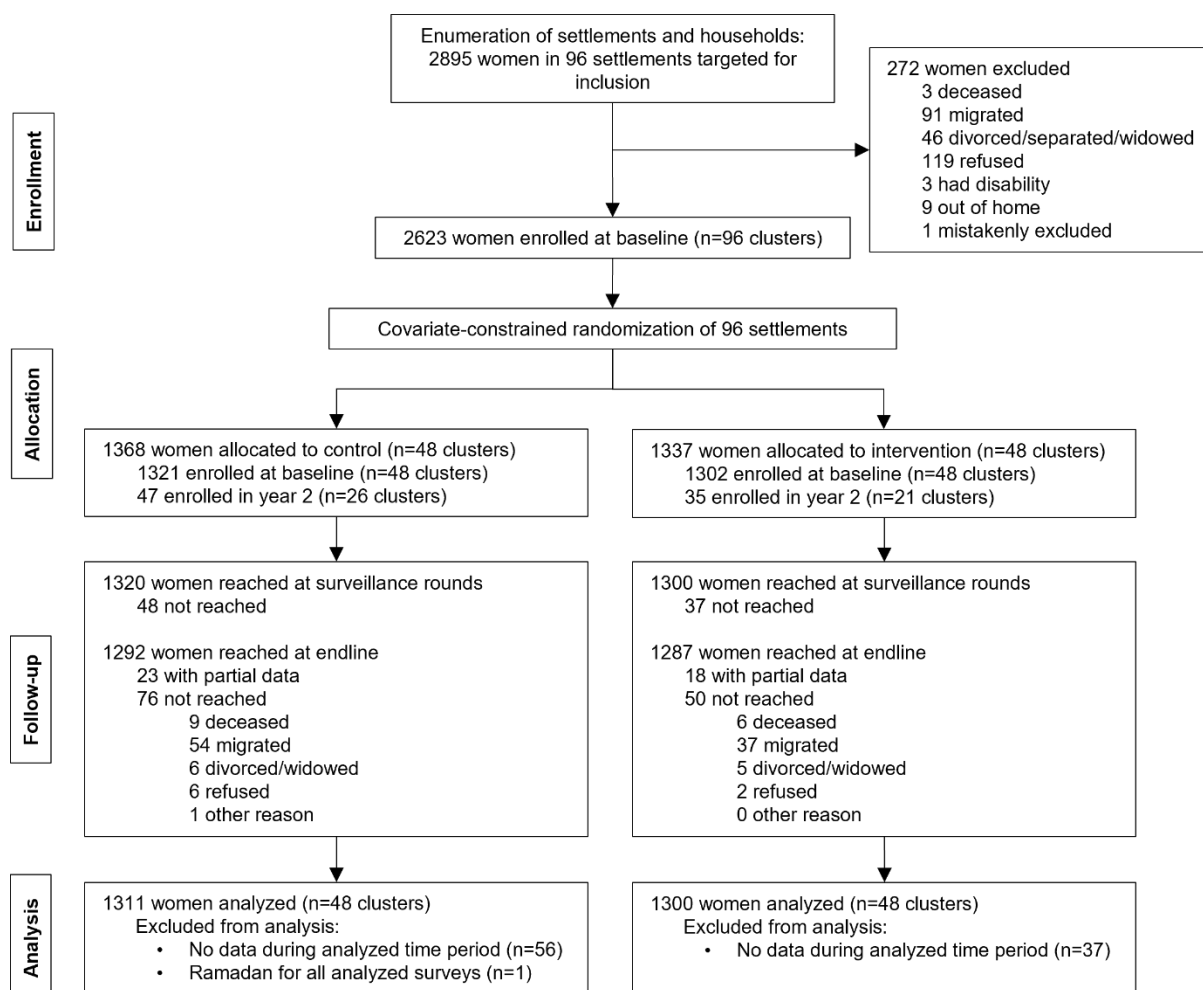
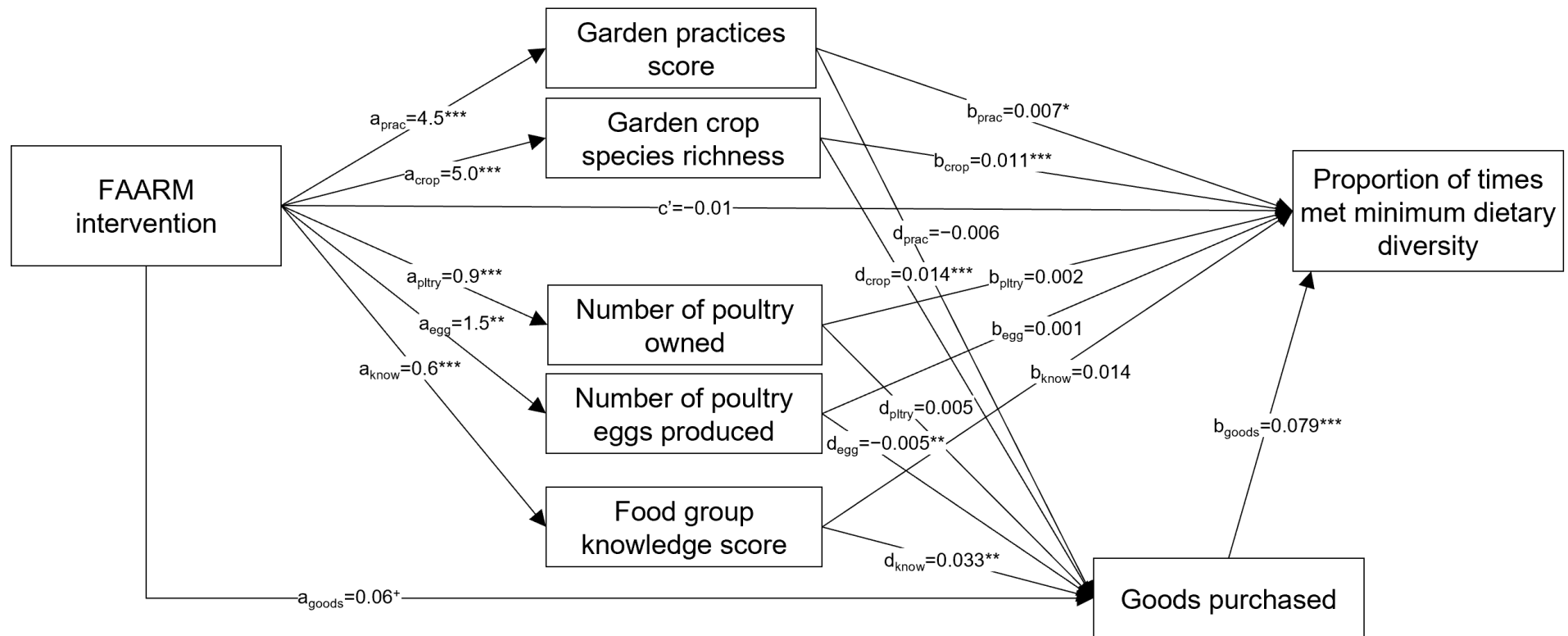


