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The individual empowerment Index (IEI): A new approach for empowerment measures

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Abstract

Over the last three decades, many research works have been conducted to define and measure the complex and composite concept of empowerment. However, an individual empowerment tool is still needed, to be applied for any disadvantaged group, women, youths (male or female), poor, etc., or any economic sector, and which can be more suitable for rigorous impact assessment studies. This paper contributes to the growing empowerment literature by providing a new multi-domain, survey-based empowerment measurement tool, the individual empowerment index (IEI). The IEI is unique in its characterization and construction. It combines individual empowerment scores in six empowerment domains: production, household livelihood, resources, income, leadership, and time allocation. It is a flexible and survey-based empowerment parameter that can be generated at individual, household community or country levels, or for any target social category. The IEI is constructed through a specific methodology based on a scale survey with an ordinal variable principle and a general process for construction of domain indicators. A key advantage of the IEI is that different household members (even husband and wife) can have different IEIs and statuses. Findings from applying the IEI approach to data collected from 1120 West-African lowland rice farmers show that lowland rice farmers globally achieved on average 71% of their full empowerment potential with only 40% of them found to be globally empowered. Female farmers were found to have lower control over their lives and were less than male farmers to be empowered. IEI estimates and comparison between WIEI and other women empowerment indexes estimates show reasonable correspondence despite the difference in the methodology and can hold for the validity of the IEI. The new IEI is a suitable tool and is recommended for quantitative and rigorous impact assessment and monitoring of programs and projects empowerment indicators.

Keywords

IEI, empowerment measurement, multidimensional tool, individual indicator, Kabeer's framework, technology adoption, impact assessment

Introduction

Everywhere in the world, advantaged strong people and disadvantaged weak people rub shoulders. Gender equality and empowerment are key factors to a peaceful, just, equitable, and prosperous world. Given their increasing importance in the fight against poverty, oppression, and gender discrimination, these concepts were included in the fifth goal in the Millennium Development Goals in 2000 (MDGs) and, later, in the Sustainable Development Goals (SDGs) in 2015 (Maiorano et al., 2021; UN, 2016). Empowerment of disadvantaged and marginalized people including women, youths and people living in poverty has been a key intended outcome in many programs and projects over the last decades (Jupp et al., 2010; KNBS, 2020; Lombardini et al., 2017). Empowerment is a contested concept and comprises complex, interrelated elements embracing values, knowledge, behavior, and relationships. Different understandings and definitions of empowerment exist among development and research organizations making its measure challenging. More than 32 different definitions of this concept were identified in the

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literature (Batliwala, 1994, 2007; Duflo, 2012; Eerdewijk et al., 2017; Ertan, 2019; Hennink et al., 2012; Ibrahim and Alkire, 2007; Maiorano et al., 2021; Kabeer, 1999, 2005; Syed, 2010; VeneKlasen and Miller, 2002). However, based on the existing definitions, we can summarize *empowerment as a process of ongoing change through which people expand their aspirations, strengthen their voice, get ability to exercise more choice, and have greater influence, power and control over resources and their own lives and futures*. Empowerment can be seen both as a process and an outcome (Eerdewijk et al., 2017). As a process, it is dialectical and involves change occurring in the freedom people have to control and influence their lives and futures, and as an outcome, it embodies the degree of that freedom. In the opposite of empowerment, *disempowerment* refers to making people (individual or group) less powerful or less confident or depriving them of power or authority, reducing their ability to exercise more choice. They then have lower influence, power, and control over resources and their lives and futures.

Over the last three decades, many research works have been conducted to define and measure the complex and composite concept of empowerment, mainly to evaluate the interventions of projects and programs aiming to empower disadvantaged people. Most of these works focus on women and girls and people living in poverty. Several and various parameters were used to measure women's empowerment in the literature. Earlier works mainly focus on one-dimensional empowerment using a single indicator such as the women educational attainment or labor market participation (Heckert and Fabic, 2013) or focused on a specific group, the poor (Narayan, 2002). Recent works considered the multidimensionality and complexity of the empowerment concept and used more than 30 individuals, household, community, and higher-level indicators. Malhotra et al. (2002) group these indicators into six domains: a) economic, b) socio-cultural, c) familial/interpersonal, d) legal, e) political, and f) psychological.

