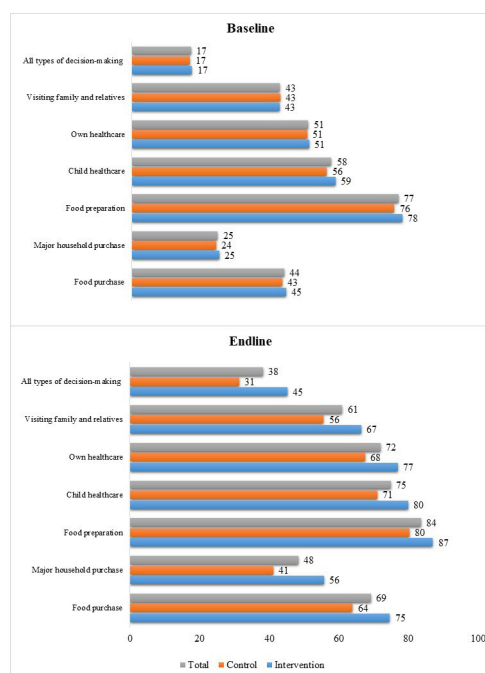


Figure 2 Proportions of women having various types of decision-making power at baseline and endline.

The outcome variables and all covariates were segregated by the baseline/endline survey and intervention/control groups.

Explorative statistics

Because of the binary outcome, logistic regression was used to assess the associated factors with various indicators of women's decision-making power and to assess the association between *Suchana* intervention and outcome variables. To test the hypotheses that *Suchana* significantly improved women's decision-making power on major household purchases, food purchases, food preparation, their own health, children's care and visiting family members and relatives, first, simple logistic regression was used to assess the bivariate relationship between the outcomes and the *Suchana* intervention (exposure), using data segregated by the baseline/endline surveys. To assess the strength of potential associations, ORs were estimated via simple logistic regression. Multiple logistic regression was used to assess the independent impact of the *Suchana* intervention and determine the factors associated with the outcome indicators after adjusting for all possible covariates based on our conceptual framework. As a cluster variable, *union* was used to adjust the SEs. Since a *union* is Bangladesh's smallest rural administrative and local government entity, and every household in that *union* receives the same healthcare and participates in the same wellness programme, the data obtained from households within each *union* were not independent.

We did an additional analysis using structural equation modelling (SEM) to investigate the individual effects of the *Suchana* intervention on each of the six measurable variables as well as the effect on the composite indicator. SEM is a strong multivariate analysis technique from the multivariate regression family, allowing the researcher to test a set of regression equations simultaneously. Using all six measurable variables, a latent variable titled 'women's

Table 2 Factors associated with women's decision-making power on food purchases, major household purchases, food preparation, children's healthcare, their own healthcare and visiting family and relatives