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Appendix 1. Trial profile and analytic sample selection.



Appendix 2. Causal mediation pathways of the FAARM intervention on women's minimum dietary diversity.

Corresponding indirect effects are included in Appendix 3. Residual correlations and variances are omitted from the figure. Coefficients of the a paths are the effect of the intervention on the mediators, coefficients of the b paths are the effect of a one-unit increase in the mediators on the proportion of times women met dietary diversity, and coefficients of the d paths are the effect of a one-unit increase in the mediators on purchasing goods. P-values: $^{+}p < 0.10$; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Appendix 3. Direct and indirect effects of the FAARM intervention on the proportion of times women met minimum dietary diversity.

	β	95% CI	p-value	Proportion mediated
Total effect ^a	0.117	0.066, 0.168	<0.001	
Direct effect	0.008	-0.043, 0.059	0.75	
Indirect effect ^b	0.109	0.078, 0.140	<0.001	93.0%
<i>Individual indirect effects:</i>				
<i>Home garden production</i>				
Garden practices score ($a_{prac} * b_{prac}$)	0.030	0.004, 0.055	0.02	
Garden crop species richness ($a_{crop} * b_{crop}$)	0.057	0.036, 0.078	<0.001	
Garden practices via goods ($a_{prac} * d_{prac} * b_{goods}$)	-0.002	-0.005, 0.001	0.16	
Garden crops via goods ($a_{crop} * d_{crop} * b_{goods}$)	0.006	0.002, 0.009	<0.001	
<i>Poultry production</i>				
No. of poultry owned ($a_{pltry} * b_{pltry}$)	0.002	-0.002, 0.006	0.36	
No. of poultry eggs produced ($a_{egg} * b_{egg}$)	0.002	-0.002, 0.005	0.30	
Poultry owned via goods ($a_{pltry} * d_{pltry} * b_{goods}$)	0.000	0.000, 0.001	0.21	
Poultry eggs via goods ($a_{egg} * d_{egg} * b_{goods}$)	-0.001	-0.001, 0.000	0.09	
<i>Nutrition knowledge</i>				
Food group knowledge score ($a_{know} * b_{know}$)	0.009	-0.001, 0.019	0.09	
Knowledge score via goods ($a_{know} * d_{know} * b_{goods}$)	0.002	0.000, 0.003	0.03	
<i>Market activity</i>				
Goods purchased ($a_{goods} * b_{goods}$)	0.005	-0.001, 0.010	0.10	
Production/knowledge via goods ($\sum a * d * b$ paths)	0.005	0.001, 0.009	0.007	
<i>Indirect effects by domain:</i>				
Home garden production ($\sum prac + crop$)	0.087	0.059, 0.114	<0.001	73.9%
Home garden production w/market ($\sum prac + crop + garden prod via goods$)	0.090	0.063, 0.118	<0.001	77.0%
Poultry production ($\sum pltry + egg$)	0.004	0.000, 0.007	0.04	3.3%
Poultry production w/market ($\sum pltry + egg + poultry prod via goods$)	0.004	0.000, 0.007	0.05	3.1%
Nutrition knowledge (know)	0.009	-0.001, 0.019	0.09	7.5%
Nutrition knowledge w/market ($\sum know + know via goods$)	0.010	0.000, 0.021	0.05	8.8%
Market activity ($\sum goods + prod/know via goods$)	0.010	0.004, 0.015	<0.001	8.3%

