IFAD
Investing in rural people

Measuring women's empowerment in agriculture

A streamlined approach

by
Alessandra Garbero
IFAD

Emilie Perge
World Bank

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Abstract

The Women's Empowerment in Agriculture Index (WEAI) can be a useful tool to measure the empowerment, agency and inclusion of women in the agriculture sector. It is an aggregate measure based on several dimensions ranging from decisions about and control over resources to gender parity within the household. However, computing the WEAI in its current form involves large data requirements, resulting in lengthy surveys with several questions on various dimensions and indicators within each dimension. This paper proposes a reduced version of the WEAI, or the R-WEAI, to reduce the data requirements, and consequently the cost of surveys and survey fatigue, for constructing a measure of women's empowerment while ensuring comparability to the full WEAI. Broadly, two possible approaches can be taken to reduce the WEAI – reducing the number of indicators required to construct the index, or retaining all the indicators, but reducing the number of survey questions required to compute each indicator. We find that, among the different possible ways to reduce the WEAI discussed in this paper, the closest a reduced version comes to the full WEAI results from performing a multiple correspondence analysis to retain fewer questions for each indicator in the survey. We use four different datasets for our analysis – three from IFPRI-supported pilot projects (in Bangladesh, the Western Highlands of Guatemala and Uganda) and the fourth from an IFAD-funded project in the Valle del Polochic of Guatemala. We also perform additional analyses to further validate the robustness of the R-WEAI and examine other contextual factors, such as educational attainment, age gap between spouses, household wealth, etc. that may affect the full WEAI and the R-WEAI.

Introduction

The Women's Empowerment in Agriculture Index, or the full WEAI, is a survey-based index that builds on research to develop indicators of agency and empowerment (Narayan, 2005; Narayan and Petesch, 2007; Alsop, Bertelsen and Holland, 2006; Ibrahim and Alkire, 2007) and was designed to measure the empowerment, agency and inclusion of women in the agricultural sector. Initially developed in 2012, under the aegis of the United States Government Feed the Future Initiative, and with the technical support of International Food Policy Research Institute (IFPRI) and the Oxford Poverty and Human Development Initiative (OPHI), the full WEAI became extensively used by a number of organizations to measure empowerment and gender parity in agriculture, both to identify areas where empowerment could be strengthened and to track progress over time (Malapit et al., 2015).

The current methodology (Alkire et al., 2013) for constructing the full WEAI uses the Alkire-Foster method (Alkire and Foster, 2011), which was first developed by OPHI to compute the multidimensional poverty index (MPI). Like the MPI, the WEAI is an aggregate index that can be measured at the country or regional level. Based on individual-level data collected by interviewing men and women within the same households, the WEAI is constructed as an aggregate measure using two main sub-indices. Weighted at 90 per cent, the first is a five-dimension endowment index (5DE) that aims to assess the degree to which women are empowered in the following five domains: (1) decisions about agricultural production; (2) access to and decision-making power about productive resources; (3) control over use of income; (4) leadership in the community; and (5) time allocation. The second sub-index, the Gender Parity Index (GPI), is weighted at 10 per cent. It measures gender parity and reflects the percentage of women whose achievements are at least as high as those of the men in their households. An important methodological point here is that male only-headed households are by definition excluded from this measure. The observations in the sample used to calculate the GPI only come from those of dual-adult households. However, the observations in the sample used to calculate the 5DE include those from both dual-adult households and female only-headed households. The index and its components can be easily interpreted in its totality or in a disaggregated form, making the index and its sub-indexes appealing to a wider audience. However, the full WEAI in its current form requires data to be collected on a large number of parameters on multiple dimensions, resulting in extensive questionnaires to be answered by each individual. The questionnaires drew on past surveys developed by IFPRI; USAID's Demographic and Health Surveys (DHS); the Gender Asset Gap Project (to develop modules on agricultural decision-making, assets, credit and income; and OPHI questions related to relative autonomy, which drew on Ryan and Deci (2000) and Chirkov, Ryan and Sheldon (2010). The time-use module drew on the Lesotho Time-Use Survey (2003) and includes primary and secondary activities in any 15-minute period.

The experience gathered as part of the various baseline surveys fielded under the aegis of USAID Feed the Future led to the recognition that the full WEAI was very resource-intensive, particularly in terms of time to administer and field costs. In addition, a few key modules in the WEAI proved problematic, namely the sections on time use, autonomy in production, and speaking in public, which were identified as particularly time-consuming, sensitive in nature and difficult to understand. The stakeholders concerned therefore discussed possible revisions of the full WEAI, and the outcome of the consultation produced two additional tools: the first, an updated version of the full WEAI, or WEAI 1.1; and the second, a shorter version named the A-WEAI, or abbreviated WEAI. The WEAI 1.1 was identical to the full WEAI in the number of indicators, with the exception of the autonomy module, which was revised to include vignettes (short hypothetical stories).

However, after the pilot survey of the A-WEAI, the vignettes were dropped from its final version. This reduction resulted in a 30 per cent decrease in the length of interviews compared with the full WEAI. In addition, the full WEAI included the autonomy vignettes, a 24-hour recall time module where only primary activities were elicited, and a shorter module on production decisions and resources (Malapit et al., 2015). Last, cognitive testing was also added to the revisions, based on the methodological experience gathered as part of the Haiti baseline survey, in order to avoid any potential misunderstanding of questions (Johnson and Diego-Rosell, 2015).

This paper adds to the existing methodological work to streamline the full WEAI by proposing a reduced version of the full WEAI, or the R-WEAI, to reduce the set of indicators, and/or questions within indicators required to measure empowerment while ensuring comparability with the full WEAI. The paper takes a statistical stance and employs a well-established data reduction approach – multiple correspondence analysis (MCA) first developed by Benzécri (1973) (see also Greenacre, 1984). MCA is a data exploration technique that is used to uncover correlation patterns across sets of variables described by single components, named principal components. Principal components can be considered as latent unobserved variables that account for the maximum variance of a set of other variables. The first principal component represents the unobserved latent variable that captures the highest variance of all observed variables used in the analysis and that is therefore the best candidate to represent all the variables considered. The first principal component can be visualized as the interpolation line that passes through a cloud of points set in an imaginary n-dimensional space of variables (axes) and that minimizes the square of the distances from all these variables (axes) and points. The main difference of this approach from standard econometric approaches is that the dependent variable is unobserved and cannot be used directly to estimate correlation coefficients. We assume therefore that empowerment is a multidimensional latent (unobserved) variable.

There are at least two computational advantages in using MCA for empowerment analysis in addition to its suitability for categorical data (Asselin, 2009). The first is that MCA gives more weight to indicators with a smaller number of hits. If we have few disempowered individuals within any dimension, these individuals are given greater weight. In the case of disempowerment indicators where the state of disempowerment is indicated by one, this could be interpreted as giving more importance to the relatively more disempowered. The second advantage is reciprocal bi-additivity. This states that (a) the composite score of an individual is the simple average of the factorial weights of the empowerment categories; and

(b) the weight of a given dimension of empowerment is the simple average of the composite scores of the population units that belong to the given dimension. This second property is particularly important because it implies that the population ordering in each of the dimensions used is preserved in the composite indicator.

Last, we conduct several robustness checks with different datasets. Therefore, this paper adds to the existing literature by proposing a tool that aims at reducing the data requirements for calculating the full WEAI, thereby decreasing the cost of the surveys and survey fatigue. We analyse data from a project supported by the International Fund for Agricultural Development (IFAD) in Valle del Polochic, Guatemala, along with datasets from three pilot Feed the Future projects (Bangladesh, Western Highlands of Guatemala and Uganda) supported by the International Food Policy Research Institute (IFPRI). We also provide additional evidence using four other IFPRI datasets conducted in Bangladesh, Malawi, Nepal and Zambia to further validate the findings of this study.

The paper is structured as follows. We first describe the WEAI and compute it using the original full version for the IFAD project in Valle del Polochic in Guatemala and the three IFPRI pilot countries. In the next section, we present an analysis of the possible ways to streamline the WEAI while comparing it with the original full WEAI version, in an effort to select a method that best mimics the original index. The number of indicators is reduced using MCA to select the variables that contribute most to the variation in empowerment measures. Following these analyses, we conduct an additional analysis to examine other possible demographic variables that might impact the full WEAI and the R-WEAI. We then provide additional evidence on the performance of R-WEAI using additional datasets from Bangladesh, Malawi, Nepal and Zambia. We conclude with a discussion of the results and its implications.

Description and analysis of data

In this section, we start by analysing the Valle del Polochic, Guatemala data to compute the full original WEAI. We repeat the same exercise for the IFPRI data from the three pilot countries. With these numbers, we then calculate the contribution of each variable to the disempowerment measure and, in the next section, proceed to reduce the number of indicators and dimensions required to compute the full WEAI.

Description and analysis of the IFAD Valle del Polochic, Guatemala dataset

The data from Valle del Polochic in Guatemala collected by IFAD in collaboration with Vox Latina were obtained from 1,714 individuals, 815 men and 899 women. Of these individuals, 95 per cent live in a dual household with both adult men and women, and the other 5 per cent are single adult women households. Data from each household were collected using the reduced WEAI questionnaire, which contains a subset of questions of the IFPRI pilot surveys questionnaires. The original index for Valle del Polochic was built using Alkire and Foster's methodology (2011), which is a combination of the two sub-indexes: 5DE and GPI. The 5DE is an aggregate measure based on 10 indicators representing five main dimensions of empowerment: agricultural production, access to productive resources, control of productive resources, control over the use of income, leadership in the community, and time allocation. These indicators are constructed as dummy variables in which the non-null value is a measure of empowerment. GPI measures gender parity as being the percentage of women who are empowered or whose level of empowerment is at least as high as that of the men in their households. As in the calculation of the full WEAI with the pilot countries in the IFPRI dataset, the five indicators for 5DE have equal weights with their sub-indicators weighted as shown in Table 1.

The final weights of the 5DE and the GPI in the full WEAI are 90 per cent and 10 per cent, respectively.