	Adjusted OR (95% CI)					All issues*
	Food purchase	Major household purchase	Food preparation	Children's healthcare	Own healthcare	
Women's current age in year						
<25						
25–30	1.14 (1.02 to 1.26)	1.23 (1.11 to 1.35)	1.32 (1.18 to 1.48)	1.20 (1.08 to 1.33)	1.17 (1.07 to 1.29)	1.19 (1.07 to 1.31)
≥30	1.93 (1.72 to 2.16)	2.07 (1.85 to 2.31)	2.12 (1.79 to 2.50)	1.82 (1.62 to 2.06)	1.80 (1.60 to 2.02)	1.97 (1.77 to 2.20)
Number of children						
1						
2–3	1.93 (1.73 to 2.15)	1.90 (1.67 to 2.16)	2.78 (2.45 to 3.15)	1.81 (1.62 to 2.02)	1.77 (1.58 to 1.97)	1.91 (1.65 to 2.20)
4–5	2.74 (2.38 to 3.17)	2.64 (2.26 to 3.08)	5.96 (4.84 to 7.34)	2.34 (2.02 to 2.72)	2.24 (1.94 to 2.58)	2.65 (2.24 to 3.13)
6+	3.56 (2.92 to 4.34)	3.99 (3.32 to 4.79)	10.9 (7.76 to 15.4)	3.24 (2.65 to 3.96)	2.69 (2.22 to 3.26)	3.69 (3.00 to 4.53)
Visit from NGO health professionals						
No						
Yes	1.27 (1.11 to 1.45)	1.10 (0.93 to 1.29)†	1.27 (1.11 to 1.45)	1.42 (1.25 to 1.62)	1.40 (1.22 to 1.61)	1.22 (1.04 to 1.43)
Experience of any domestic violence						
Yes						
No	1.2 (1.08 to 1.32)	1.40 (1.28 to 1.54)	1.36 (1.18 to 1.55)	1.44 (1.30 to 1.61)	1.51 (1.36 to 1.67)	1.49 (1.37 to 1.63)
Educational level of women						
No schooling						
Primary incomplete	1.16 (1.03 to 1.29)	1.19 (1.05 to 1.35)	1.17 (0.99 to 1.37)	1.27 (1.13 to 1.43)	1.27 (1.13 to 1.43)	1.20 (1.06 to 1.36)
Primary complete	1.19 (1.08 to 1.32)	1.24 (1.08 to 1.41)	1.25 (1.06 to 1.46)	1.29 (1.13 to 1.46)	1.27 (1.13 to 1.42)	1.21 (1.08 to 1.37)
Women earning activity						
Not involved						
Involved	1.63 (1.38 to 1.93)	2.04 (1.72 to 2.43)	1.59 (1.28 to 1.97)	1.76 (1.44 to 2.16)	2.00 (1.62 to 2.46)	1.59 (1.34 to 1.87)
Educational level of HH head						
No schooling						
At least 1 year of formal education	1.08 (1.00 to 1.16)	1.12 (1.05 to 1.20)	0.96 (0.87 to 1.06)†	1.12 (1.03 to 1.23)	1.06 (0.97 to 1.16)†	1.15 (1.07 to 1.24)
Sex of HH head						
Female						
Male	1.04 (0.9 to 1.19)†	1.13 (0.95 to 1.35)†	2.10 (1.77 to 2.50)	1.41 (1.20 to 1.65)	1.26 (1.09 to 1.45)	1.01 (0.86 to 1.19)†
Age of HH head	0.98 (0.97 to 0.98)	0.98 (0.97 to 0.98)	0.98 (0.97 to 0.98)	0.98 (0.98 to 0.98)	0.98 (0.98 to 0.98)	0.98 (0.97 to 0.98)
HH size	0.78 (0.76 to 0.80)	0.76 (0.74 to 0.78)	0.69 (0.67 to 0.71)	0.83 (0.81 to 0.84)	0.84 (0.82 to 0.86)	0.78 (0.76 to 0.80)
HFIAS						
Food secure						
Mildly food insecure	0.97 (0.81 to 1.16)†	0.98 (0.84 to 1.14)†	0.96 (0.81 to 1.13)†	1.08 (0.93 to 1.25)†	0.98 (0.85 to 1.13)†	0.93 (0.78 to 1.11)†

Continued

Table 2 Continued

	Adjusted OR (95% CI)						All issues*
	Food purchase	Major household purchase	Food preparation	Children's healthcare	Own healthcare	Visiting family and relatives	
Moderately food insecure	1.01 (0.87 to 1.18)†	0.92 (0.79 to 1.06)†	1.04 (0.90 to 1.19)†	0.94 (0.81 to 1.10)†	0.85 (0.73 to 0.99)	0.88 (0.78 to 0.98)	0.93 (0.80 to 1.07)†
Severely food insecure	0.84 (0.72 to 0.99)	0.82 (0.69 to 0.97)	0.70 (0.58 to 0.85)	0.95 (0.80 to 1.13)†	0.9 (0.75 to 1.08)†	0.93 (0.80 to 1.09)†	0.84 (0.71 to 0.99)
Asset index							
Fifth quintile							
Fourth quintile	1.07 (0.94 to 1.21)†	1.10 (0.99 to 1.24)†	1.27 (1.07 to 1.51)	1.02 (0.91 to 1.15)†	1.04 (0.92 to 1.17)†	1.08 (0.96 to 1.22)†	1.04 (0.92 to 1.17)†
Third quintile	1.07 (0.95 to 1.21)†	1.14 (1.01 to 1.28)	1.34 (1.15 to 1.55)	1.04 (0.91 to 1.18)†	1.05 (0.94 to 1.17)†	1.07 (0.96 to 1.20)†	1.10 (0.97 to 1.24)†
Second quintile	1.09 (0.97 to 1.22)†	1.15 (1.01 to 1.32)	1.35 (1.17 to 1.56)	1.08 (0.95 to 1.22)†	1.07 (0.95 to 1.20)†	1.15 (1.02 to 1.29)	1.05 (0.92 to 1.20)†
First quintile	1.15 (1.00 to 1.32)	1.25 (1.10 to 1.42)	1.62 (1.31 to 1.99)	1.01 (0.87 to 1.18)†	1.06 (0.93 to 1.22)†	1.21 (1.06 to 1.39)	1.21 (1.06 to 1.38)
HH have any loans							
No							
Yes	1.18 (1.08 to 1.30)	1.17 (1.07 to 1.28)	1.53 (1.36 to 1.73)	1.30 (1.16 to 1.44)	1.25 (1.12 to 1.39)	1.11 (0.98 to 1.26)†	1.10 (0.98 to 1.23)†
Involved with aquaculture							
No							
Yes	1.06 (0.91 to 1.24)†	0.81 (0.68 to 0.98)	1.17 (0.93 to 1.46)†	1.26 (1.05 to 1.51)	1.18 (1.00 to 1.40)†	1.11 (0.94 to 1.32)†	0.86 (0.70 to 1.06)†
Involved with horticulture							
No							
Yes	1.33 (1.21 to 1.47)	1.38 (1.23 to 1.53)	1.03 (0.92 to 1.15)†	1.16 (1.04 to 1.29)	1.22 (1.09 to 1.36)	1.15 (1.03 to 1.3)	1.33 (1.18 to 1.50)
Got any support from HH members							
Yes							
No	1.03 (0.84 to 1.27)†	1.09 (0.87 to 1.35)†	1.25 (0.92 to 1.70)†	1.24 (0.97 to 1.58)†	1.20 (0.94 to 1.52)†	1.35 (1.07 to 1.71)	1.22 (0.97 to 1.52)†
Coping strategy							
No							
Yes	1.01 (0.90 to 1.14)†	1.06 (0.95 to 1.18)†	0.92 (0.81 to 1.05)†	0.98 (0.87 to 1.11)†	1.01 (0.90 to 1.13)†	0.98 (0.88 to 1.08)†	1.15 (1.03 to 1.29)
Whether the incidents occurred in last 1 year							
No							
Yes	1.26 (1.09 to 1.45)	1.12 (0.98 to 1.28)†	1.11 (0.96 to 1.27)†	1.05 (0.89 to 1.23)†	1.00 (0.87 to 1.16)†	1.08 (0.94 to 1.24)†	1.06 (0.93 to 1.22)†