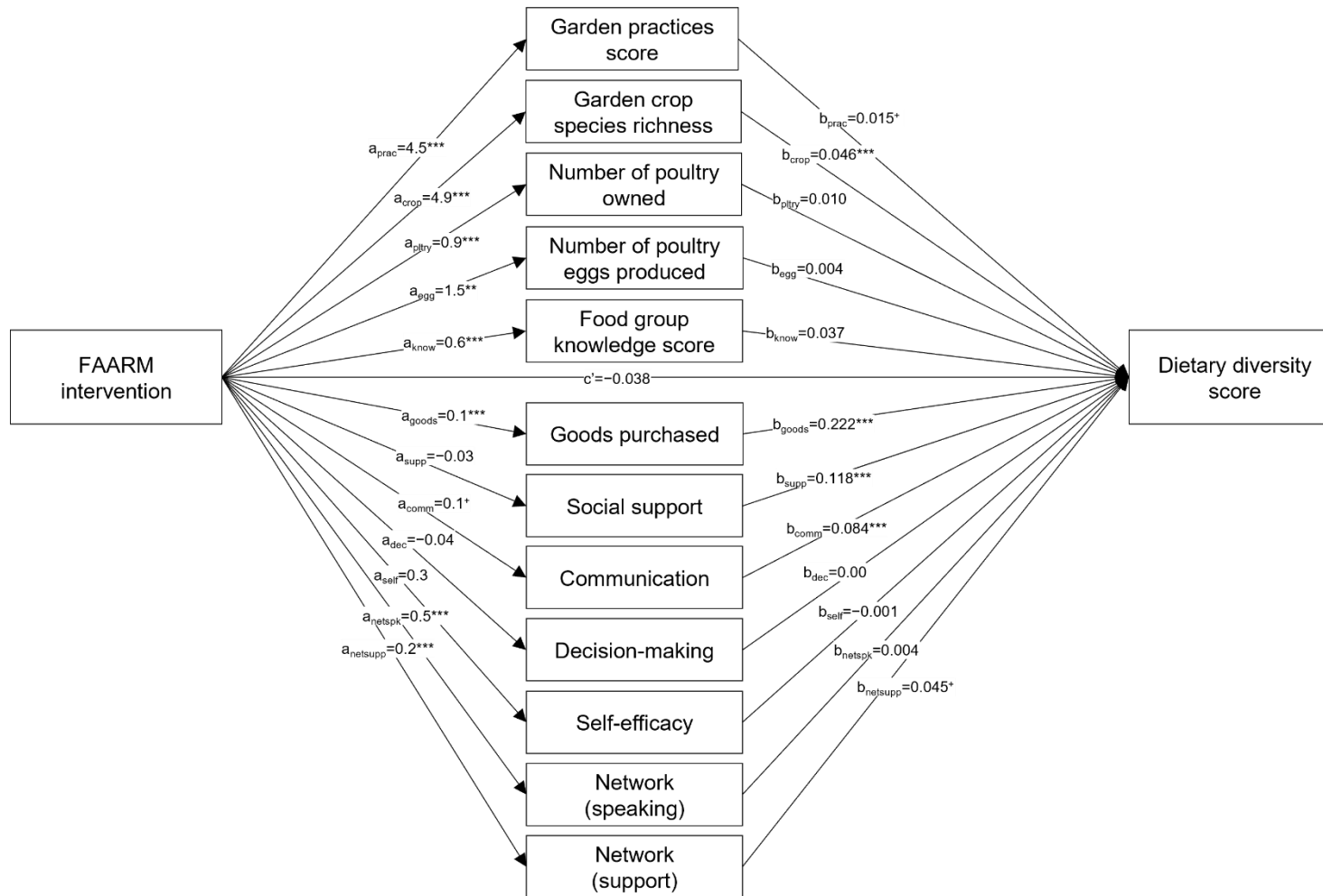
Note: The structural equation model controlled for the following baseline covariates as potential mediator-outcome confounders: religion, household wealth quintile, homestead land size, agricultural land size, garden crop species richness, women's education, domains of women's empowerment (including mobility, social support, communication, and decision-making), and women's dietary diversity score. We estimated the model using Full Information Maximum Likelihood (FIML) and allowed for correlations between the residuals of all the poultry and garden mediators. The model includes 8600 observations of 2611 women.