"Sufficiency" or "adequacy" for an indicator means that the woman's achievements exceed the threshold for that indicator. A woman is defined as empowered in 5DE if she has adequate achievements in four of the five domains, or is empowered in some combination of the weighted indicators that reflect 80 per cent total adequacy.[1] The variables are coded in a manner that ensures that non-null values indicate a higher degree of empowerment. As a result, for each of the indicators a value closer to unity represents better adequacy. In the Guatemala Valle del Polochic data shown in Table 2, respondents are mostly adequate in deciding what to do with their income and time (workload and leisure). However, data show that they are highly inadequate in accessing credit or deciding what to do with it.

1. Note that all mentions of adequacy counts refer to raw scores. Calculations based on censored scores are available on request.

Table 1: Domains, indicators and weights in the 5DE

Domain		Indicator	Weight
Production	Decisions about agricultural production and sole or joint decision-making about food and cash crop farming, livestock and fisheries and autonomy in agricultural production	Input in productive decisions	1/10
		Autonomy in production	
Resources	Ownership of, access to and decision-making power about productive resources such as land, livestock, agricultural equipment, consumer durables and credit	Ownership of assets	1/15
		Purchase, sale or transfer of assets	
		Access to and decisions about credit	
Income	Sole or joint control over the use of income and expenditures	Control over use of income	1/5
Leadership	Leadership in the community, measured by membership in economic or social groups and comfort speaking in public	Group membership	1/10
		Speaking in public	
Time	Allocation of time to productive and domestic tasks and satisfaction with the time available for leisure activities	Workload	1/10
		Leisure	

Source: Alkire et al. (2013).

Table 2: Adequacy counts (mean and standard deviation) and contribution to disempowerment

Variable	Guatemala, Valle del Polochic 2014 (IFAD)	Contribution
Input in productive decisions	0.888 (0.314)	0.114
Autonomy in production	0.866 (0.340)	0.082
Ownership of assets	0.833 (0.372)	0.090
Purchase, sale or transfer of assets	0.784 (0.411)	0.101
Access to and decisions on credit	0.400 (0.490)	0.137
Control over use of income	0.933 (0.250)	0.146
Group membership	0.871 (0.334)	0.084
Speaking in public	0.549 (0.497)	0.212
Workload	0.980 (0.139)	0.001
Leisure	0.920 (0.272)	0.028
Number of observations	**699**	

Note: The figures reported are averages from the sample. Standard deviations are reported in parentheses.

Further, in Table 3, we find that women are less adequate than men in most indicators except those linked to time use. For instance, there are significant differences between men and women in terms of ownership of assets and ability to speak in public: only 72 per cent of women own assets in their households compared with 95 per cent of men, and only 33 per cent of women feel able to speak in public compared with 80 per cent of men. However, women are significantly more satisfied with their leisure time and are more likely to be non-poor in terms of workload.

Table 2 also shows that in this case, the largest contributors to women's disempowerment are the variables "input in productive decisions", "access to and decision on credit", "control over use of income" and "speaking in public".

The resulting reduced WEAI computed with the data from the Guatemala Valle del Polochic project (Table 4) has been computed for 699 women (654 observations to compute the GPI). We also present the results from three other IFPRI pilot datasets from Bangladesh, Guatemala and Uganda computed for 700, 552 and 550 women, respectively.

Overall, 41.7 per cent of women are disempowered in this sample, and these disempowered women have inadequacy in 37.5 per cent of the indicators. Over 40.3 per cent of women in the sample have no gender parity and the average empowerment gap is over 20.6 per cent. These levels are lower than the ones in the IFPRI data from the Western Highlands of Guatemala, where 72.1 per cent of women are disempowered in 43.8 per cent of the indicators. Overall, women's empowerment was found to be greater in Valle del Polochic than in the Western Highlands of Guatemala.

Table 3: Average differences between men and women

Variable	Guatemala Valle del Polochic 2014 (IFAD)			Bangladesh (IFPRI)			Guatemala Western Highlands (IFPRI)			Uganda (IFPRI)		
	M	W	Diff.	M	W	Diff.	M	W	Diff.	M	W	Diff.
Input in productive decisions	0.99	0.79	0.19***	0.88	0.70	0.18***	0.92	0.63	0.29***	0.94	0.92	0.02
Autonomy in production	0.88	0.84	0.04**	0.97	0.92	0.05***	0.69	0.70	-0.01	0.50	0.83	-0.33***
Ownership of assets	0.95	0.72	0.23***	0.93	0.90	0.03	0.91	0.85	0.06**	0.98	0.89	0.09***
Purchase, sale or transfer of assets	0.88	0.69	0.19***	0.76	0.68	0.08**	0.72	0.6	0.12***	0.93	0.85	0.08***
Access to and decisions on credit	0.42	0.38	0.04	0.42	0.39	0.03	0.27	0.20	0.07**	0.33	0.25	0.08**
Control over use of income	0.99	0.87	0.12***	0.97	0.75	0.21***	0.86	0.55	0.31***	0.89	0.79	0.10***
Group membership	0.92	0.82	0.10***	0.31	0.34	-0.03	0.61	0.47	0.13***	0.72	0.45	0.27***
Speaking in public	0.80	0.33	0.47***	0.45	0.67	-0.21***	0.87	0.64	0.22***	0.95	0.83	0.11***
Workload	0.97	0.99	-0.02***	0.71	0.81	-0.1***	0.88	0.67	0.21***	0.81	0.55	0.25***
Leisure	0.90	0.93	-0.03**	0.66	0.65	0.01	0.81	0.83	0.02	0.73	0.69	0.04
Number of observations	**815**	**899**		**338**	**436**		**197**	**237**		**262**	**335**	

Note: *** p<0.01, ** p<0.05, * p<0.1

Table 4: WEAI results for the three IFPRI pilot country datasets and the IFAD Guatemala Valle del Polochic project computed using the original WEAI syntax

Index	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Disempowered headcount (H)	41.7%	61%	72.1%	54.5%
Average inadequacy score (A)	37.5%	41.6%	43.8%	38.4%
Disempowerment index (M_0)	0.156	0.254	0.316	0.210
5DE Index (1- M_0)	0.843	0.746	0.684	0.790
Percentage of women with no gender parity (H_{GPI})	40.3%	40.5%	64.2%	48.2%
Average empowerment gap (I_{GPI})	20.6%	25.2%	29.1%	24.5%
Gender Parity Index	0.916	0.899	0.813	0.882
WEAI	0.850	0.762	0.696	0.799
Number of observations	**699**	**700**	**552**	**550**

Description and analysis of the three IFPRI datasets

In this section, we use the original methodology by Alkire and Foster (2011) and compute the full WEAI for the three IFPRI pilot countries. The pilot country data covered: (a) 800 individuals in Bangladesh from the districts of Barguna, Jessore, Khulna, Madaripur and Patuakhali (the south and south-western part of the country close to the Indian border); (b) 625 individuals surveyed in the Western Highlands of Guatemala in the Quetzaltengo, San Marcos, Huehuetenango, El Quiché and Totonicapán areas with a high concentration of indigenous populations; and (c) 625 individuals surveyed in Uganda, in five spatially dispersed rural districts in the north (Kole and Amuru), central (Masaka and Luwero) and eastern (Iganga) regions of the country (Alkire et al., 2013). As emphasized in the IFPRI report (Malapit et al., 2014), the samples in all three countries are not nationally representative and results reflect only the situation in each site (Alkire et al., 2013).

As seen from Table 4, women in the Western Highlands of Guatemala are more likely than women at other IFPRI sites to be disempowered and have no gender parity, and their inadequacy score and average empowerment gap are larger.

Some of our results may be different from those presented in Alkire et al. (2013) due to the fact that missing values may not have been treated in the same way. The sample sizes used to compute the indices are 700 individuals in Bangladesh (331 women for the GPI), 552 individuals in the Western Highlands of Guatemala (204 women for the GPI) and 550 individuals in Uganda (116 women for the GPI).

Table 5 shows the adequacy counts achieved by women across different parameters from both the IFAD and the IFPRI datasets.

In the next section, we look at the methods used in this paper to reduce the variables required to compute the full WEAI, thereby constructing the R-WEAI.

Table 5: Comparison of indicators of 5DE across the IFAD and IFPRI datasets – adequacy counts (mean and standard deviation)

Variable	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Input in productive decisions	0.888 (0.314)	0.785 (0.411)	0.760 (0.427)	0.936 (0.245)
Autonomy in production	0.866 (0.340)	0.945 (0.226)	0.701 (0.458)	0.690 (0.463)
Ownership of assets	0.833 (0.372)	0.920 (0.271)	0.880 (0.325)	0.930 (0.254)
Purchase, sale or transfer of assets	0.784 (0.411)	0.718 (0.450)	0.659 (0.474)	0.885 (0.319)
Access to and decisions on credit	0.400 (0.490)	0.407 (0.491)	0.235 (0.424)	0.288 (0.453)
Control over use of income	0.933 (0.250)	0.850 (0.357)	0.693 (0.461)	0.835 (0.371)
Group membership	0.871 (0.334)	0.331 (0.471)	0.537 (0.499)	0.574 (0.495)
Speaking in public	0.549 (0.497)	0.578 (0.494)	0.744 (0.436)	0.887 (0.318)
Workload	0.980 (0.139)	0.767 (0.422)	0.766 (0.423)	0.669 (0.470)
Leisure	0.920 (0.272)	0.662 (0.473)	0.825 (0.379)	0.710 (0.453)
Number of observations	**699**	**700**	**552**	**550**

Note: The figures reported are averages from the sample. Standard deviations are reported in parentheses.

Reducing the full WEAI

Two approaches can be taken to reduce the data required to calculate the WEAI. The first approach entails reducing the number of indicators required to calculate the full WEAI. The second involves retaining all the indicators but instead reducing the number of questions asked within each indicator to calculate the WEAI. In this section, we take an empirical and inductive stance and compare the two approaches.

Our findings reveal that the second approach provides a more consistent set of results and can thus be considered a more desirable method.

First, we reduce the number of indicators required to calculate the full WEAI using MCA to retain indicators with the highest contribution while dropping the others. Next, we focus on the second approach where we reduce the number of questions within each indicator required in the full WEAI to construct the R-WEAI, based on their contribution using MCA. For all these analyses in this paper, we use both the IFAD and the IFPRI datasets, and present our results.