The analyses were done using pooled data (baseline and endline).

*On positive responses for all six indicators, the variable was converted into binary form (if all were yes then composite variable=1 otherwise composite variable=0).

†Not statistically significant at 5% level; *union* was used for as a cluster.

HFIAS, Household Food Insecurity Access Scale; NGO, non-government organisation.

decision-making power' was created as a composite indicator. The method of estimating the parameters was the maximum likelihood estimate. Standardised root mean squared residual (SRMR) and coefficient of determination (CD) were used to assess the goodness-of-fit test. The *union* was used as a cluster variable to adjust the SEs. The SRMR value of close to 0.08 implies that there is a relatively good fit between the hypothesised model and the observed data.²³ The latent variable was treated as a continuous measurement. An adjusted standardised coefficient (aCoef) was reported from SEM findings.

Finally, *p* values <0.05 (α) were considered significant for a single hypothesis test. However, we needed to control for the family wise alpha inflation to interpret logistic regression findings since we analysed six outcomes that were not independent. 'Sidak correction' was used to control the family wise error rate. The new level of significance was calculated, $\alpha_{\text{new}} = 1 - (1 - \alpha_{\text{old}})^{1/n} = 1 - (1 - 0.05)^{1/6} = 0.009$.

RESULTS

General characteristics

The sociodemographic characteristics and general characteristics of the women are presented in [table 1](#). In the baseline survey, 44% of women were able to make decisions on food purchases (intervention: 45%, control: 43%), 25% on major household purchases (intervention: 25%, control: 24%), 77% on food preparation (intervention: 78%, control: 76%), 58% on seeking healthcare for children (intervention: 59%, control: 56%), 51% on seeking their own healthcare (intervention: 51%, control: 51%), 43% on visiting family and relatives (intervention: 43%, control: 43%) and 17% on all six of these issues (intervention: 17%, control: 17%).

In the endline survey, 69% of women were able to make decisions on food purchases (intervention: 75%, control: 64%), 48% on major household purchases (intervention: 56%, control: 41%), 84% on food preparation (intervention: 87%, control: 80%), 75% on seeking healthcare for children (intervention: 80%, control: 71%), 72% on seeking their own healthcare (intervention: 77%, control: 68%), 61% on visiting family and relatives (intervention: 67%, control: 56%) and 38% on all six issues (intervention: 45%, control: 31%). Highly significant differences in all decision-making indicators were observed between the intervention group and control group in the endline survey ([figure 2](#)).