Fit statistics: CFI=0.997; TLI=0.889; RMSEA=0.049; $\chi^2(4)=29.4$, $p<0.001$

^aThe total effect is the sum of the direct effect and the total indirect effect.

^bThe indirect effect is calculated as the sum of the indirect effects through garden production, poultry production, nutrition knowledge, and marketing activity.

Abbreviations: CFI – Comparative Fit Index, CI – confidence interval, No. - number, RMSEA – Root Mean Square Error of Approximation, TLI – Tucker-Lewis Index, w/ - with



Appendix 4. Causal mediation pathways of the FAARM intervention on women's dietary diversity score through women's home garden production, poultry production, nutrition knowledge, market activity, and empowerment.

Corresponding indirect effects are included in Appendix 5. Residual correlations and variances are omitted from the figure. Coefficients of the a paths are the effect of the intervention on the mediators and coefficients of the b paths are the effect of a one-unit increase in the mediators on dietary diversity score. P-values: $^{+}p < 0.10$; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Appendix 5. Direct and indirect effects of the FAARM intervention on women's dietary diversity score through women's home garden production, poultry production, nutrition knowledge, market activity, and empowerment.

	β	95% CI	p-value	Proportion mediated
Total effect ^a	0.419	0.245, 0.593	<0.001	
Direct effect	0.043	-0.124, 0.210	0.61	
Indirect effect ^b	0.376	0.273, 0.480	<0.001	89.7%
<i>Individual indirect effects:</i>				
<i>Home garden production</i>				
Garden practices score ($a_{prac} * b_{prac}$)	0.070	-0.005, 0.146	0.07	
Garden crop species richness ($a_{crop} * b_{crop}$)	0.223	0.151, 0.296	<0.001	
<i>Poultry production</i>				
No. of poultry owned ($a_{pltry} * b_{pltry}$)	0.010	-0.003, 0.022	0.13	
No. of poultry eggs produced ($a_{egg} * b_{egg}$)	0.006	-0.004, 0.015	0.25	
<i>Nutrition knowledge</i>				
Food group knowledge score ($a_{know} * b_{know}$)	0.022	-0.004, 0.049	0.10	
<i>Market activity</i>				
Goods purchased ($a_{goods} * b_{goods}$)	0.025	0.009, 0.041	0.002	
<i>Empowerment</i>				
Social support score ($a_{supp} * b_{supp}$)	-0.003	-0.031, 0.025	0.84	
Communication score ($a_{comm} * b_{comm}$)	0.011	-0.002, 0.025	0.10	
Decision-making score ($a_{dec} * b_{dec}$)	0.000	-0.001, 0.002	0.73	
Self-efficacy score ($a_{self} * b_{self}$)	-0.001	-0.004, 0.003	0.76	
Network speaking score ($a_{netspk} * b_{netspk}$)	0.002	-0.016, 0.020	0.85	
Network support score ($a_{netsupp} * b_{netsupp}$)	0.010	-0.003, 0.024	0.14	
<i>Indirect effects by domain:</i>				
Home garden production ($\sum prac + crop$)	0.293	0.206, 0.380	<0.001	69.9%
Poultry production ($\sum pltry + egg$)	0.015	0.004, 0.027	0.01	3.6%
Nutrition knowledge (know)	0.022	-0.004, 0.049	0.10	5.3%
Market activity (goods)	0.025	0.009, 0.041	0.002	6.0%
Empowerment ($\sum supp + comm + dec$)	0.020	-0.017, 0.058	0.29	4.9%

Note: The structural equation model controlled for the following baseline covariates as potential mediator-outcome confounders: religion, household wealth quintile, homestead land size, agricultural land size, garden crop species richness, women's education, domains of women's empowerment (including mobility, social support, communication, and decision-making), and women's dietary diversity score. We estimated the model using Full Information Maximum Likelihood (FIML). We allowed for correlations between the residuals of all the poultry and garden mediators and correlations between the residuals of the empowerment variables. The model includes 8600 observations of 2611 women.