Reducing the number of indicators in the full WEAI to calculate the R-WEAI

In this section, the MCA methodology is used to reduce the full WEAI. MCA is run on the pooled datasets, and the contributions of each variable to the underlying index can be seen in Table 6.[2] Keeping the indicators with the highest contributions, four variables appear to be the most important: (a) input in productive decisions; (b) ownership of assets; (c) purchase, sale or transfer of assets; and (d) control over use of income. These four variables account for 89.6 per cent of the total index (25.1 per cent, 17.3 per cent, 23.9 per cent and 23.3 per cent, respectively).

2. Results are the same for Bangladesh and the Western Highlands of Guatemala. On the other hand, in Uganda, only three indicators (ownership of assets, purchase, sale or transfer of assets and control over use of income) are retained and contribute to 70 per cent of the underlying variable. In Valle del Polochic, five indicators (input in productive decision; ownership of assets; purchase, sale or transfer of assets; control over use of income; and group membership) are kept and explain 81 per cent of the underlying variable.

Table 6: Overall contribution of each indicator calculated from pooled data

Indicator	Overall contribution
Input in productive decisions	0.251
Autonomy in production	0.005
Ownership of assets	0.173
Purchase, sale or transfer of assets	0.239
Access to and decisions on credit	0.019
Control over use of income	0.233
Group membership	0.042
Speaking in public	0.031
Workload	0.000
Leisure	0.006
Number of observations	**2,501**

Assigning equal weights to all four variables, the resulting WEAIs are obtained (Table 7). The obtained WEAIs are either smaller (e.g. in the Valle del Polochic in Guatemala) or larger (IFPRI Bangladesh and Uganda) than the original ones. Only in the Western Highlands of Guatemala the R-WEAI calculated using a smaller number of indicators is remarkably close to the original one. When the R-WEAI calculated using this approach is smaller than the original one, the result can be explained by the fact that both the disempowerment headcount and the average inadequacy scores are larger for the R-WEAI calculated using this approach than for the full WEAI. Also, a greater percentage of women with no gender parity can be observed in the former case, with a larger average empowerment gap. For Bangladesh, the average inadequacy score and average empowerment gap are higher; therefore, the R-WEAI calculated using this approach is larger than the original one. In Uganda, on the contrary, while the average empowerment gap is larger, the average inadequacy score for the R-WEAI is nearly equal to the original one.

Overall, the results account for 64 per cent of the variation of the original indicator in Guatemala Valle del Polochic, 59 per cent in Bangladesh, 57 per cent in the Western Highlands of Guatemala and 47 per cent in Uganda. These correlation values are not reported here, but are available upon request.

The cross-tabulations of disempowered women (not reported here, but available upon request) indicate that disempowerment of women is likely to be misclassified in Uganda since 50 per cent of the originally disempowered women are now identified as empowered. This may also apply to the Valle del Polochic data, where 21 per cent of originally empowered women are now identified as disempowered, according to the WEAI calculated using this approach.

Table 7: Original and reduced WEAI indicators

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	41.7%	50.4%	61%	50.4%	72.1%	72.2%	54.5%	35.1%
Average inadequacy score (A)	37.5%	44.4%	41.6%	47.0%	43.8%	43.7%	38.4%	38.2%
Disempowerment index (M_0)	0.156	0.224	0.254	0.237	0.316	0.316	0.210	0.134
5DE Index (1- M_0)	0.843	0.775	0.746	0.763	0.684	0.685	0.790	0.865
Percentage of women with no gender parity (H_{GPI})	40.3%	45.4%	40.5%	38.5%	64.2%	60.8%	48.2%	32.7%
Average empowerment gap (I_{GPI})	20.6%	29.1%	25.2%	37.5%	29.1%	30.6%	24.5%	26.5%
Gender Parity Index	0.916	0.867	0.899	0.855	0.813	0.813	0.882	0.913
WEAI	0.850	0.795	0.762	0.772	0.696	0.696	0.799	0.870
Number of observations	**699**		**700**		**522**		**550**	

Reducing the number of questions in each indicator to calculate the WEAI

Another way to reduce the full WEAI is to use fewer questions within the indicators that make up the index. This set of reduced questions was obtained through an MCA run on the three IFPRI pilot countries only (Bangladesh, Guatemala Western Highlands and Uganda). The results from this MCA produced a reduced questionnaire that was used in the Guatemala Valle del Polochic survey in 2014. This reduced questionnaire has since been incorporated into the IFAD Results and Impact Management System (RIMS) (IFAD, 2005; Garbero, 2014). IFAD has been implementing this reduced questionnaire (termed the gender-based RIMS), which is at the basis of the construction of the second approach for the R-WEAI in a number of studies.[3]

The reduced questionnaire implemented as part of the gender-based RIMS survey has the same type of questions as the full WEAI questionnaire, except that there are fewer questions for some of the indicators. For instance, to compute "input in productive decisions", the RIMS questionnaire reports answers only for two types of agricultural decisions (purchasing inputs and types of crops) instead of the five types presented in the original questionnaire. It also does not distinguish between questions related to wage and self-employed activities. With respect to "relative autonomy in agricultural production", the reduced questionnaire asks questions about inputs for agricultural production, types of crops grown, minor household expenditures and family planning, but excludes questions regarding overall agricultural production, such as taking crops to market, livestock-raising, non-farm business activities and other non-agricultural related questions. Regarding the ownership of assets and purchase, and sale and transfer of assets, the reduced questionnaire does not take into account non-agricultural land and housing. Questions related to credit include only credit received from formal lenders, friends and relatives, microfinance groups and cooperative

3. The RIMS indicator system is currently under review.

societies, but exclude credit received from NGOs and informal lenders. Questions regarding income-related decisions do not distinguish between income from wage and self-employed activities. Indicators on speaking in public include only matters related to infrastructure.

All indicators from the RIMS survey are kept in our analysis except those related to workload, as these could not be computed with the three other datasets from the IFPRI pilot projects (Bangladesh, Guatemala and Uganda). The applied weights are those defined by Alkire and Foster (2011), except for leisure, which has a weight of 1/5. Table 8 shows the values of the 5DE indicators computed using the reduced questionnaire. Comparing these values with those obtained using the overall questionnaire, one can see that values from the reduced questionnaire are lower. The reduced indicators explain between 76 per cent of the variation in Valle del Polochic, 61 per cent in Uganda, 55 per cent in Bangladesh and 43 per cent in the Western Highlands of Guatemala. These correlations are not reported here, but are available upon request.

Indicators' contributions to women's disempowerment show large variation (Table 9). Four variables – "access to and decisions on credit", "control over use of income", "group membership" and "speaking in public" – contribute the most to women's disempowerment. In Bangladesh and Uganda, leisure contributes greatly to women's disempowerment. At the two Guatemalan sites, the variable "input in productive decisions" contributes greatly to disempowerment. The variable "ownership of assets" does not seem to have a large impact on women's disempowerment.

Table 8: Indicators of 5DE – Adequacy counts using weights from each separate dataset

Variable	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Input in productive decisions	0.859 (0.348)	0.669 (0.471)	0.719 (0.450)	0.918 (0.274)
Autonomy in production	0.839 (0.367)	0.890 (0.313)	0.606 (0.489)	0.618 (0.486)
Ownership of assets	0.833 (0.373)	0.865 (0.342)	0.797 (0.403)	0.906 (0.292)
Purchase, sale or transfer of assets	0.77 (0.392)	0.719 (0.450)	0.659 (0.475)	0.885 (0.319)
Access to and decisions on credit	0.379 (0.485)	0.259 (0.438)	0.218 (0.413)	0.398 (0.490)
Control over use of income	0.911 (0.285)	0.799 (0.401)	0.696 (0.460)	0.934 (0.248)
Group membership	0.868 (0.338)	0.321 (0.467)	0.532 (0.499)	0.600 (0.491)
Speaking in public	0.525 (0.499)	0.370 (0.483)	0.672 (0.470)	0.811 (0.392)
Leisure	0.920 (0.272)	0.663 (0.473)	0.826 (0.380)	0.711 (0.454)
Number of observations	**699**	**700**	**522**	**550**

Note: The figures reported are averages from the sample. Standard deviations are reported in parentheses.

Table 9: Contribution of indicators to women's disempowerment using weights from each separate dataset

Variable	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Input in productive decisions	0.122	0.091	0.105	0.031
Autonomy in production	0.082	0.036	0.108	0.109
Ownership of assets	0.081	0.020	0.036	0.040
Purchase, sale or transfer of assets	0.089	0.043	0.052	0.040
Access to and decisions on credit	0.127	0.127	0.136	0.115
Control over use of income	0.151	0.136	0.240	0.081
Group membership	0.075	0.166	0.135	0.194
Speaking in public	0.207	0.134	0.113	0.059
Leisure	0.062	0.246	0.075	0.331
Number of observations	**699**	**700**	**522**	**550**

Table 10: Comparison of original and IFAD's reduced questionnaire using fewer questions in each indicator

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	41.7%	46.5%	61%	66.4%	72.1%	72.8%	54.5%	47.7%
Average inadequacy score (A)	37.5%	39.4%	41.6%	43.0%	43.8%	43.6%	38.4%	38.5%
Disempowerment index (M_0)	0.156	0.183	0.254	0.285	0.316	0.317	0.210	0.184
5DE Index (1- M_0)	0.843	0.816	0.746	0.714	0.684	0.682	0.790	0.816
Percentage of women with no gender parity (H_{GPI})	40.3%	43.8%	40.5%	34.5%	64.2%	67%	48.2%	40.4%
Average empowerment gap (I_{GPI})	20.6%	23.1%	25.2%	27.6%	29.1%	28.5%	24.5%	24.6%
Gender Parity Index	0.916	0.898	0.899	0.904	0.813	0.808	0.882	0.900
WEAI	0.850	0.824	0.762	0.733	0.696	0.694	0.799	0.824
Number of observations	**699**		**700**		**522**		**550**	

Except for Uganda, the WEAIs obtained are smaller when using the R-WEAI with the reduced questionnaire compared with the full WEAI questionnaires (Table 10). Overall, the results show more disempowered individuals with the reduced questionnaire, with their average inadequacy scores also higher in three countries. The average percentage of women with no gender parity is also larger, except for Bangladesh and Uganda.

In Appendix B, the values of the disempowerment headcounts, inadequacy scores and disempowerment/empowerment index are presented under different thresholds (k=25 per cent, k=30 per cent and k=35 per cent) for the three pilot countries. Increasing the threshold increases the empowerment index since it reduces the number of indicators in which individuals need to be adequate to be qualified as empowered. Again, as in the methodology used by Alkire and Foster (2011), the threshold k=20 per cent is retained, indicating that a woman is empowered if she has adequate achievements in 80 per cent of the indicators.