Determinants of decision-making power

[Table 2](#) presents the adjusted ORs for the associations between the indicators of women's decision-making power and their determinants, calculated via multiple binary logistic regression after adjusting for *union* as a cluster. Women's current age, number of children, experience of any domestic violence, educational level, women's earning activity, age of the household head and household size were significantly associated with all indicators

of women's decision-making power. Moreover, visits from NGO health professionals, the educational level of the household head, the sex of the household head, the Household Food Insecurity Access Scale, asset index, the household having any loan, involved in aquaculture, involved in horticulture, coping strategy and whether the incidents occurred in the last 1 year were associated with some of the indicators of women's decision-making power.

Explorative findings

Multiple logistic regression was performed to assess the strength of the associations between the indicators of women's decision-making power and the *Suchana* intervention as an exposure after adjusting for the significant variables ([table 2](#)); the adjusted ORs (aORs) have been presented in [table 3](#). In the baseline survey, there was no significant relationship between any outcome and the study group before intervention. However, highly significant relationships were observed in the endline survey, except for the 'food preparation' indicator. The odds of women having decision-making power on food purchases were 1.37-fold higher (aOR 1.37 (95% CI 1.12 to 1.68); *p*=0.002) in the intervention group than in the control group. Similarly, the intervention was positively associated with improvements in women's decision-making power on major household purchases (aOR 1.62 (95% CI 1.29 to 2.03); *p*<0.001), children's healthcare (aOR 1.28 (95% CI 1.02 to 1.60); *p*=0.033), their own healthcare (aOR 1.26 (95% CI 1.01 to 1.56); *p*=0.037), visiting family and relatives (aOR 1.35 (95% CI 1.04 to 1.76); *p*=0.023) and all types of decision making (aOR 1.65 (95% CI 1.29 to 2.11); *p*<0.001). After controlling for alpha correction, the *Suchana* intervention demonstrated improvements in women's decision-making power on food purchases and major household purchases.

The CD was 0.24 which indicates that the 24% percentage of variance of dependent variable was explained by the independent variables of the model. Also, the value of SRMR was 0.041 at the end of the survey, which is <0.08, indicating that the model was good fit. The *Suchana* intervention had a significant effect (aCoef: 0.073 (*p*<0.01)) on the latent variable of women's decision-making power ([figure 3](#)). The *Suchana* intervention was also significantly associated with the measurable variables such as food purchases (aCoef: 0.052 (*p*<0.01)), major household purchases (aCoef: 0.039 (*p*<0.01)), food preparation (aCoef: 0.057 (*p*<0.01)), children's healthcare (aCoef: 0.065 (*p*<0.01)), their own healthcare (aCoef: 0.062 (*p*<0.01)) and visiting family and relatives (aCoef: 0.049 (*p*<0.01)). The coefficients corresponding to all the adjustment variables from the structural model have been given in the online supplemental table 2.

DISCUSSION

The findings depicted in this research are based on the findings of the *Suchana* evaluation with a pre-post design,

Table 3 Effect of the *Suchana* intervention on various types of women's decision-making power

Women have decision-making power on	Adjusted OR* (95% CI)		Adjusted OR† (95% CI)	
	Baseline survey	P value	Endline survey	P value
Food purchases	0.99 (0.82 to 1.19)	0.932	1.37 (1.12 to 1.68)	0.002
Major household purchases	1.04 (0.82 to 1.32)	0.752	1.62 (1.29 to 2.03)	0.000
Food preparation	0.97 (0.74 to 1.26)	0.804	1.10 (0.86 to 1.41)	0.439
Children's healthcare	1.05 (0.83 to 1.33)	0.702	1.28 (1.02 to 1.60)	0.033
Own healthcare	0.99 (0.78 to 1.26)	0.928	1.26 (1.01 to 1.56)	0.037
Visiting family and relatives	0.96 (0.78 to 1.18)	0.691	1.35 (1.04 to 1.76)	0.023
All types of decision making‡	1.02 (0.83 to 1.27)	0.824	1.65 (1.29 to 2.11)	0.000

Adjusted ORs were estimated using multiple logistic regression where outcome variables were the indicators of decision-making power.

*Exposure variable was pre-intervention versus control in baseline survey.

†Exposure variable was post-intervention versus control in endline survey. Adjusted for women's current age, number of children, visits from NGO health professionals, experience of any domestic violence, educational level of women, women's earning activity, educational level of HH head, sex of HH head, age of HH head, HH size, HFIAS, asset index and HH having any loans involved with aquaculture, involved with horticulture, got any support from HH members, coping strategy, whether the incidents occurred in last 1 year. *Union* was used for as a cluster.

‡On positive responses for all six indicators, the variable was converted into binary form (if all were yes then composite variable=1 otherwise composite variable=0).