Recent works on women empowerment led to the development of many composite parameters[1] that also rely on these domains to measure and analyze women's empowerment status (see Table A1 in Appendix 1). While the women economic empowerment (WEE), the three women empowerment index (WEI) approaches, the SWPER (survey-based women's empowerment indicator), and the female empowerment index (FEMI) are more global and can be applied to various activity sectors and various contexts, the women empowerment in agriculture index (WEAI), the project-level women's empowerment in agriculture index (pro-WEAI) and the pro-WEAI for market inclusion (pro-WEAI + MI), the women empowerment index in rice-based agriculture (WEIRA), the women's empowerment in livestock index (WELI), and the women's empowerment in nutrition index (WENI) are more focused on specific sectors: WEAI, pro-WEAI, and pro-WEAI + MI on agricultural sector in general, the WEIRA on rice-based agriculture sector, the WEE on economic sector, WELI on livestock sector, and the WENI on nutrition sector. Also, apart from the FEMI which is national and sub-national indicator and the WEI developed by the hunger project which is a community level parameter, the others are individual or household level parameters. Even if the other measures can also be used for projects monitoring, the context-specific parameters Oxford's WEI, pro-WEAI and the pro-WEAI + MI are more designed for rigorous impact assessment studies. Furthermore, almost all the existing empowerment parameters are focused and personalized on women. Thus, they cannot be used to assess the empowerment status of other groups of actors targeted by projects like youths (male and female) or poor (male and female). For instance, the existing parameters cannot be assessed as impacted to assess the impact of agricultural technology adoption on beneficiaries' empowerment since the population benefiting from agricultural technologies are often both men and women. Moreover, most existing parameters do not incorporate intrahousehold decision-making power relations. Indeed, gender inequality in the distribution of power within households is one of the key factors explaining women being disadvantaged economically, not only in terms of their immediate access to resources, but also in their ability to pursue opportunities outside the home (UNECE, 2021). Since a household is both a production and consumption unit, the intrahousehold power relation in decisions related to the use of the household outputs and incomes and whether, when, in what, and in which proportion to invest in improving household livelihoods are key to assess people's ability to influence their lives and futures.

Therefore, despite this diversity of the existing empowerment measures, there is still a lack of a parameter that could be applied to any "disadvantaged group" such as women, youths (male or female), and poor (male or female), to any economic sector and more suitable for rigorous econometric impact evaluation exercises.

This paper presents a new empowerment measurement tool that fills this gap: the individual empowerment index (IEI). It contributes to the growing empowerment literature by providing a new multi-domain, survey-based, and individual empowerment measure which can be used to measure the empowerment levels of any target group in any sector. IEI can be estimated for various gender intersections between women and men. The IEI is based on the Kabeer conceptual empowerment framework (Kabeer, 1999, 2005) and combines individual empowerment scores in six empowerment domains: resources, production, income, household livelihood, leadership, and time allocation. Unlike many other tools based on this framework, IEI incorporates intrahousehold decision-making power relations, mainly in household consumption, children schooling, household members health, food and nutrition, and various households' investments and achievements. Different empowerment-related items are used in each IEI domain and can be adapted to the context of projects, activities, and actors targeted by the evaluation. It also uses a specific methodology in the construction of empowerment indicators. As an individual empowerment measure, IEI is a flexible tool, adaptable to any context, economic activity,

and disadvantaged category. It can also be generated at any level: individual, household, group, community, or country. IEI can be used to generate empowerment index for women, youth (male vs female), technology beneficiaries (adopters vs non-adopters), etc. It is therefore a suitable tool for projects aiming to assess the impact of technologies adoption on empowerment indicators.

This introductory section of this paper is followed by the presentation of the conceptual framework in which the IEI is developed and the main principles of the specific methodology followed in the construction of IEI parameter (section 2) and the details on the construction methodology of the IEI domain indicators and IEI parameter (section 3). Section 4 focuses on the state of the art of empirical research on IEI using original survey data collected in lowland rice production communities in West Africa in the framework of ex-post impact assessment study of a lowland development technology, the Smart-valleys. Session 5 concludes this paper by identifying potential avenues where the new empowerment measurement tool can be used in the future, some limitations of the tool and further improvement of IEI.