Cross-tabulating the disempowerment condition obtained with this reduced questionnaire with the one obtained with the original syntax (not reported here, but available upon request), we found that in the Guatemala Valle del Polochic dataset, 89 per cent of women identified as empowered with the original methodology were still identified as empowered with the reduced indicator. Similarly, 96 per cent of women identified as disempowered were still identified as disempowered with the reduced indicator. Overall, the reduced questionnaire performs quite well, compared with the full WEAI questionnaire.

To test another possible way to reduce the questionnaire, we next pooled all the four datasets together and conducted MCA again. After recoding the variables for consistency, MCA was run to assess the contribution of each variable to the indicators.[4] The questions that are retained along with their explained variation are presented in Appendix C.

As shown in Table 11, the values obtained differ greatly from the original ones (Table 4) and from the ones obtained when using the reduced questionnaire (Table 8).[5] It can be seen that, in most cases, the values are on average smaller than the ones obtained before. Individuals have a smaller set of items upon which to be empowered, which consequently diminishes their overall empowerment measure.

Table 12 shows that the contribution to women's disempowerment varies considerably. The greatest change can be seen in group membership, where questions are limited to three groups compared with the seven groups in the full WEAI questionnaire. Similarly, the variable "purchase, sale or transfers of assets" seems to contribute more to women's disempowerment. Leisure time and input in productive decisions contribute less to disempowerment of women than when using the original questionnaire.

On average, the variables explain about 78 per cent of the variation in Uganda; 56 per cent in Bangladesh; and 64 per cent and 68 per cent, respectively, in the Guatemala Valle del Polochic and Western Highlands datasets. These correlations are not reported here but are available upon request.

4. We also conducted a country-specific MCA to examine country specificities when reducing the number of items and questions in each indicator. The results are presented in Table 12.

5. Both time-use values are similar since it is the same set of questions used in the original syntax and its reduced form.

Table 11: Indicators of 5DE – Adequacy counts using weights from pooled MCA approach

Variable	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Input in productive decisions	0.879 (0.326)	0.701 (0.458)	0.733 (0.443)	0.925 (0.264)
Autonomy in production	0.862 (0.344)	0.941 (0.236)	0.698 (0.460)	0.647 (0.478)
Ownership of assets	0.610 (0.488)	0.734 (0.442)	0.671 (0.470)	0.771 (0.420)
Purchase, sale or transfer of assets	0.288 (0.453)	0.185 (0.389)	0.202 (0.402)	0.524 (0.500)
Access to and decisions on credit	0.236 (0.425)	0.392 (0.488)	0.210 (0.407)	0.270 (0.444)
Control over use of income	0.818 (0.386)	0.669 (0.471)	0.438 (0.497)	0.763 (0.425)
Group membership	0.029 (0.168)	0.159 (0.366)	0.484 (0.500)	0.618 (0.487)
Speaking in public	0.516 (0.500)	0.370 (0.483)	0.672 (0.470)	0.811 (0.392)
Workload	0.980 (0.139)	0.768 (0.423)	0.767 (0.423)	0.670 (0.471)
Leisure	0.920 (0.272)	0.663 (0.473)	0.826 (0.380)	0.711 (0.454)
Number of observations	**699**	**700**	**522**	**550**

Note: The figures reported are averages from the sample. Standard deviations are reported in parenthesis.

Table 12: Contribution of variables to women's disempowerment using weights from pooled MCA approach

Variable	Guatemala Valle del Polochic 2014 (IFAD)	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Input in productive decisions	0.057	0.088	0.078	0.033
Autonomy in production	0.042	0.015	0.083	0.083
Ownership of assets	0.092	0.045	0.044	0.055
Purchase, sale or transfer of assets	0.126	0.123	0.104	0.097
Access to and decisions on credit	0.127	0.093	0.115	0.133
Control over use of income	0.133	0.216	0.270	0.159
Group membership	0.233	0.174	0.124	0.169
Speaking in public	0.171	0.116	0.095	0.037
Workload	0.002	0.048	0.062	0.116
Leisure	0.016	0.080	0.026	0.116
Number of observations	**699**	**700**	**522**	**550**

Table 13: Country-specific MCA to reduce number of indicators using weights from each separate dataset

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	41.7%	82.8%	61%	76.7%	72.1%	88.1%	54.5%	78.5%
Average inadequacy score (A)	37.5%	44.6%	41.6%	44.6%	43.8%	50.7%	38.4%	40.1%
Disempowerment index (M_0)	0.156	0.369	0.254	0.342	0.316	0.447	0.210	0.321
5DE Index (1- M_0)	0.843	0.631	0.746	0.657	0.684	0.553	0.790	0.679
Percentage of women with no gender parity (H_{GPI})	40.3%	21.2%	40.5%	34.6%	64.2%	10%	48.2%	41.4%
Average empowerment gap (I_{GPI})	20.6%	42%	25.2%	43.1%	29.1%	42.4%	24.5%	42.4%
Gender Parity Index	0.916	0.911	0.899	0.850	0.813	0.958	0.882	0.823
WEAI	0.850	0.659	0.762	0.676	0.696	0.593	0.799	0.693
Number of observations	**699**		**700**		**522**		**550**	

The results are quite striking; women's empowerment is really low compared with previous estimations (Table 13). Using a threshold of 20 per cent, our data indicate that the headcount of disempowered women is high, between 60 and 90 per cent, and so is the average inadequacy score. The GPI shows that the percentage of women with no gender parity is smaller than in the original methodology across all four sites, even though the average empowerment gap is higher in the new syntax compared with the original one.

Increasing the threshold of disempowerment decreases the headcount of disempowered women and increases the average score of inadequacy, making the 5DE in the R-WEAI closer to the original 5DE indexes in the full WEAI, as shown in the table in Appendix B. For instance, when using a threshold at 35 per cent, 48.7 per cent of women are disempowered in the Western Highlands of Guatemala sample and their average inadequacy score is 52 per cent, which is closer to the original measures. However, such a threshold implies that women are empowered only in 35 per cent of the dimensions.

Overall, it seems that this reduction overestimates women's disempowerment (Table 14). Cross-tabulations of women's empowerment status (not reported here but available upon request) reveal that all women originally identified as disempowered are still identified as disempowered, but many of the women originally identified as empowered are now identified as disempowered when using this approach with a pooled analysis. Even though this reduced indicator accounts for all the dimensions in the full WEAI, the selection of components included in each indicator may sometimes be too drastic and neglect many components in

which women are likely to be empowered. As shown earlier in Table 12, country-specific MCA results are presented and data reductions of items and questions are conducted to compute the reduced indicators. This gives slightly different results from the above reductions because country specificities are taken into account. For instance, in Bangladesh all decisions with respect to fisheries are kept in the analysis (excluded from the previous reduction). However, although the country-specific MCA data reduction takes into account country specificity, it does so at the expense of cross-country comparability.

In conclusion, having defined multiple ways to reduce the full WEAI, we find that the best match for the full WEAI is the R-WEAI obtained through the reduced questionnaire, implemented as part of IFAD's gender-based RIMS survey. The questionnaire retains fewer questions for each indicator using multiple correspondence analysis in producing the R-WEAI. In the next section, we conduct an additional analysis to examine how demographic information, such as education, age gap between spouses and household wealth, is associated with the calculations of the full WEAI and the R-WEAI.

Table 14: Original and reduced WEAI using fewer questions in each indicator

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	41.7%	91%	61%	87.2%	72.1%	90.8%	54.5%	62.7%
Average inadequacy score (A)	37.5%	42.1%	41.6%	48%	43.8%	48.8%	38.4%	43.6%
Disempowerment index (M_0)	0.156	0.393	0.254	0.419	0.316	0.443	0.210	0.274
5DE Index (1- M_0)	0.843	0.617	0.746	0.581	0.684	0.557	0.790	0.726
Percentage of women with no gender parity (H_{GPI})	40.3%	15.8%	40.5%	47.1%	64.2%	17.5%	48.2%	38.3%
Average empowerment gap (I_{GPI})	20.6%	27.7%	25.2%	36.5%	29.1%	37.4%	24.5%	50.3%
Gender Parity Index	0.916	0.956	0.899	0.828	0.813	0.934	0.882	0.807
WEAI	0.850	0.651	0.762	0.606	0.696	0.595	0.799	0.734
Number of observations	**699**		**700**		**522**		**550**	

Additional analysis

Additional analysis: determinants of empowerment

An additional analysis was conducted using IFPRI's three pilot country datasets (Bangladesh, Guatemala Western Highlands and Uganda) where the full WEAI and the R-WEAI components (i.e. inadequacy counts, 5DE and gender parity) are regressed against household and individual characteristics such as education, wealth, household composition, individuals' age, land size and activity participation. Note that all regressions are run separately for each country. The main purpose of this analysis is to examine how the full WEAI and, in comparison, the R-WEAI perform when important contextual characteristics such as wealth, education or women's age change across countries.

A linear regression is first conducted to look at individuals' inadequacy counts for each of the three pilot countries.[6] One expects that less educated and younger individuals married to an older person would have greater inadequacy counts, as would households with more children. Similarly, having a higher level of educational attainment, higher wealth index and landholdings, as well as participating in an economic activity, should have a negative effect on inadequacy counts. Using a probit specification, one can assess what predicts the likelihood of empowerment (i.e. a dummy variable taking the value 0 if the individual's inadequacy score is greater than the 20 per cent cut-off, and the value of 1 otherwise), and whether a woman has gender parity within her household (i.e. a dummy variable equal to 0 if a woman does not have gender parity and 1 otherwise). Keeping in mind social and cultural differences, we conduct this test for all three IFPRI datasets looking at the effect of individual age, age gap between partners, household size, land size and different educational variables (Sraboni et al., 2014). One expects that older and better educated individuals are more likely to be empowered. Similarly, women whose partners are older are less likely to be empowered.

Land size and the asset index are both measures of wealth. As opposed to the measure of inadequacy, the asset measure is constructed at the household level using the maximum asset holdings owned by both individuals.