HFIAS, Household Food Insecurity Access Scale; NGO, non-government organisation.

which included baseline and endline cross-sectional surveys. Our bivariate analysis likely reflects the actual effect of *Suchana* intervention on women's decision-making power. According to the multiple model (both logistic and SEM), *Suchana* intervention considerably improved the composite indices of women's decision-making power. Consequently, this indicates that the study generated valuable findings encompassing women's involvement in different activities, which led to safer nutritional practices and attainment of empowerment. This ultimately contributed to the sustenance of the achievements through 3 years of engagement with *Suchana* interventions. *Suchana's* approach included different dimensions of gender for attaining empowerment of women. Mobility, care seeking practices, education and engagement in income-generating activities were among the dimensions reported. It is worth mentioning that, as the results were similar at baseline between the intervention and control areas, the endline results reflect the actual effect of the *Suchana* intervention on the indices of women empowerment.

The progress observed in this study can be attributed to the *Suchana* intervention as the findings on women's decision-making power (40%–60%) obtained before the *Suchana* intervention are similar to national surveys, for example, the BDHS-2014 surveys and other DHS reports.^{3 7 9} The randomised pre-post study design supports this conclusion. However, women's decision-making power is largely dependent on the general characteristics of the household and women, as previously reported in national findings.²⁴ We also found similar associations among household and women's general characteristics and women's decision-making power.

We observed that not experiencing domestic violence has a beneficial impact on decision-making power. This implies that a women's decision-making competence is

influenced by a healthy family constitution. A recent study showed that a composite indicator of various decision-making characteristics was associated with a lower incidence of domestic violence, which is in line with our findings, and these findings are supported by previous studies conducted in similar settings.^{12 25} Moreover, visits by NGO health professionals were found to be associated with higher decision-making power.

Various NGOs in Bangladesh are implementing community interventions such as behaviour change communication as part of a national commitment to empower and strengthen the decision-making capacity of women, particularly those from the lowest social segment.^{17 26 27} These NGOs are largely focusing on food insecurity, economic development and maternal and newborn healthcare services.²⁸ It is commonly acknowledged that maternal healthcare service and utilisation, exposure to NGO health professionals and women's involvement in any earning activities are all closely affiliated to women's decision-making power.^{9 29 30} This suggests that intervention programmes to strengthen women's decision-making capacity and empowerment are critical. Despite the fact that addressing these challenges requires a multifaceted approach, researchers have revealed that women who are exposed to simple interventions become substantially more involved in household decision-making. As a result, effective interventions may minimise domestic disputes, foster improved support for female family members and improve reliance among the members of the household.³¹ In a setting with particularly low rates of empowerment, the *Suchana* model has proven its effectiveness in altering the situation of women's empowerment status in the study population by integrating livelihood intervention with constant social and behavioural change communication messages delivered through courtyard sessions and frequent home visits. Consequently, it is