Conceptual framework of individual empowerment Index (IEI)

The IEI is developed based on the Kabeer empowerment conceptual framework (Kabeer, 1999, 2005) which laid out the basis for most work in the field and is commonly referred to the related literature. According to the author, an individual empowerment can be described as a process of change on three interrelated dimensions of resources (pre-conditions), agency (process), and achievements (outcomes). This first dimension *Resources* includes material, economic, human, and social resources that enhance the ability to make life choices. These resources are acquired through a multiplicity of social relationships conducted in the various institutional domains which make up a society (such as family, market, and community) (Kabeer, 1999). Access to these resources reflect the rules and norms which govern distribution and exchange in different institutional arenas giving certain actors authority over others in determining the principles of distribution and exchange. This first empowerment dimension implies analyzing access to and control over these resources (Batliwala, 2007). The second dimension, *agency or process* is defined as the ability of an actor to define his goals and act upon them (Kabeer, 1999) or make strategic life choices. It encompasses the meaning, motivation, and purpose which individuals bring to their activity, their sense of agency, or "the power within." Agency can be operationalized as 'decision-making' in the social science literature, the form of bargaining and negotiation, deception and manipulation, subversion and resistance as well as more intangible, cognitive processes of reflection and analysis. It can be exercised by individuals as well as by collectivities. Agency has both positive (power to) and negative (power over) meanings. Many other studies make a distinction between four different types of agency: coercive agency (power over), intrinsic agency (power within), instrumental agency (power to), and collective agency (power with) (Ibrahim and Alkire, 2007; Rowlands, 1997). The last Kabeer's empowerment dimension, achievements or outcomes, refers to the extent to which people can realize their choices (well-being, outcomes) (Batliwala, 2007; Kabeer, 1999).

The IEI, using six empowerment domains, encompasses these three empowerment dimensions. As for many other empowerment measure tools, the agency is the dominant dimension of the IEI tool. Both the key questions and the items on which the questions are asked are chosen to reflect on of these dimensions. Many of the key variables used in the domain empowerment indicators construction are related to decision making. Certain authors even argued that the agency dimension is a more direct measure of empowerment, compared with resources or achievements (Malapit et al., 2019), the key dimension of empowerment. However, the other dimensions, resources and achievements are also encompassed in the IEI construction. Moreover, the four types of agency defined above are also incorporated in the IEI. The coercive agency (power over) is not in the sense of violence, coercion, or threat, but in the sense of imposing one's decisions on others in case of collective agency (mainly household livelihood and leadership domains) or in the use of other persons' resources or income. The dimension of resources is incorporated through the IEI resources and income domains (Narayanan et al., 2019; Torre et al., 2019). The resources domain analyzes not only the access to productive and non-productive resources, but also the decision-making related to the use and control over these resources. In addition, the resources considered are related mainly to the five capital categories of the sustainable livelihood framework (human capital, social capital, natural capital, physical capital and financial capital), including technology knowledge, education, health, reproductive, and HIV and AIDS prevention and care, market information, new technologies, medias, etc. The dimension of agency is analyzed in all the six IEI domains through the decision-making processes: resources through the decision-making related to control over resources ("power to," "power with," and "power within"); the production through decision-making related to practice of the productive activities, how and when to manage the activities for more income ("power to" and "power with"); household livelihood through the decision-making related to child schooling, household members health, and nutrition management, the various households' investments and achievements and the social networking and political life ("power with" and "power over").