6. In Appendix D, we present additional analysis tests done with pooled data including country fixed effects.

Table 15: Summary statistics from three IFPRI pilot project datasets for additional analysis

Variable name	Definition	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Dependent variables				
Original indicators				
Inadequacy counts	Inadequacy counts	0.28 (0.16)	0.28 (0.18)	0.23 (0.14)
5DE	Dummy for whether or not individual is empowered	0.41 (0.49)	0.44 (0.49)	0.52 (0.50)
Parity	Dummy for whether woman has gender parity	0.60 (0.49)	0.36 (0.48)	0.54 (0.50)
Indexes with four indicators from MCA				
Inadequacy counts	Inadequacy counts	0.18 (0.26)	0.28 (0.19)	0.10 (0.19)
5DE	Dummy for whether or not individual is empowered	0.58 (0.50)	0.66 (0.47)	0.72 (0.44)
Parity	Dummy for whether woman has gender parity	0.61 (0.49)	0.54 (0.50)	0.67 (0.47)
Indexes with IFAD's reduced questionnaire				
Inadequacy counts	Inadequacy counts	0.30 (0.16)	0.28 (0.18)	0.21 (0.15)
5DE	Dummy for whether or not individual is empowered	0.32 (0.47)	0.40 (0.49)	0.60 (0.49)
Parity	Dummy for whether woman has gender parity	0.66 (0.48)	0.33 (0.47)	0.59 (0.49)
Explanatory variables				
Landholding	Size of land owned privately, either self- or joint ownership (in decimal)	84.37 (78.75)	4598.83 (6670.66)	16904.30 (65277.52)
Age of individual	Age of individual	40.84 (13.88)	41.45 (14.53)	42.73 (15.31)
Age gap	Gap between age of individual and age of spouse	-0.58 (11.62)	0.00 (8.56)	0.00 (10.53)
Primary school	Dummy for whether or not individual has completed primary education (=1 if yes; =0 if less than primary)	0.42 (0.49)	0.24 (0.43)	0.45 (0.50)
Literacy	Dummy for whether or not individual can read and write (=1 if yes; =0 otherwise)	0.50 (0.50)	0.59 (0.49)	0.60 (0.49)
Share of children	Ratio of number of children (less than 15 years old) out of household size	0.31 (0.20)	0.43 (0.22)	0.51 (0.21)

Variable name	Definition	Bangladesh (IFPRI)	Guatemala Western Highlands (IFPRI)	Uganda (IFPRI)
Explanatory variables				
Household size	Number of household members	4.25 (1.39)	6.24 (2.59)	6.81 (2.71)
Wealth index	Index of assets (self or jointly) owned by households	0.00 (1.31)	0.07 (1.40)	0.14 (1.19)
Participation in paid employment	Dummy for whether individual has had a paid job in the last seven days (=1 if yes; =0 otherwise)	0.78 (0.42)	0.51 (0.50)	0.22 (0.42)
Religion/ ethnicity	Dummy for whether individual is from the ethnic majority (ladina in Guatemala), a specific ethnicity (Uganda) or religion (Muslim in Bangladesh) (=1 if yes; =0 otherwise)	0.81 (0.39)	0.39 (0.49)	0.22 (0.42)
Floor material/ Dwelling condition	Dummy for whether floor is of poor material (mud or earth) in Guatemala and Uganda, or whether dwelling is in good condition in Bangladesh (=1 if yes; =0 otherwise)	0.40 (0.49)	0.66 (0.48)	0.71 (0.46)
Water in dwelling	Dummy for whether household has water piped in the dwelling (=1 if yes; =0 otherwise)	0.69 (0.46)	0.33 (0.47)	0.02 (0.14)
Access to electricity	Dummy for whether household has access to electricity (=1 if yes; =0 otherwise)	0.38 (0.48)	0.72 (0.45)	0.06 (0.24)
Number of observations		**700**	**522**	**500**

Note: The figures reported are averages from the sample. Standard deviations are reported in parenthesis.

Additional analysis using the full WEAI

The first column in Tables 16, 17 and 18 shows the results from a linear regression of the inadequacy counts against a number of determinants. Empowerment is mostly explained by age of individual, age gap, education, wealth and participation in paid employment (either wage or non-wage activities). Overall, age and age gaps have negative and positive effects on an individual's inadequacy counts. Landholdings, wealth index and employment status consistently have negative effects on individuals' inadequacy count. Having a dwelling in good condition in Bangladesh or access to electricity in the Western Highlands of Guatemala has a negative effect on the inadequacy count, while having a mud floor has a positive effect in Uganda.

Looking at the 5DE column, where the dependent variable is a dummy equal to 1 if the individual is empowered and 0 otherwise, having at least attended primary school has a positive effect on empowerment in the Western Highlands of Guatemala and in Uganda but no effect in Bangladesh. Older individuals and a smaller age gap are conditions that are positively related to empowerment, although a larger age gap has a positive effect on individual empowerment in Guatemala. Similarly, households with a high wealth index, with a dwelling in good condition, or a concrete floor in Uganda, and with paid employment, are also more likely to be empowered. In the Western Highlands of Guatemala, individuals not belonging to an ethnic minority are more likely to be empowered than individuals from an ethnic minority.

Table 16: Determinants of women's empowerment in Bangladesh

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-0.000216**	0.000380	0.00110
	(9.14e-05)	(0.000786)	(0.00116)
Age of individual	0.000174	-0.00650	0.00911
	(0.000545)	(0.00484)	(0.00806)
Age gap	0.00127**	-0.00585	-0.0141*
	(0.000577)	(0.00507)	(0.00851)
Primary school	-0.00966	-0.0407	0.0694
	(0.0209)	(0.180)	(0.268)
Literacy	0.00242	0.0640	-0.170
	(0.0201)	(0.174)	(0.258)
Share of children	-0.0288	-0.320	0.351
	(0.0406)	(0.351)	(0.525)
Household size	-0.00480	0.106**	0.0458
	(0.00526)	(0.0457)	(0.0682)
Wealth index	-0.0109*	0.0898*	0.0271
	(0.00616)	(0.0530)	(0.0792)
Participation in paid employment	-0.0579***	0.363**	0.585**
	(0.0166)	(0.150)	(0.237)
Religion/ethnicity	0.00143	-0.190	-0.895**
	(0.0280)	(0.251)	(0.434)
Dwelling in good condition	-0.0363***	0.196*	0.226
	(0.0127)	(0.110)	(0.163)
Water in dwelling	-0.00294	0.0638	-0.629***
	(0.0159)	(0.138)	(0.213)
Access to electricity	-0.000722	-0.0578	0.105
	(0.0134)	(0.117)	(0.172)
Number of observations	**617**	**617**	**306**
R-squared	**0.101**	**0.0406**	**0.0983**

Note: District/village effects are included. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 17: Determinants of women's empowerment in Guatemala Western Highlands

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	5.04e-08	-6.99e-06	6.73e-07
	(1.39e-06)	(1.21e-05)	(1.86e-05)
Age of individual	-0.00286***	0.0319***	0.0310**
	(0.000846)	(0.00821)	(0.0127)
Age gap	-0.00130	0.0185*	0.00535
	(0.000984)	(0.0104)	(0.0149)
Primary school	-0.0312	0.466**	0.728**
	(0.0216)	(0.200)	(0.319)
Literacy	-0.0174	0.0356	0.242
	(0.0205)	(0.189)	(0.273)
Share of children	-0.136***	1.900***	1.440**
	(0.0518)	(0.503)	(0.724)
Household size	0.00720*	-0.0269	-0.0649
	(0.00385)	(0.0359)	(0.0518)
Wealth index	-0.0204**	0.0864	0.0173
	(0.00816)	(0.0746)	(0.0979)
Participation in paid employment	-0.147***	0.927***	-0.0756
	(0.0177)	(0.169)	(0.333)
Religion/ethnicity	-0.106**	1.217***	0.893
	(0.0425)	(0.441)	(0.562)
Dwelling in good condition	-0.0235	0.0326	0.163
	(0.0209)	(0.192)	(0.274)
Water in dwelling	-0.0141	-0.258	-0.600**
	(0.0202)	(0.187)	(0.275)
Access to electricity	-0.0481**	0.269	0.416
	(0.0232)	(0.212)	(0.300)
Number of observations	**375**	**368**	**177**
R-squared	**0.363**	**0.220**	**0.142**

Note: District/village effects are included. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 18: Determinants of women's empowerment in Uganda

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-2.80e-08	8.57e-07	1.97e-06
	(1.10e-07)	(1.03e-06)	(1.60e-06)
Age of individual	-0.000480	-0.00241	0.00393
	(0.000824)	(0.00596)	(0.00968)
Age gap	0.00241**	-0.0318***	-0.0425**
	(0.000953)	(0.00774)	(0.0170)
Primary school	-0.0315	0.374**	0.280
	(0.0200)	(0.159)	(0.272)
Literacy	-0.0385*	0.138	-0.141
	(0.0230)	(0.181)	(0.303)
Share of children	0.0248	0.128	-0.731
	(0.0531)	(0.427)	(0.662)
Household size	-0.00761*	0.0280	0.132**
	(0.00430)	(0.0352)	(0.0544)
Wealth index	0.00780	0.0878	-0.0655
	(0.00991)	(0.0811)	(0.125)
Participation in paid employment	-0.00359	0.245	-0.421
	(0.0236)	(0.198)	(0.320)
Religion/ethnicity	0.0958	-4.757	-3.572
	(0.147)	(220.8)	(186.5)
Dwelling in good condition	0.0696***	-0.696***	-1.468***
	(0.0250)	(0.205)	(0.344)
Water in dwelling	0.0171	-1.329**	0.0948
	(0.0649)	(0.528)	(0.796)
Access to electricity	0.0415	-0.194	-0.725
	(0.0409)	(0.357)	(0.580)
Number of observations	**304**	**444**	**213**
R-squared	**0.214**	**0.159**	**0.250**

Note: District/village effects are included. Standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Additional analysis using the R-WEAI

Examining the results of the additional analysis in the case of the R-WEAI index computed with the reduced questionnaire, we obtain similar results to the full WEAI. Landholding has a negative and significant effect on individuals' inadequacy scores in Bangladesh. Wealth also has the expected negative and significant effect on inadequacy scores, and a positive and significant effect on the likelihood of being adequate, both in Uganda and the Western Highlands of Guatemala.