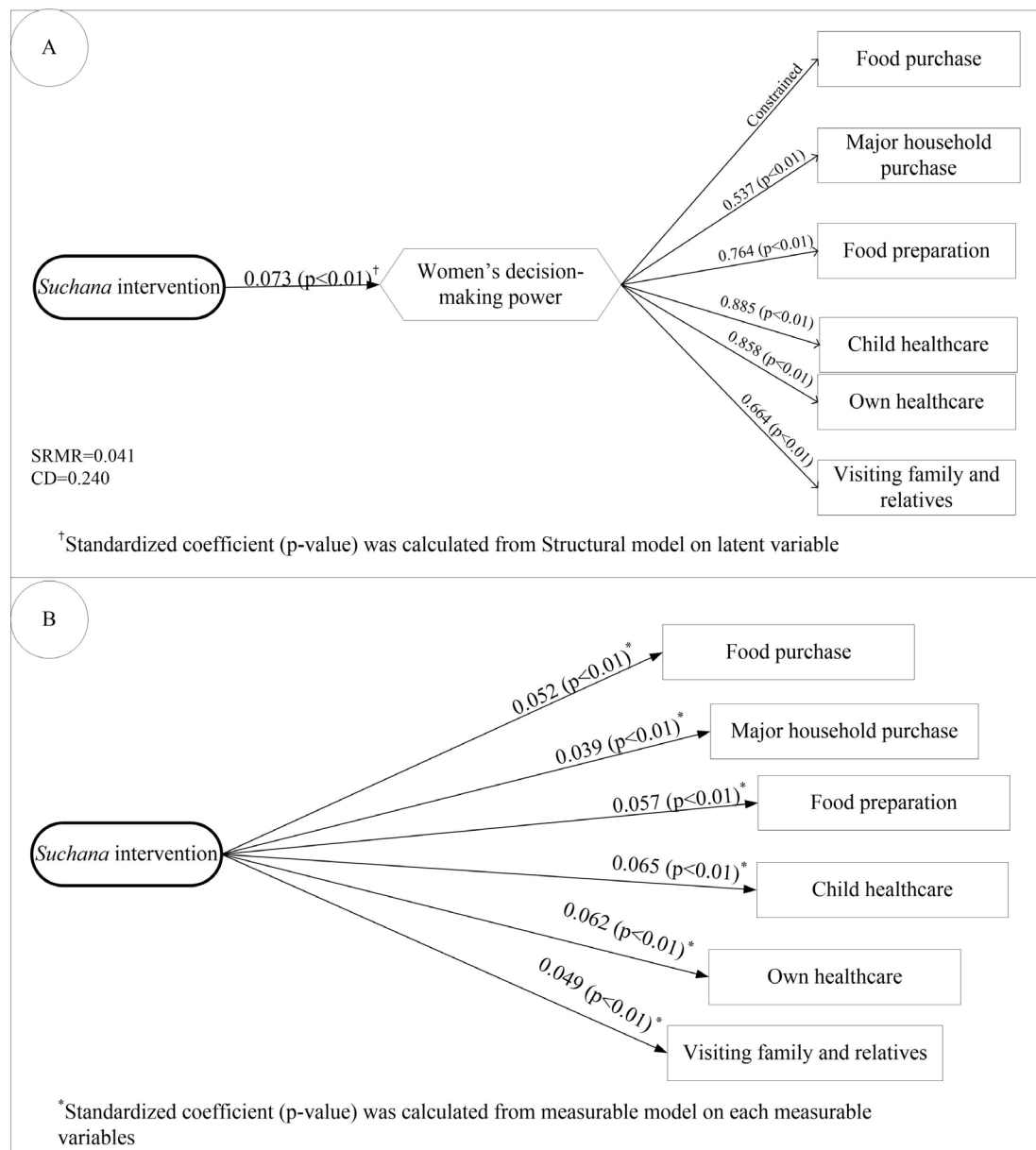


Figure 3 (A) The effect of *Suchana* intervention on women's decision-making power. The composite indicator 'women's decision-making power' was computed as a latent variable using structural equation modelling. (B) The direct effect of *Suchana* intervention on the measurable variables such as food purchases, major household purchases, food preparation, children's healthcare, own healthcare and visiting family relatives computed from the measurable model.

worth emphasising that the *Suchana* programme was designed to help a large number of people, the vast majority of whom were from the poorest socioeconomic classes. Due to the constant poor performance in development indicators compared with other parts of the country, the coverage of the *Suchana* programme (Sylhet, as a geographic catchment area) is also a critical aspect. Furthermore, the *Suchana* research design and coverage are robust in comparison to other existing study findings from different parts of the country.

Finally, this analysis implies that strengthening social behaviour change initiatives through a variety of innovative approaches, coupled with appropriate supporting materials, may represent an instrumental strategy for

empowering women in our society. In order to ensure that all members of the household engage effectively in decision-making processes, it is essential to counsel both women and their family members, the in-laws in particular. Women may be able to convey their opinions and decisions in various dimensions as a result of these strategies, resulting in a more integrated community structure that fosters women's empowerment.

Strengths and limitations

There were some limitations to this study. The study used a cross-sectional pre-post intervention design, indicating that the same participants were not studied longitudinally for repeated measurements. Since the primary goal

of the *Suchana* programme was to minimise the burden of childhood stunting in children aged 12–23 months, we collected data from mother-child pairs; therefore, the mother group at the endline differed from the baseline as different child groups were followed. Although this analysis indicates an association between women's decision-making power and *Suchana* intervention, a causal relationship cannot be assumed due to the cross-sectional design of this study. Several important indicators of women's empowerment as seen in other available literature, such as managerial control over loans, accounting knowledge, active use of loans, magnitude of women's economic contribution, mobility in the public domain, ownership of productive assets, freedom from family domination and political awareness, were not included in this analysis. As data on the indicators of decision-making capacity was gathered through maternal responses, the possibility of recall bias exists. However, due to the large sample size and the adjustment for significant covariates in the regression model, the bias was minimised. The cluster randomised pre-post design offered credible evidence of the intervention's positive impacts on the outcome indicators, which is a major attribute of this study. The similarity of the control and intervention groups at the baseline indicates the homogeneity of the women's background characteristics and decision-making power. One of the main assumptions in the structural equation modelling is normality. Our outcome variables were binary variables, which follow the binomial distribution. However, for large sample sizes, the binomial distribution converges to approximate the normal distribution.