The agency dimension is analyzed in IEI income domain through the decision-making regarding the use of his or her own generated income or income generated by other relatives ("power within," "power to," "power with," and "power over"). The leadership domain analyzes whether or not an individual is an active member of a group, is a member of a group management committee, and is involved in decision-making regarding the group. It also incorporates

the individual ability to speak in public. In this sense, it encompasses the intrinsic agency, collective agency, and sometimes coercive agency. Lastly, the time allocation domain evaluates an individual ability to allocate enough time during a day for sleeping, rest, and leisure, the "non-working activities" ("power to" and "power with"). The last empowerment dimension, achievements or well-being outcomes, is covered by the income and leadership domains. Income in the IEI is considered as outcome resulting from both access and use of resources and individual agency. Similarly, the membership of a group as well as the individual ability to speak in public are also considered as outcomes of his agency.

General process of IEI and empowerment domains scores construction

The IEI combines individual empowerment score in the six empowerment domains: 1) production, 2) household livelihood, 3) resources; 4) income, 5) leadership, and 6) time allocation. Note that resources domain includes general resources, credit related resources and human resources (education and health); the leadership domain includes roles in groups/local organizations/associations, ability to speak in public and relationship with external support organizations. The specific methodology used in the construction of this new empowerment measurement tool is based on an exploratory mixed method with both qualitative and quantitative data collection. It starts with the sampling. The survey unit is the individual actor, including non-married actors, mainly divorced and widows. Two main reasons justify this choice. The first is related to the fact that the non-married can be marginalized or disadvantaged people and the main projects beneficiaries. The second reason is the fact that many of non-married people have in their environment (inside their household or outside) other decision makers who often interact in their household power decision-making. Even if the situation may not be exactly the same as for the married respondents living with their spouse, the impact of the projects' interventions should also be evaluated on them. The second specificity is related to the mixed method research design used with the questionnaire design and the empowerment indicators construction. The following process should be followed:

- Carry out an exploratory study on the target sites to collect qualitative data on the empowerment domains and understand the dimensions covered by each domain, the questions to be asked to cover these dimensions, the possible options existing in the target regions or countries to answer these questions as well as their relative importance.
- Design the modules of the questionnaire: At this stage, two types of questions can be distinguished: i) questions directly related to empowerment domains, mainly those related to power relations or access to and control over resources and income that are called key questions with the corresponding key variables, and 2) the other questions called ordinary questions with the corresponding ordinary variables. As much as possible, all the questions expressing a level of empowerment should be designed following the ordinal variable principle for easier empowerment levels comparison. The codes related to key questions are formulated in such a way that the possible options to answer them are ordered and structured in increasing order (scale survey) based on the power relation between respondents and other adults in relationships with them (inside the household or outside) or the importance of the options' contributing to empowerment. For all key variables, lower values mean lower power or empowerment of the respondent. For the other variables, nominal variables are mostly used. Modules are designed to ask all the questions on a comprehensive list of "items" related to the concerned domain. Items are the 'objects' of the empowerment questions in each domain and can be either the different types of decisions often made in a given domain, the different resources or microfinance institutions often accessible by the target population (resources domain), different income sources existing in the study area (income domain) or different organizations, associations or groups existing in the target population and accessible to them (see the individual questionnaire used to collect the data used in this paper in Appendix 2).
- Collect the quantitative data: Once the questionnaire is designed and tested, it is administrated to respondents for data collection. Note that the questions and the lists of each domain items can also be adapted to the study sites, specific context and purpose.
- Ensure data structure during processing: the researcher should ensure that all the key variables follow the ordinal variables' structure.

The third specificity of the methodology is the construction of the domain indicators and the IEI parameter. The general estimation statistic method used is the mean. Indeed, after the data collection and processing, apart from the time allocation domain indicator, the following five steps are generally followed to generate the empowerment indicators for the other domains (see the details on the estimation for all the six domains indicators in Appendix 4). The production domain will be used to illustrate each step.

(i) Estimation of the "*domain key variables ratios*" for each of the key variables identified to be included in the estimation. Each ratio is given by the value obtained for a given key variable k divided by the highest value of that key variable k in the investigated population for the concerned item j and a given individual i.

For instance, for the production domain, the production key variables ratios PDR_{ijk} are generated by equation (1) as followed:

$$PDR_{ijk} = \frac{x_{ijk}}{max(x)_{ijk}} \quad (1)$$

Where x_{ijk} the value of the key variable k of a given production item j of a given individual i, $max(x)_{ijk}$ the highest value of the production key variable k in the interviewed population for item j and individual i.