Fit statistics: CFI=0.981; TLI=0.887; RMSEA=0.042; $\chi^2(45)=222.6$, $p<0.001$

^aThe total effect is the sum of the direct effect and the total indirect effect.

^bThe indirect effect is calculated as the sum of the indirect effects through garden production, poultry production, nutrition knowledge, market activity, and empowerment.

Abbreviations: CFI – Comparative Fit Index, CI – confidence interval, No. - number, RMSEA – Root Mean Square Error of Approximation, TLI – Tucker-Lewis Index

Appendix 6. Sensitivity analysis: Direct and indirect effects of the FAARM intervention on women's dietary diversity score, including women with observations during Ramadan.

	β	95% CI	p-value	Proportion mediated
Total effect ^a	0.426	0.245, 0.606	<0.001	
Direct effect	0.032	-0.148, 0.212	0.73	
Indirect effect ^b	0.394	0.293, 0.494	<0.001	92.5%
<i>Individual indirect effects:</i>				
<i>Home garden production</i>				
Garden practices score ($a_{prac} * b_{prac}$)	0.104	0.028, 0.179	0.007	
Garden crop species richness ($a_{crop} * b_{crop}$)	0.228	0.154, 0.302	<0.001	
Garden practices via goods ($a_{prac} * d_{prac} * b_{goods}$)	-0.005	-0.013, 0.003	0.20	
Garden crops via goods ($a_{crop} * d_{crop} * b_{goods}$)	0.014	0.004, 0.024	0.005	
<i>Poultry production</i>				
No. of poultry owned ($a_{pltry} * b_{pltry}$)	0.006	-0.006, 0.018	0.33	
No. of poultry eggs produced ($a_{egg} * b_{egg}$)	0.011	-0.001, 0.023	0.07	
Poultry owned via goods ($a_{pltry} * d_{pltry} * b_{goods}$)	0.001	0.000, 0.002	0.20	
Poultry eggs via goods ($a_{egg} * d_{egg} * b_{goods}$)	-0.001	-0.003, 0.000	0.10	
<i>Nutrition knowledge</i>				
Food group knowledge score ($a_{know} * b_{know}$)	0.022	-0.007, 0.050	0.13	
Knowledge score via goods ($a_{know} * d_{know} * b_{goods}$)	0.004	0.000, 0.008	0.05	
<i>Market activity</i>				
Goods purchased ($a_{goods} * b_{goods}$)	0.012	-0.003, 0.026	0.12	
Production/knowledge via goods ($\sum a * d * b$ paths)	0.012	0.003, 0.022	0.01	
<i>Indirect effects by domain:</i>				
Home garden production ($\sum prac + crop$)	0.332	0.243, 0.420	<0.001	77.9%
Home garden production w/market ($\sum prac + crop + garden prod via goods$)	0.340	0.251, 0.430	<0.001	80.0%
Poultry production ($\sum pltry + egg$)	0.017	0.003, 0.031	0.02	3.9%
Poultry production w/market ($\sum pltry + egg + poultry prod via goods$)	0.016	0.003, 0.030	0.02	3.8%
Nutrition knowledge (know)	0.022	-0.007, 0.050	0.13	5.1%
Nutrition knowledge w/market ($\sum know + know via goods$)	0.025	-0.002, 0.053	0.07	6.0%
Market activity ($\sum goods + prod/know via goods$)	0.024	0.008, 0.040	0.003	5.6%

Note: The structural equation model controlled for the following baseline covariates as potential mediator-outcome confounders: religion, household wealth quintile, homestead land size, agricultural land size, garden crop species richness, women's education, domains of women's empowerment (including mobility, social support, communication, and decision-making), and women's dietary diversity score. We estimated the model using Full Information Maximum Likelihood (FIML). We allowed for correlations between the residuals of all the poultry and garden mediators and correlations between the residuals of the empowerment variables. The model includes 9272 observations of 2612 women.

Fit statistics: CFI=0.997; TLI=0.889; RMSEA=0.050; $\chi^2(4)=30.0$, $p<0.001$

^aThe total effect is the sum of the direct effect and the total indirect effect.

^bThe indirect effect is calculated as the sum of the indirect effects through garden production, poultry production, nutrition knowledge, and market activity.

Abbreviations: CFI – Comparative Fit Index, CI – confidence interval, No. - number, RMSEA – Root Mean Square Error of Approximation, TLI – Tucker-Lewis Index, w/ - with

Appendix 7. Supplementary methods.