Participation in paid employment during the seven days preceding the survey has a negative and significant effect on inadequacy scores, and a positive effect on the likelihood of being adequate, in both Bangladesh and the Western Highlands of Guatemala. In Bangladesh, women in paid work are also more likely to have gender parity than women doing unpaid work (Table 19).

Table 19: Determinants of women's empowerment in Bangladesh using the R-WEAI

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-0.000235**	0.00141	0.000994
	(0.000108)	(0.000947)	(0.00147)
Age of individual	-0.000194	0.00606	0.00564
	(0.000692)	(0.00623)	(0.0108)
Age gap	0.000403	0.0125*	0.00583
	(0.000761)	(0.00692)	(0.0114)
Primary school	-0.0528**	0.328	0.440
	(0.0251)	(0.221)	(0.334)
Literacy	0.0289	0.102	-0.194
	(0.0239)	(0.213)	(0.316)
Share of children	-0.0240	0.298	0.242
	(0.0486)	(0.432)	(0.678)
Household size	-0.00610	0.0336	0.0516
	(0.00630)	(0.0554)	(0.0866)
Wealth index	-0.00795	0.0674	-0.127
	(0.00683)	(0.0601)	(0.0916)
Participation in paid employment	-0.0810***	0.395*	0.945***
	(0.0225)	(0.214)	(0.346)
Religion/ethnicity	0.0551	-0.563	-0.147
	(0.0356)	(0.355)	(0.481)
Dwelling in good condition	-0.00774	-0.0733	0.151
	(0.0154)	(0.136)	(0.214)
Water in dwelling	0.0140	-0.155	-0.731***
	(0.0190)	(0.167)	(0.279)
Access to electricity	-0.00396	-0.224	-0.0843
	(0.0160)	(0.142)	(0.220)
Number of observations	**439**	**439**	**193**
R-squared	**0.115**	**0.0665**	**0.119**

Note: District/village effects are included. Standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Age has a negative and significant effect on an individual's inadequacy score and a positive effect on the likelihood of being adequate and on gender parity in the Western Highlands of Guatemala (Table 20).

Having at least a primary education also has a negative and significant effect on inadequacy scores in Bangladesh, and a positive and significant effect on the likelihood of being adequate in Uganda. Having water in the dwelling has a negative effect on gender parity in Bangladesh and in the Western Highlands of Guatemala (Table 21).

Table 20: Determinants of women's empowerment in Guatemala Western Highlands using the R-WEAI

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	5.04e-08	1.75e-05	1.06e-05
	(1.39e-06)	(1.28e-05)	(2.54e-05)
Age of individual	-0.00286***	0.0262***	0.0341**
	(0.000846)	(0.00825)	(0.0163)
Age gap	-0.00130	0.0279***	0.0279
	(0.000984)	(0.00994)	(0.0193)
Primary school	-0.0312	0.321	0.556
	(0.0216)	(0.206)	(0.405)
Literacy	-0.0174	0.283	0.180
	(0.0205)	(0.189)	(0.337)
Share of children	-0.136***	1.666***	0.634
	(0.0518)	(0.518)	(0.881)
Household size	0.00720*	-0.0659*	-0.145**
	(0.00385)	(0.0370)	(0.0680)
Wealth index	-0.0204**	0.0823	-0.00613
	(0.00816)	(0.0797)	(0.112)
Participation in paid employment	-0.147***	0.978***	-0.599
	(0.0177)	(0.174)	(0.393)
Religion/ethnicity	-0.106**	0.422	0.992
	(0.0425)	(0.405)	(0.839)
Dwelling in good condition	-0.0235	0.233	0.0431
	(0.0209)	(0.198)	(0.337)
Water in dwelling	-0.0141	-0.263	-0.924**
	(0.0202)	(0.196)	(0.362)
Access to electricity	-0.0481**	0.170	1.282***
	(0.0232)	(0.223)	(0.417)
Number of observations	**375**	**344**	**133**
R-squared	**0.363**	**0.192**	**0.263**

Note: District/village effects are included. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 21: Determinants of women's empowerment in Uganda using the R-WEAI

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-5.99e-08	3.95e-08	2.09e-06
	(1.26e-07)	(1.12e-06)	(2.66e-06)
Age of individual	-0.00119	0.0103	-0.00398
	(0.00100)	(0.00999)	(0.0242)
Age gap	-0.000810	0.00428	0.0436
	(0.00116)	(0.0125)	(0.0398)
Primary school	-0.0305	0.482**	-0.317
	(0.0228)	(0.221)	(0.560)
Literacy	-0.0678**	0.642**	0.930
	(0.0268)	(0.256)	(0.586)
Share of children	0.0202	0.146	-3.390**
	(0.0632)	(0.651)	(1.356)
Household size	-0.00344	0.0275	0.293**
	(0.00492)	(0.0483)	(0.123)
Wealth index	0.00407	-0.0948	-0.227
	(0.0110)	(0.107)	(0.187)
Participation in paid employment	0.0162	0.109	0.269
	(0.0284)	(0.281)	(0.747)
Religion/ethnicity	0.107		
	(0.155)		
Dwelling in good condition	0.0769**	-0.850***	-0.878
	(0.0307)	(0.315)	(0.655)
Water in dwelling	-0.0308	0.411	
	(0.0693)	(0.812)	
Access to electricity	0.0794*	-0.930*	
	(0.0457)	(0.539)	
Number of observations	**266**	**255**	**68**
R-squared	**0.201**	**0.180**	**0.261**

Note: District/village effects are included. Standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

In the next section, more evidence is provided using additional IFPRI datasets from the Bangladesh Integrated Household Survey and from Malawi, Nepal and Zambia to compare the full WEAI and the R-WEAI.

Additional evidence on the performance of the R-WEAI

In this section, we use datasets from IFPRI's larger data collection efforts related to testing the full WEAI. The WEAIs obtained are compared with those reported in Sraboni et al. (2013) in the case of the Bangladesh Integrated Household Survey, and with those in Malapit et al. (2014) in the case of Malawi, Nepal and Zambia.

Data for Bangladesh come from a nationally representative household survey conducted in 2012 in 325 primary sampling units and 6,503 households. Of the household heads in the sample, 88 per cent are Muslims and 99 per cent are from a Bangali ethnic group. The average age of the sampled individuals is 26 years. Some 82 per cent of the sampled households are headed by a man aged on average 44 years. The average household size is four members and 92 per cent of the sampled individuals work in a rural area (Sraboni et al., 2013). Data for Malawi come from 3,476 households in rural areas in seven districts situated across the boundary of the central and southern regions (Malapit et al., 2014). Households are on average composed of four members. Data for Nepal were collected on 2,000 households in 20 districts located in in the country's three farthest western regions, Terai and the lower hilly regions (ibid.). Households are on average composed of five members. Data for Zambia come from 1,501 households living in five districts located in the Eastern Province. Households have on average 5.8 members.

When constructing the indices, the estimation sample is the following: 10,948 individuals in the Bangladesh Integrated Household Survey (3,164 women to estimate the GPI); 3,442 individuals in Malawi (1,629 women for the GPI); 2,756 individuals in Nepal (1,127 women for the GPI); and 2,076 individuals in Zambia (995 women for the GPI).

Computing the full WEAI

The full WEAI was computed for the given data using the methodology of Alkire and Foster (2011). Most differences between our results and the ones presented in the reports mentioned above are due to the treatment of missing values. The number of observations in our computations and in their reports is different even though only rural households were retained in both cases.

As presented in Table 22, most individuals in Malawi, Nepal and Zambia seem to have control over the use of income, compared with only 17.6 per cent of individuals in the Bangladesh Integrated Household Survey. In Bangladesh, the most important indicator of the 5DE is "group membership" followed by "access to and decisions on credit", which is different from the rankings obtained using the Bangladesh pilot data.

Table 22: Comparison of adequacy counts

Variable	Bangladesh Integrated Household Survey (IFPRI)	Malawi (IFPRI)	Nepal (IFPRI)	Zambia (IFPRI)
Input in productive decisions	0.300 (0.458)	0.948 (0.223)	0.960 (0.196)	0.938 (0.241)
Autonomy in production	0.147 (0.354)	0.209 (0.407)	0.478 (0.500)	0.098 (0.297)
Ownership of assets	0.206 (0.405)	0.935 (0.247)	0.954 (0.209)	0.921 (0.269)
Purchase, sale or transfer of assets	0.358 (0.480)	0.852 (0.355)	0.887 (0.317)	0.845 (0.362)
Access to and decisions on credit	0.478 (0.500)	0.362 (0.481)	0.550 (0.498)	0.349 (0.477)
Control over use of income	0.176 (0.380)	0.946 (0.226)	0.943 (0.233)	0.947 (0.224)
Group membership	0.781 (0.413)	0.749 (0.434)	0.186 (0.389)	0.744 (0.437)
Speaking in public	0.521 (0.500)	0.755 (0.430)	0.814 (0.389)	0.819 (0.385)
Workload	0.281 (0.450)	0.489 (0.500)	0.512 (0.500)	0.278 (0.448)
Leisure	0.278 (0.448)	0.856 (0.351)	0.851 (0.356)	0.829 (0.377)
Number of observations	**3,164**	**1,629**	**1,127**	**995**

Note: The figures reported are averages from the sample. Standard deviations are reported in parentheses.

The full WEAI indices are presented in Table 23. Women in the Bangladesh Integrated Household Survey seem to be more disempowered than the ones in the pilot data. Disempowerment headcounts are high in all four countries, and average inadequacy scores vary from 36 to 46 per cent. Women's gender parity is low, as are the average empowerment gaps. Overall the GPI is higher than the 5DE index, which would increase the WEAI only slightly.

Table 23: WEAI results with original syntax

Index	Bangladesh Integrated Household Survey (IFPRI)	Malawi (IFPRI)	Nepal (IFPRI)	Zambia (IFPRI)
Disempowered headcount (H)	79.3%	67.1%	66.4%	78.9%
Average inadequacy score (A)	46.1%	35.9%	36.1%	38.0%
Disempowerment index (M_0)	0.366	0.241	0.240	0.300
5DE Index (1- M_0)	0.634	0.759	0.760	0.700
Percentage of women with no gender parity (H_{GPI})	60.3%	55.8%	48.6%	62.9%
Average empowerment gap (I_{GPI})	31.4%	20.6%	19.4%	21.9%
Gender Parity Index	0.810	0.885	0.905	0.862
WEAI	0.651	0.771	0.774	0.716
Number of observations	**3,164**	**1,629**	**1,127**	**995**

Note: The figures reported are averages from the sample.