(ii) Generation of the '*per applicable domain item sub-indicator'*. This sub-indicator for a given item j and a given individual i is the mean of all the generated domain key variables ratios for all the concerned key variables k. In the case of the production domain, the per applicable production item sub-indicator $PDIS_{ij}$ is given by equation (2):

$$PDIS_{ij} = \frac{1}{n}\sum_{k=1}^{n} PDR_{ijk} \quad (2)$$

Where PDR_{ijk} is the production key variables ratios generated above *and* n the number of key variable k used in the production domain.

(iii) Generation of '*all applicable domain items sub-indicator*': This sub-indicator is the mean of all the 'per applicable item sub-indicators for all the applicable items. For example, the "*all applicable production items sub-indicator*" $APDS_i$ is generated through equation (3):

$$APDS_i = \frac{1}{n}\sum_{j=1}^{n} PDIS_{ij} \quad (3)$$

Where $PDIS_{ij}$ is the "*per applicable production item sub-indicator*" generated above and n the number of applicable production items.

(iv) Estimation of the "*domain items participation ratio*." This ratio informs about the involvement level of the respondent in the decisions-making items. It is the quotient which numerator is the number of domain items in which the respondent participated, and denominator is the highest number of items in which an individual participated. If PPR_i is the production items participation ratio, NPP_i the number of production items in which the respondent i participated, $HNPP_{ic}$ the highest number of items in which an individual participated c of the respondent *i,* PPR_i is given by equation (4) as follows:

$$PPR_i = \frac{NPP_i}{HNPP_{ic}} \quad (4)$$

(v) Estimation of the "*domain empowerment score*." This indicator is the individual empowerment indicator for the concerned empowerment domain. It is obtained by the weighted mean value of the "*all applicable domain items sub-indicator*" related to the concerned empowerment domain and "*the domain items participation ratio*" related to the concerned domain. The weights used are ¾ (0.75) for the first sub-indicator obtained at step 3 and ¼ (0.25) for the second sub-indicator obtained at step 4. This choice is explained by the fact that the first sub-indicator is the main part of the domain indicator since it compiles all the domain key variables values while the second sub-indicator add to the domain indicator its extent. The "*domain empowerment score*" is a continuous variables ranging from 0 to 1. Considering the case of production domain, if PES_i is the "*production empowerment score*," PES_i is given by equation (5) as follows:

$$PES_i = \frac{1}{4}(3 * APDS_i + PPR_i) \quad (5)$$

(vi) Estimation of the "*domain empowerment status*"*:* This indicator takes the value of 1 if the domain indicator's value is equal to or greater than the domain threshold. It determines whether the respondent is empowered or not in the concerned domain. For the production domain, with the threshold of 0.80 chosen, the production empowerment status *EPES* is given by equation (6) as followed:

$$EPES = \begin{cases} 1, & PES_i \geq 0.80 \\ 0, & Otherwise \end{cases} \quad (6)$$

The details for the construction of the time allocation indicators, the time allocation empowerment score ($TAES_i$) and the time allocation empowerment status ($ETAES_i$) are provided in Appendix 3 and 4. With WTS_i been the working time score, $TAES_i$ and $ETAES_i$ are given by equations (7) and (8) as follows:

$$TAES_i = \left(1 - \frac{1}{24}\ WTS_i\right) \quad (7)$$

$$ETAES_i = \begin{cases} 1, & [TAES_i \geq 0.55] \\ 0, & Otherwise \end{cases} \quad (8)$$