Intervention description

To facilitate program activities, women were organized into village-level ‘women farmer groups’ ranging in size from 8 to 26 women. In each group, one woman and her family were elected as lead farmers. Over three years, groups were trained on different project components with sessions held about every two months (see below). Women also received individually tailored counseling visits at home from field staff approximately every other month. When the project closed, each group selected one or more peer educators to continue to support promoted activities.

The project activities are listed below by intervention component.

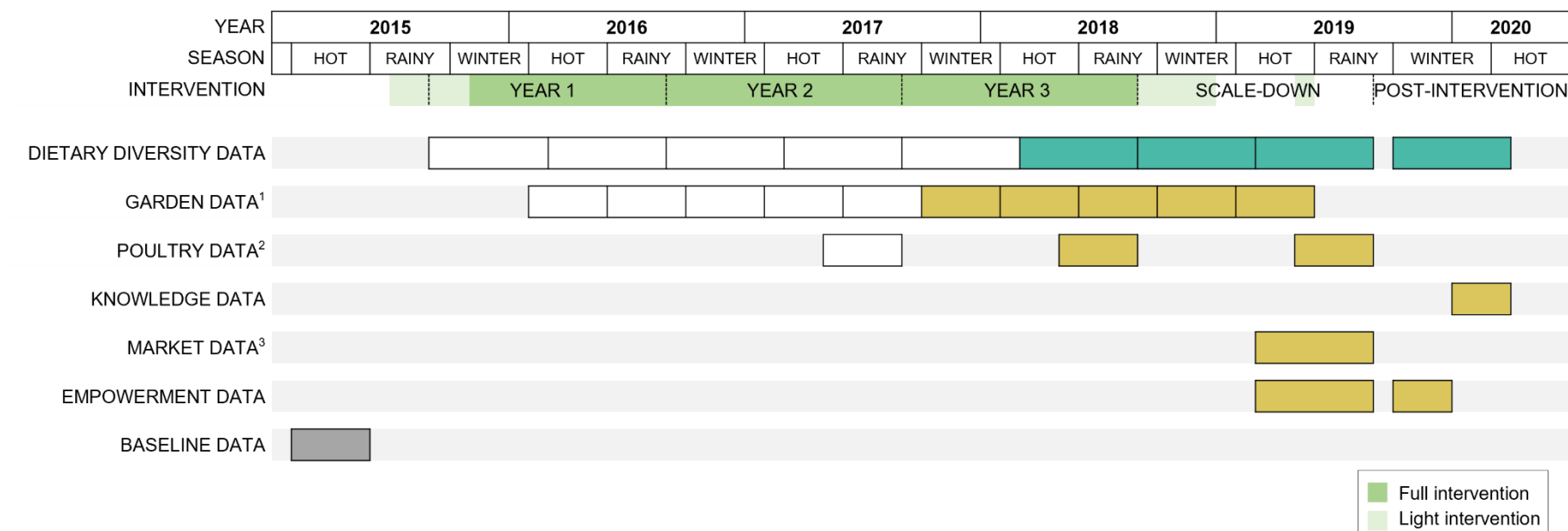
Home gardening: With a goal of year-round vegetable production, women received seasonally focused training on homestead vegetable and fruit production as well as sustainable gardening techniques such as fertilizer production, seed preservation and selection, and sack gardening. In addition to maintaining a model farm and a space for training, lead farmers nurtured seedlings and saplings for distribution to other participants. Seeds for nutrient-rich, local vegetables were provided to households once or twice per year during the main planting seasons, and interested households with sufficient land also received fruit tree saplings. Participants also received small gardening assets such as watering cans and spades.

Poultry rearing: Poultry training was provided annually and included information on how to raise healthy poultry and chicks, meet their nutritional needs, manage common diseases through deworming and vaccination, and construct an ‘improved’ poultry shed. Participants received starter feed and watering stations, and partial reimbursement to build the shed and to purchase 3-4 poultry from local vendors. A community vaccination program was established to provide participating households with the opportunity to vaccinate their poultry against common poultry diseases at low cost.

Market links: Market training was provided in the third year of the intervention with the goal of enabling participating women to sell surplus garden and poultry products through collection points using a group marketing approach. Marketing sessions held subsequent to the training were organized by the lead farmer families in each area.