CONCLUSION

One essential aspect of women's empowerment is their decision-making capacity. This study clearly suggests the large-scale development achievement of the programme in improving the decision-making power of vulnerable women in Bangladesh. Innovative social and behaviour change communication approaches tailored to the community level will create more opportunities for society in general, particularly for women and their family members, to obtain a greater understanding of the importance of women's empowerment.

Acknowledgements The study analysed baseline survey data from the *Suchana* programme; this intervention is being implemented by a consortium led by Save the Children, with support from the Foreign, Commonwealth and Development Office (FCDO) and the European Union (EU). The icddr,b acknowledges with gratitude the commitment of Save the Children, FCDO and the EU to its research efforts. We acknowledge with gratitude the commitment of the Government of the People's Republic of Bangladesh to icddr,b's research strength. We also acknowledge the following donors for providing unrestricted support to icddr,b's effort and the advancement of its strategic plan: Canada, Sweden and the UK. We gratefully acknowledge our core donors for their support and commitment to icddr,b's research efforts. We would like to acknowledge the invaluable contributions of Save the Children as lead agency, our technical partners Helen Keller International, World Fish and International Development Enterprises and the implementing partners, Friends In Village Development Bangladesh (FIVDB), Rangpur Dinajpur Rural Services (RDRS) and the Center for Natural Resource Studies (CNRS), who played critical roles in generating and refining the data-collection tools. We would also like

to acknowledge Kazi Istiaque Sanin and Barbic Zaman Wahid as internal reviewers, and Andrea Devlin of Science Editing Experts for editing and linguistic revision of the manuscript. We are also pleased to acknowledge the contributions of a number of researchers who worked with us on the project's field site (supplemental file).

Contributors TA and NC originated the idea for the study and led the protocol design. MAH, NC and ASGF conceptualised the manuscript. SMTA, SR, MJR, MAH, NC, FDF and TA contributed on survey design. MAH performed statistical analysis and drafted the manuscript. NC and ASGF supervised the work, critically reviewed and are the guarantors. NC oversaw the statistical analysis and suggested necessary improvements from statistical point of view as well as public health perspective. MAH, NC, MJR, MA, FDF, FN, TJS, ASGF, TA and SR contributed to the revision of the final draft for submission. All authors contributed to the revision of the final draft before submission, read and approved the final version, and are responsible for the final content of this article.

Funding This study was made possible by the committed contribution of Foreign, Commonwealth and Development Office (grant number: 204131-103).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study was approved by the Research Review Committee and Ethical Review Committee, the two obligatory components of the institutional review board (IRB) of icddr,b. Informed written consent was obtained from study participants.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available. Data are available upon reasonable request. All data relevant to the study are included in the article or uploaded as supplemental information. The data of this study on which the findings are based upon, are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Md Ahshanul Haque <http://orcid.org/0000-0003-3452-8367>
Nuzhat Choudhury <http://orcid.org/0000-0001-8345-5278>
A S G Faruque <http://orcid.org/0000-0001-8343-4653>
Tahmeed Ahmed <http://orcid.org/0000-0002-4607-7439>

REFERENCES

- Roy PK, Haque S, Jannat A, *et al*. Contribution of women to household income and decision making in some selected areas of Mymensingh in Bangladesh. *Progressive Agriculture* 2017;28:120–9.
- Story WT, Burgard SA. Couples' reports of household decision-making and the utilization of maternal health services in Bangladesh. *Soc Sci Med* 2012;75:2403–11.
- Acharya DR, Bell JS, Simkhada P, *et al*. Women's autonomy in household decision-making: a demographic study in Nepal. *Reprod Health* 2010;7:15.
- Mainuddin A, Ara Begum H, Rawal LB, *et al*. Women empowerment and its relation with health seeking behavior in Bangladesh. *J Family Reprod Health* 2015;9:65.
- DFID. *Poverty elimination and the empowerment of women: strategies for achieving the International development targets*, 2000.