Computing the R-WEAI

Table 24 presents the variables that define the 5DE and GPI indicators using the reduced questionnaire. The average values for all four countries are somewhat similar to the ones obtained with the full WEAI.

As a result, the contributions of each indicator to women's disempowerment follow the same distribution as the ones observed with the original methodology in all four countries (Table 25).

The R-WEAIs from this analysis are close to the ones obtained with the original methodology presented in Table 26. Women's empowerment in all four cases is greater with the reduced methodology than with the original one. This result may be explained by a smaller inadequacy score (Bangladesh and Nepal) or smaller disempowerment headcounts (Malawi, Nepal and Zambia). In all four cases, the GPI is also greater with the reduced methodology than with the original one. However, these differences are small and most households identified as empowered using the original method remain empowered when the reduced one is used.

According to the results presented in this paper, the R-WEAI constructed through the reduced questionnaire well approximates the full WEAI while significantly reducing the data requirements needed to compute an aggregated measure of women's empowerment.

Table 24: Indicators of 5DE – Adequacy counts

Variable	Bangladesh Integrated Household Survey (IFPRI)	Malawi (IFPRI)	Nepal (IFPRI)	Zambia (IFPRI)
Input in productive decisions	0.416 (0.493)	0.928 (0.258)	0.938 (0.241)	0.916 (0.277)
Autonomy in production	0.221 (0.415)	0.134 (0.341)	0.390 (0.488)	0.064 (0.245)
Ownership of assets	0.249 (0.432)	0.888 (0.315)	0.945 (0.227)	0.896 (0.305)
Purchase, sale or transfer of assets	0.358 (0.480)	0.852 (0.355)	0.887 (0.317)	0.845 (0.362)
Access to and decisions on credit	0.713 (0.453)	0.328 (0.470)	0.474 (0.499)	0.205 (0.403)
Control over use of income	0.210 (0.408)	0.914 (0.281)	0.954 (0.208)	0.913 (0.282)
Group membership	0.788 (0.409)	0.684 (0.465)	0.164 (0.371)	0.725 (0.447)
Speaking in public	0.707 (0.455)	0.680 (0.466)	0.759 (0.428)	0.763 (0.426)
Leisure	0.278 (0.448)	0.856 (0.351)	0.851 (0.356)	0.829 (0.377)
Number of observations	**3,164**	**1,629**	**1,127**	**995**

Note: The figures reported are averages from the sample. Standard deviations are reported in parentheses.

Table 25: Contributions of variables to women's disempowerment

Variable	Bangladesh Integrated Household Survey (IFPRI)	Malawi (IFPRI)	Nepal (IFPRI)	Zambia (IFPRI)
Input in productive decisions	0.086	0.038	0.012	0.046
Autonomy in production	0.054	0.243	0.186	0.247
Ownership of assets	0.061	0.035	0.023	0.042
Purchase, sale or transfer of assets	0.058	0.049	0.024	0.061
Access to and decisions on credit	0.118	0.151	0.147	0.156
Control over use of income	0.096	0.098	0.030	0.090
Group membership	0.173	0.130	0.271	0.096
Speaking in public	0.198	0.151	0.146	0.121
Leisure	0.153	0.105	0.162	0.140
Number of observations	**3,164**	**1,629**	**1,127**	**995**

Note: The figures reported are averages from the sample.

Table 26: Comparison of results for WEAI and R-WEAI

Index	Bangladesh Integrated Household Survey (IFPRI)		Malawi (IFPRI)		Nepal (IFPRI)		Zambia (IFPRI)	
	Original	Reduced (variation explained: 67.1%)	Original	Reduced (variation explained: 53.7%)	Original	Reduced (variation explained: 53.8%)	Original	Reduced (variation explained: 69%)
Disempowered headcount (H)	79.3%	80.1%	67.1%	61.5%	66.4%	58.7%	78.9%	67.1%
Average inadequacy score (A)	46.1%	45.1%	35.9%	36.8%	36.1%	35.4%	38.0%	39.0%
Disempowerment index (M_0)	0.366	0.361	0.241	0.227	0.240	0.208	0.300	0.262
5DE Index (1- M_0)	0.634	0.638	0.759	0.773	0.760	0.792	0.700	0.738
Percentage of women with no gender parity (H_{GPI})	60.3%	60.9%	55.8%	52.5%	48.6%	45.0%	62.9%	56.6%
Average empowerment gap (I_{GPI})	31.4%	29.8%	20.6%	22.9%	19.4%	17.7%	21.9%	22.0%
Gender Parity Index	0.810	0.818	0.885	0.880	0.905	0.920	0.862	0.875
WEAI	0.651	0.656	0.771	0.783	0.774	0.805	0.716	0.751
Number of observations	**3,164**		**1,629**		**1,127**		**995**	

Redundancy analysis

A further robustness check to validate the R-WEAI against the full WEAI was conducted using a redundancy analysis, a methodology presented in Alkire et al. (2015). The measure of redundancy (R^0) is an attractive measure as it displays the number of observations that have the same deprivation status in both the R-WEAI and the full WEAI. The method essentially involves comparing the proportions of empowered and disempowered, and dividing the proportion of empowered and disempowered by the minimum number empowered/disempowered by either the R-WEAI or the full WEAI, respectively. The findings, presented in Appendix F, further corroborate the validity of the R-WEAI as the measure of redundancy is well beyond the recommended threshold of 80 per cent. The latter implies that 80 per cent of those who are deprived in the indicator, having the lower marginal headcount ratio, are also deprived in the other indicator. Contingency tables and measures of redundancy for Bangladesh, Guatemala and Uganda are presented in Appendix F.

Conclusion

This paper demonstrates that a reduced questionnaire obtained through MCA on three datasets and at the basis of the construction of a R-WEAI gives a good approximation of the full WEAI in all five dimensions. This questionnaire is shorter than the full WEAI questionnaire, but still has enough elements to capture the diversified livelihood activities in which women may be engaged. At present, the questionnaire focuses on nine indicators (workload being excluded), but with simpler questions. The indicators in the reduced questionnaire focus on a diversified portfolio of assets, but exclude assets related to non-agricultural land and housing. With respect to inputs in productive decisions and autonomy in production, this indicator only focuses on inputs for agricultural production and types of crops grown. The variable "access to and decisions on credit" is computed using data related to credit from formal lenders, friends and relatives, microfinance institutions and cooperative societies. Questions on group membership are not different from the ones in the full WEAI questionnaire. However, questions about speaking in public are restricted to individual ability to speak in public with respect to the infrastructure. All questions related to time use are similar to those in the original questionnaire, except that the reduced questionnaire omits any questions related to workload.

Our analysis suggests that the most important dimensions of empowerment are linked to production, wealth (resources and income) and level of educational attainment. This is also corroborated by the additional analysis that shows that wealth and participation in paid employment decrease inadequacy scores and increase the likelihood of empowerment and gender parity in most cases. We recommend the inclusion of data items such as household wealth, landholdings, partners' age gap, educational attainment and participation in paid employment in the analysis and in future surveys. As seen in the additional analysis to explore the determinants of empowerment, these variables often explain empowerment and gender parity. Therefore, the inclusion of these variables in the questionnaire may lead to a better measurement of gender empowerment. The analysis also suggests that dimensions such as household wealth, participation in paid employment, landholdings and individual characteristics (age and education) could proxy and predict women's empowerment adequately without having to resort to an index.

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Appendices

Appendix A: Country-specific MCA to reduce number of indicators

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	41.7%	32.1%	61%	50.4%	72.1%	72.3%	54.5%	33.1%
Average inadequacy score (A)	37.5%	51.6%	41.6%	47.0%	43.8%	43.7%	38.4%	46.8%
Disempowerment index (M_0)	0.156	0.166	0.254	0.237	0.316	0.316	0.210	0.155
5DE Index (1- M_0)	0.843	0.834	0.746	0.762	0.684	0.683	0.790	0.844
Percentage of women with no gender parity (H_{GPI})	40.3%	41.3%	40.5%	38.5%	64.2%	60%	48.2%	31.8%
Average empowerment gap (I_{GPI})	20.6%	37.3%	25.2%	37.5%	29.1%	31.3%	24.5%	36.9%
Gender Parity Index	0.916	0.882	0.899	0.855	0.813	0.812	0.882	0.882
WEAI	0.850	0.838	0.762	0.772	0.696	0.696	0.799	0.848
Number of observations	**699**		**700**		**522**		**550**	

Appendix B: Thresholds for 5DE indicators using original and IFAD's reduced questionnaire

Index	Guatemala Valle del Polochic 2014 (IFAD)		Bangladesh (IFPRI)		Guatemala Western Highlands (IFPRI)		Uganda (IFPRI)	
K=25%	Original	Reduced	Original	Reduced	Original	Reduced	Original	Reduced
Disempowered headcount (H)	34.2%	39.9%	57.3%	64.8%	68.6%	69.3%	53.1%	43.6%
Average inadequacy score (A)	40.8%	42.2%	42.7%	43.5%	44.8%	44.7%	38.8%	40.0%
Disempowerment index (M_0)	0.139	0.165	0.245	0.282	0.308	0.310	0.206	0.174
5DE Index (1- M_0)	0.860	0.831	0.755	0.718	0.692	0.690	0.793	0.825
K=30%								
Disempowered headcount (H)	22.6%	27.0%	40.1%	46.6%	53.8%	50.8%	33.9%	29.9%
Average inadequacy score (A)	47.1%	48.7%	49.2%	49.9%	49.5%	51.1%	45.1%	45.3%
Disempowerment index (M_0)	0.106	0.132	0.197	0.232	0.267	0.260	0.153	0.135
5DE Index (1- M_0)	0.893	0.868	0.802	0.767	0.733	0.740	0.846	0.864
K=35%								
Disempowered headcount (H)	19.9%	23.9%	36.2%	43.8%	48.0%	48.7%	30.6%	27.5%
Average inadequacy score (A)	48.9%	50.7%	50.9%	50.9%	51.5%	52.0%	46.4%	46.3%
Disempowerment index (M_0)	0.097	0.121	0.184	0.223	0.247	0.252	0.142	0.127
5DE Index (1- M_0)	0.902	0.878	0.815	0.776	0.752	0.747	0.857	0.872
Number of observations	**699**		**700**		**522**		**550**	