Nutrition counseling: Women and their families received courtyard training sessions every two months covering topics in women’s nutrition, prevention of anemia, vitamin A deficiency, iodine deficiency, infant and young child feeding practices, sick child care, and hygiene. An additional food hygiene component was incorporated from June 2017 to February 2018 which emphasized hand-washing, clean utensils, food storage, and food reheating.¹

¹Sobhan, Shafinaz, Anna A. Müller-Hauser, Tarique Md. Nurul Huda, Jillian L. Waid, Om Prasad Gautam, Giorgia Gon, Amanda S. Wendt, and Sabine Gabrysch. “Design, Delivery, and Determinants of Uptake: Findings from a Food Hygiene Behavior Change Intervention in Rural Bangladesh.” *BMC Public Health* 22, no. 1 (May 4, 2022): 887. <https://doi.org/10.1186/s12889-022-13124-w>.



Appendix 8. Timeline of intervention activities and data collection periods.

Shaded boxes represent the data collection periods of the data used in this mediation analysis and the unshaded boxes all available data periods as part of the FAARM trial surveillance system and endline survey. The outcome is shaded in green, the mediators in yellow, and the confounders in grey. The darker green shading for the intervention (full intervention) indicates greater intervention programming intensity during the depicted time periods. ¹For garden data, boxes represent the recall period and not the time of the interview (i.e., garden questions captured information on the prior season). ²Poultry questions captured information on the prior week. ³Market and purchase activity questions captured information on the prior month.

Appendix 9. Variables included in the mediation analysis.

Variable	Type	Level	Data collection	Analytic sample size	Description
FAARM intervention	Exposure	Cluster	N/A	2611	Random allocation to the intervention or control group
Dietary diversity score	Outcome	Individual	Routine assessment, Mar 2018-Feb 2020 (4 rounds)	2611	The number of food groups consumed (out of 10) by a woman in the prior 24 hours, averaged over four data collection rounds (or the number of rounds completed if missing data). ¹ Score 0-10. Of 2611 women with dietary data in the selected time period, 56% had data from all four rounds, 26% from three rounds, 10% from two, and 8% from one.
Minimum dietary diversity	Outcome	Individual	Routine assessment, Mar 2018-Feb 2020 (4 rounds)	2611	The proportion of times a woman met the criteria for minimum dietary diversity (≥ 5 out of 10 food groups in the prior 24 hours) over four data collection rounds (or the number of rounds completed if missing data). ¹ Score 0.0-1.0. Of 2611 women with dietary data in the selected time period, 56% had data from all four rounds, 26% from three rounds, 10% from two, and 8% from one.
Garden practices score	Mediator	Individual	Routine assessment, Mar-June 2018 (1 round)	2388	The number of promoted garden practices applied (out of 17). Garden practices included raised beds, intercropping, seed beds, seed storage, integrated pest management, organic fertilizer, fencing, live fencing, pit crops, drought-resistant plants, flood-resistant plants, windbreak/protective trees, fruit trees, sapling production, seedling production, biochar-based fertilizer, and sack gardening. Score 0-17.
Garden crop species richness	Mediator	Individual	Routine assessment, Mar 2018-Sep 2019 (5 rounds)	2464	The number of crop species harvested in a woman's home garden in the prior season (4 months), averaged over five data collection rounds (or the number of rounds completed if missing data).
Number of poultry owned	Mediator	Individual	Routine assessment, May-Sep 2018/2019	2446	The number of poultry owned at the time of the interview, averaged over two data collection rounds. The number of

			(2 rounds)		poultry was capped at 95 for each round to reduce the influence of outliers.
Number of poultry eggs produced	Mediator	Individual	Routine assessment, May-Sep 2018/2019 (2 rounds)	2446	The number of poultry eggs produced in the past week averaged over two data collection rounds. The number of eggs was capped at 95 for each round to reduce the influence of outliers.
Food group knowledge score	Mediator	Individual	Endline (ended early due to COVID-19), Jan-Mar 2020 (1 round)	1765	The number of correct answers to five multiple-choice nutrition questions, asking the correct health reason for eating dark green leafy vegetables, animal foods, yellow and orange fruits/vegetables, pulses, and staples. Score 0-5.
Goods purchased	Mediator	Individual	Routine assessment, Mar-Aug 2019 (1 round)	2336	Whether a woman bought goods in the last month (yes/no).
Social support score	Mediator (Supplemental analysis)	Individual	Routine assessment, Mar-Aug 2019 (1 round)	2336	A woman's ability to seek help based on the sum score of getting help through others lending them money, giving food, visiting when sick, talking about problems, and whether she often had contact with her natal family. Score 0-5.
Communication score	Mediator (Supplemental analysis)	Individual	Routine assessment, Mar-Aug 2019 (1 round)	2336	A woman's ability to communicate with her husband (about work/agricultural activities, home, expenditures, community, own health), speak up in a meeting, and communicate with other women (about community, education, health, and women's problems and information on health/nutrition). Score 0-9.
Decision-making score	Mediator (Supplemental analysis)	Individual	Endline, Oct-Dec 2019 (1 round)	2513	A woman's ability to make usual decisions on food preparation, daily household purchases, major purchases, her visits to family or relatives, her own health care, and how to use her own earnings. Score 0-6.
Self-efficacy score	Mediator (Supplemental analysis)	Individual	Endline, Oct-Dec 2019 (1 round)	2556	A woman's "perception of her capabilities and ability to reach her goals" based on the sum score of 8 statements ² , each scored 1-5: strongly disagree (1), disagree (2), neither agree or disagree (3), agree (4), or strongly agree (5). Score 0-40.