- 6 Chien L-Y, Tai C-J, Yeh M-C. Domestic decision-making power, social support, and postpartum depression symptoms among immigrant and native women in Taiwan. *Nurs Res* 2012;61:103–10.
- 7 National Institute of Population Research and Training - NIPORT/ Bangladesh, Mitra and Associates, ICF International. *Bangladesh demographic and health survey 2014*. NIPORT, Mitra and Associates, and ICF International: Dhaka, Bangladesh and Rockville, Maryland, USA, 2016.
- 8 Jennings L, Na M, Cherewick M, et al. Women's empowerment and male involvement in antenatal care: analyses of demographic and health surveys (DHS) in selected African countries. *BMC Pregnancy Childbirth* 2014;14:297.
- 9 Senarath U, Gunawardena NS. Women's autonomy in decision making for health care in South Asia. *Asia Pac J Public Health* 2009;21:137–43.
- 10 Hou X, Ma N. The effect of women's decision-making power on maternal health services uptake: evidence from Pakistan. *Health Policy Plan* 2013;28:176–84.
- 11 Galiè A, Teufel N, Girard AW, et al. Women's empowerment, food security and nutrition of pastoral communities in Tanzania. *Glob Food Sec* 2019;23:125–34.
- 12 Kwagala B, Wandera SO, Ndugga P, et al. Empowerment, partner's behaviours and intimate partner physical violence among married women in Uganda. *BMC Public Health* 2013;13:1112.
- 13 Sabri B, Simonet M, Campbell JC. Risk and protective factors of intimate partner violence among South Asian immigrant women and perceived need for services. *Cultur Divers Ethnic Minor Psychol* 2018;24:442–52.
- 14 Dardis CM, Dichter ME, Iverson KM. Empowerment, PTSD and revictimization among women who have experienced intimate partner violence. *Psychiatry Res* 2018;266:103–10.
- 15 Semahegn A, Belachew T, Abdulahi M. Domestic violence and its predictors among married women in reproductive age in Fagitalekoma Woreda, Awi zone, Amhara regional state, North Western Ethiopia. *Reprod Health* 2013;10:63.
- 16 Coates J, Rogers BL, Brewer N, et al. Domestic violence against women is associated with lower household food security in rural Bangladesh. *The FASEB Journal* 2010;24:104.1-04.1..
- 17 Haque MA, Choudhury N, Ahmed SMT, et al. Factors associated with domestic violence in rural Bangladesh. *J Interpers Violence* 2022;37:1248–69.
- 18 Sharareh N, Hess R, Wan N, et al. Incorporation of Information-Seeking behavior into food insecurity research. *Am J Prev Med* 2020;58:879–87.
- 19 Helen Keller International (HJI), James P. Grant school of public health (JPGSPH). *state of food security and nutrition in Bangladesh: 2013*. Dhaka, BD: HKI and JPGSPH, 2014.
- 20 Choudhury N, Raihan MJ, Ahmed SMT, et al. The evaluation of Suchana, a large-scale development program to prevent chronic undernutrition in north-eastern Bangladesh. *BMC Public Health* 2020;20:744.
- 21 Fleming JS. TETCORR: a computer program to compute smoothed tetrachoric correlation matrices. *Behav Res Methods* 2005;37:59–64.
- 22 Coates J, Swindale A, Bilinsky P. *Household food insecurity access scale (HFIAS) for measurement of food access: indicator guide (V. 3)*. Washington, D.C.: Food and Nutrition Technical Assistance Project, Academy for Educational Development, 2007.
- 23 Lt H, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal* 1999;6:1–55.
- 24 National Institute of Population Research and Training (NIPORT), ICF. *Bangladesh demographic and health survey 2017-18*. Dhaka, Bangladesh and Rockville, Maryland, USA: NIPORT and ICF, 2020.
- 25 Mootz JJ, Muhanguzi FK, Panko P, et al. Armed conflict, alcohol misuse, decision-making, and intimate partner violence among women in northeastern Uganda: a population level study. *Confl Health* 2018;12:37.
- 26 General Economics Division (GED), Planning Commission, Government of People's Republic of Bangladesh. *The Seventh Five Year Plan (2016-2020) "Accelerating Growth, Empowering Citizens": Government of People's Republic of Bangladesh*, 2015.
- 27 Government of the Peoples' Republic of Bangladesh. *National women development policy 2011: Ministry of women and children Affairs*, 2011.
- 28 Amin R, Becker S, Bayes A. NGO-promoted microcredit programs and women's empowerment in rural Bangladesh: quantitative and qualitative evidence. *J Dev Areas* 1998;32:221–36.
- 29 Tiruneh FN, Chuang K-Y, Chuang Y-C. Women's autonomy and maternal healthcare service utilization in Ethiopia. *BMC Health Serv Res* 2017;17:718.
- 30 Ghose B, Feng D, Tang S, et al. Women's decision-making autonomy and utilisation of maternal healthcare services: results from the Bangladesh demographic and health survey. *BMJ Open* 2017;7:e017142.
- 31 Amanda Satterly. The Simple Intervention that Increases Women's Empowerment, 2016. Techno Serve. Available: <https://www.technoserve.org/blog/the-simple-intervention-that-increases-womens-empowerment/>