Appendix C: Questions kept through MCA and shared variation

Variable	Questions and items kept	Label in original syntax	Shared variation
Input in productive decisions	Activity participation in food and cash farming and livestock Decisions regarding purchasing inputs, types of crops, marketing and minor household expenditures	feelmakedec_b feelmakedec_c feelmakedec_d inputdec_1 inputdec_2 inputdec_3	91%
Autonomy in production	Autonomy regarding inputs for agricultural production, types of crops and marketing	raiabove_b raiabove_c raiabove_d	71%
Ownership of assets	Assets: poultry (chicken and ducks), farm equipment (non-mechanized), non-farm business, large and small consumer durables, cell phone	selfjointown_d selfjointown_f selfjointown_h selfjointown_j selfjointown_k selfjointown_l	74%
Purchase, sale or transfer of assets	Self or joint decision over assets: poultry, farm equipment (non-mechanized), non-farm business, large and small consumer durables, and cell phone	selfjointrightany_d selfjointrightany_f	27%
Access to and decisions on credit	Credit from NGOs, informal lenders, formal lenders, friends and relatives	creditselfjointanydec_a creditselfjointanydec_b creditselfjointanydec_d	Too many zero values
Control over use of income	Income from food and cash farming and livestock-raising Decisions over small expenditures	incomedec_1 incomedec_2 incomedec_3 feelmakedec_h	56%
Group membership	Groups: agricultural groups, civic groups, local governments, religious groups and other local groups	groupmember_a groupmember_f groupmember_g groupmember_h groupmember_i	54%
Speaking in public	Decisions on infrastructure	speakpublic_a	70%
Workload	Similar to original		
Leisure	Similar to original		

Appendix D: Additional analysis with pooled data

Indicators before any reductions

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-6.89e-08 (1.14e-07)	8.00e-07 (8.69e-07)	6.77e-07 (1.25e-06)
Age of individual	-0.000712* (0.000375)	0.00251 (0.00291)	0.0130*** (0.00448)
Age gap	0.00109** (0.000443)	-0.00983*** (0.00353)	-0.0118** (0.00580)
Primary school	-0.0309*** (0.0115)	0.241*** (0.0892)	0.180 (0.134)
Literacy	-0.00344 (0.0112)	0.00293 (0.0872)	-0.0402 (0.124)
Share of children	-0.0321 (0.0263)	0.255 (0.209)	0.332 (0.300)
Household size	-0.00112 (0.00234)	0.0279 (0.0183)	0.00991 (0.0262)
Wealth index	-0.0124*** (0.00345)	0.0834*** (0.0280)	0.0463 (0.0397)
Participation in paid employment	-0.0777*** (0.0100)	0.381*** (0.0814)	0.0982 (0.120)
Water in dwelling	0.00625 (0.0106)	-0.148* (0.0872)	-0.337*** (0.129)
Access to electricity	0.00183 (0.0104)	-0.0405 (0.0858)	0.123 (0.125)
Number of observations	**1,301**	**1,445**	**705**
R-squared	**0.106**	**0.0460**	**0.0592**

Note: Country and district/village effects are included. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Indicators with four sub-indicators selected through MCA

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	1.21e-08 (1.30e-07)	3.84e-07 (9.07e-07)	-1.44e-07 (1.21e-06)
Age of individual	-0.00133*** (0.000435)	0.00521* (0.00296)	0.00770* (0.00431)
Age gap	0.00187*** (0.000527)	-0.0127*** (0.00362)	0.000461 (0.00539)
Primary school	-0.0206 (0.0134)	0.172* (0.0926)	0.00583 (0.132)
Literacy	0.00847 (0.0131)	-0.0528 (0.0886)	-0.135 (0.119)
Share of children	-0.0581* (0.0314)	0.198 (0.214)	0.313 (0.289)
Household size	-0.00263 (0.00274)	0.0271 (0.0191)	0.00160 (0.0254)
Wealth index	-0.0291*** (0.00419)	0.134*** (0.0301)	0.0977** (0.0395)
Participation in paid employment	-0.112*** (0.0120)	0.628*** (0.0824)	0.317*** (0.117)
Water in dwelling	0.00535 (0.0132)	-0.0207 (0.0889)	-0.204* (0.124)
Access to electricity	0.00461 (0.0130)	-0.0843 (0.0877)	-0.0715 (0.120)
Number of observations	**1,484**	**1,510**	**747**
R-squared	**0.227**	**0.0812**	**0.0325**

Note: Country and district/village effects are included. Standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Indicators computed using IFAD's reduced questionnaire

Variable	Inadequacy counts (1)	5DE (2)	Parity (3)
Landholding	-6.62e-08 (1.26e-07)	-5.24e-08 (1.01e-06)	8.82e-07 (2.06e-06)
Age of individual	-0.00106** (0.000436)	0.0140*** (0.00374)	0.0185*** (0.00614)
Age gap	1.95e-05 (0.000532)	0.0128*** (0.00455)	0.0113 (0.00730)
Primary school	-0.0379*** (0.0126)	0.301*** (0.106)	0.131 (0.173)
Literacy	-0.00238 (0.0123)	0.311*** (0.104)	0.214 (0.156)
Share of children	-0.0387 (0.0296)	0.460* (0.252)	0.169 (0.385)
Household size	0.000426 (0.00253)	-0.00412 (0.0212)	-0.0288 (0.0335)
Wealth index	-0.0119*** (0.00372)	0.0762** (0.0313)	0.00416 (0.0452)
Participation in paid employment	-0.0915*** (0.0117)	0.495*** (0.102)	0.0722 (0.163)
Water in dwelling	0.00863 (0.0118)	-0.152 (0.100)	-0.502*** (0.154)
Access to electricity	0.000477 (0.0117)	-0.152 (0.0998)	0.0133 (0.151)
Number of observations	**1,082**	**1,053**	**437**
R-squared	**0.136**	**0.0899**	**0.103**

Note: Country and district/village effects are included. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendix E: Questions kept when using reduced questionnaire for computing the R-WEAI (variables using IFPRI questionnaire notations)

Dimension	Indicator name	Survey question	Variable
Production	Input in productive decisions	How much input did you have in making decisions about food crop farming, cash crop farming, livestock-raising and fish culture? To what extent do you feel you can make your own personal decisions regarding these aspects of household life if you want to? Aspects: types of inputs to buy and types of crops to grow for agricultural production.	B02 1-3,5 G02 B-C
	Autonomy in production	My actions are partly because I will get in trouble with someone if I act differently. I do what I do so others don't think poorly of me. I do what I do because I personally think it is the right thing to do. Domain: inputs to buy and crops to grow.	G03-G05 B-C
Resources	Ownership of assets	Who would you say can use the assets most of the time? Assets: agricultural land, small livestock, large livestock, non-mechanized agricultural tools, mechanized farm equipment, non-farm tools, small and large durable goods, cell phone, transport.	C03 A-N (no I and M)
	Purchase, sale or transfer of assets	Who would you say can decide whether to sell, give away, rent/mortgage assets most of the time? Who contributes most to decisions regarding a new purchase of assets? Assets: agricultural land, small livestock, large livestock, non-mechanized agricultural tools, mechanized farm equipment.	C04-C06 A-G C09 A-G
	Access to and decisions about credit	Who made the decision to borrow/what to do with money/item borrowed from [source]? Sources: formal lender (bank), friends or relatives, microfinance groups, cooperative savings.	C11-C12 C-F
Income	Control over use of income	How much input did you have in decisions about the use of income generated from food crop, cash crop, livestock, non-farm/wage activities and fish culture? To what extent do you feel you can make your own personal decisions regarding these aspects of household life if you want to? Aspects: minor household expenditures.	B03 1-5, G02 H
Leadership	Group membership	Are you a member of any groups? Groups: agricultural/livestock/fisheries producer/market group; water, forest users' credit or microfinance group; mutual help or insurance group (including burial societies); trade and business association; civic/charitable group; local government; religious group; other group.	E07 A-I
	Speaking in public	Do you feel comfortable speaking up? Topic: productive infrastructure.	E02 A

Dimension	Indicator name	Survey question	Variable
Time[7]	Leisure time	How would you rate your satisfaction with your time available for leisure activities such as visiting neighbours, watching TV, listening to the radio, seeing movies or practising sports?	F02
Demographic characteristics	Individual age	What is individual's age?	Household survey - B03
	Age gap between men and women	What is individual's spouse's age?	
	Primary school[8]	What is the highest grade of education completed by the individual? Education: never attended school, attended class I, completed class I, completed class II, completed secondary school.	Household survey - B07
Wealth	Household asset index (factor analysis)	Does anyone in the household currently have any of these items? Who would you say owns most of the items? Items: large and small livestock, poultry, agricultural or fish equipment, non-mechanized and mechanized farm equipment, business equipment, large and small consumer durables, cell phone and means of transport.	C01a_B-H/J-L and N C02_B-H/J-L, and N

7. In the RIMS questionnaire, the workload question refers only to fuelwood collection, which is presumably included in domestic work in the IFPRI questionnaire. However, the RIMS question does not allow us to build a workload dummy for whether or not an individual works more than 10.5 hours per day.
8. In some cases, upper grades in primary education or secondary education could be better proxies for education, but we did not have this type of variable in the three IFPRI pilot countries.

Appendix F: Contingency tables for Bangladesh, Guatemala and Uganda

		5DE original		
		Disempowered = 0	**Empowered = 1**	**Total**
Bangladesh				
	Disempowered = 0	33.78%	24.93%	58.70%
5DE Reduced	**Empowered = 1**	4.72%	36.58%	41.30%
	Total	38.50%	61.50%	100.00%
Measure of redundancy				
Empowered	88.6%			
Disempowered	87.7%			
Guatemala				
	Disempowered = 0	31.67%	0.71%	32.38%
5DE Reduced	**Empowered = 1**	24.52%	43.10%	67.62%
	Total	56.19%	43.81%	100.00%
Measure of redundancy				
Empowered	98.3%			
Disempowered	97.8%			
Uganda				
	Disempowered = 0	24.00%	23.43%	47.43%
5DE Reduced	**Empowered = 1**	3.43%	49.14%	52.57%
	Total	27.43%	72.57%	100.00%
Measure of redundancy				
Empowered	93.5%			
Disempowered	87.5%			

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