Network (speaking) score	Mediator (Supplemental analysis)	Individual	Endline, Oct-Dec 2019 (1 round)	2560	The number of women, of a random selection of 5 women in her settlement, to which the respondent woman has ever spoken. Score 0-5.
Network (support) score	Mediator (Supplemental analysis)	Individual	Endline, Oct-Dec 2019 (1 round)	2560	The number of women, of a random selection of 5 women in her settlement, that the respondent woman could ask for help. Score 0-5.
Household wealth quintile	Confounder	Household	Baseline, Mar-May 2015	2611	Quintiles of household wealth, based on a wealth index calculated using principal components analysis of household assets. Women with missing data (n=11) were assigned the wealth quintile of their settlement.
Household religion	Confounder	Household	Baseline, Mar-May 2015	2611	Muslim or Hindu
Homestead land size	Confounder	Household	Baseline, Mar-May 2015	2611	Size of homestead land (in decimals). Women with missing data (n=13) were assigned the mean value of their settlement.
Agricultural land size	Confounder	Household	Baseline, Mar-May 2015	2611	Size of agricultural land (in decimals). Women with missing data (n=13) were assigned the mean value of their settlement.
Garden crop species richness	Confounder	Household	Baseline, Mar-May 2015	2611	The number of crop species harvested in a woman's home garden in the prior year. Women with missing data (n=13) were assigned the mean value of their settlement.
Education level	Confounder	Individual	Baseline, Mar-May 2015	2611	A woman's education level based on her reported number of completed school years: no formal education, partial primary education, complete primary education, partial secondary education, or complete secondary education.
Mobility score	Confounder	Individual	Baseline, Mar-May 2015	2611	A woman's ability to leave the homestead based on the sum score of whether she had left the homestead in the last month, had ever visited a clinic alone, and could visit a clinic alone or with her children. Women with missing data (n=21) were assigned the mean score of their settlement. Score 0-3.

Social support score	Confounder	Individual	Baseline, Mar-May 2015	2611	A woman's ability to seek help based on the sum score of getting help through others lending them money, giving food, visiting when sick, talking about problems, and whether she often had contact with her natal family. Women with missing data (n=21) were assigned the mean score of their settlement. Score 0-5.
Communication score	Confounder	Individual	Baseline, Mar-May 2015	2611	A woman's ability to communicate with her husband (about work/agricultural activities, home, expenditures, community, own health), speak up in a meeting, and communicate with other women (about community, education, health, and women's problems and information on health/nutrition). Women with missing data (n=21) were assigned the mean score of their settlement. Score 0-9.
Decision-making score	Confounder	Individual	Baseline, Mar-May 2015	2611	A woman's ability to make usual decisions on food preparation, daily household purchases, major purchases, her visits to family or relatives, and her own health care. Women with missing data (n=21) were assigned the mean score of their settlement. Score 0-5.
Dietary diversity score (baseline)	Confounder	Individual	Baseline, Mar-May 2015	2611	The number of food groups consumed (out of 10) by a woman in the prior 24 hours, at baseline. Women with missing data (n=101) were assigned the mean dietary diversity score of their settlement. Score 0-10.

¹FAO and FHI 360. Minimum Dietary Diversity for Women: A Guide to Measurement. Rome: FAO, 2016

²Statements: 1) I will be able to achieve most of the goals that I have set for myself, 2) When facing difficult tasks, I am certain that I will accomplish them, 3) In general, I think that I can obtain outcomes that are important to me, 4) I believe I can succeed at most any endeavor to which I set my mind, 5) I will be able to successfully overcome many challenges, 6) I am confident that I can perform effectively on many different tasks, 7) Compared to other people, I can do most tasks very well, 8) Even when things are tough, I can perform quite well. Reference: Seymore G, Ferguson N, van Biljon C, Malapit H. User Guide on the Project-level Women's Empowerment in Agriculture Index (Pro-WEAI). IFPRI <https://weai.ifpri.info/files/2023/07/Pro-WEAI-Guide.pdf>