After the estimation of the individual empowerment indicator in each of the six empowerment domains, the Individual Empowerment Index ($\boldsymbol{IEI_i}$) is generated. The IEI_i is the combination of individual empowerment score in all the six empowerment domains. IEI_i is then the ***mean value of the six empowerment indicators of the six empowerment domains***, including domain indicators with zero values. The six empowerment indicators are production empowerment score ($\boldsymbol{PES_i}$), the household livelihood empowerment score ($\boldsymbol{HLES_i}$), the resources empowerment score ($\boldsymbol{RES_i}$), the income empowerment score ($\boldsymbol{IES_i}$), the leadership empowerment score ($\boldsymbol{LES_i}$), and the time allocation empowerment score ($\boldsymbol{TAES_i}$). The IEI_i as well as all the

six domain indicators are continuous variables ranging from 0 to 1. The IEI_i is generated through equation (9) as follows:

$$IEI_i = \frac{1}{6}(PES_i + HLES_i + RES_i + IES_i + LES_i + TAES_i) \quad (9)$$

***Disempowerment* score (IDE_i),** which is the distance from the empowerment potential, is given by equation (10) as follows:

$$IDE_i = 1 - IEI_i \quad (10)$$

A disempowerment score equal to zero means that the individual reaches his/her full empowerment potential level.

***Gender parity gap* (*GPG*)** is the gap between the men and women's empowerment indexes, and is given by equation (11) as follows:

$$GPG = MIEI - WIEI \quad (11)$$

Where ***MIEI*** is the average empowerment index within male farmers of a targeted group or population and ***WIEI*** is the average empowerment index within female farmers of the same group or population. In general, the gender parity gap is estimated either at group/community level or household level. It is estimated at household level when the second primary adult living in the target individual's household (his/her spouse or another primary adult when his/her spouse is not a household member) is also interviewed in addition to the target individual. A zero value of the ***GPG*** means a global gender equality in the group/community or in the household. A positive value of the ***GPG*** means that men have greater power and ability to make strategic and life choices for their future than women. A negative value of the ***GPG*** means that women have greater power and ability to make strategic and life choices for their future than men.

Finally, the ***Individual empowerment status (EIEI) is generated from the Individual Empowerment Index (IEI).*** Due to the difference between the time allocation threshold scale and the other domain indicators thresholds scale, a threshold of 0.75, which is the mean value of the six empowerment domains thresholds, is used for the IEI_i**.** An individual is declared globally empowered if the value of the IEI_i is equal to or greater than 0.75. The individual empowerment status, *EIEI*, is obtained through equation (11) as follows:

$$EIEI = \begin{cases} 1, & IEI_i \geq 0.75 \\ 0, & Otherwise \end{cases} \quad (12)$$

An individual is declared globally empowered if she or he obtains a value of *EIEI* equal to 1.

The empowerment index and status can be estimated for any subpopulation (women, men, adopters, non-adopters, youths, adults, etc.) and be compared between two groups. One can estimate for instance the women individual empowerment index ($WIEI_i$) for women, the men individual empowerment index ($MIEI_i$) for men, the adopters individual empowerment index ($AIEI_i$) for adopters and the non-adopters individual empowerment index ($NIEI_i$) for non-adopters.

Table A3.2 in Appendix 4 summarizes the construction process of the IEI_i. Figure 1 gives a graphical illustration of the dimensions of the IEI_i and its importance in improving individual and household livelihood.

Determination of thresholds values for each empowerment indicator and the IEI

Considering the values of the empowerment domain indicators ranging from 0 to 1, the general threshold value applied to the empowerment domain indicators is 0.8 as for most of the existing empowerment domain indicators (Alkire et al., 2013; KNBS, 2020; Lombardini et al., 2017; The Hunger Project, 2015) to allow some comparisons. In order words, for a given empowerment domain, an individual who reaches at least 80% of his or her empowerment potential is considered as empowered in that domain.

The exception is the time allocation domain. In this domain, the two extreme time poverty line value defined by Bardasi and Wodon (2006) was used to determine the threshold (see details in Appendix 3). This approach was the one used by Alkire et al. (2013) in the development of the WEAI. The lower time poverty line of 70.5 h per week (or 10.07 h per day) defining the lower threshold corresponds to 1.5 times the median while the higher time poverty line of 94 h per week (or 13.4 h per day) defining the higher threshold corresponds to 2 times the median. In the construction of the IEI, the time poverty line of 10.8 h per day of working time is used as threshold for the time allocation domain indicator. In other words, an individual is empowered in working time allocation if his working time is less than 10.8 h per day. Since the non-working time ratio is estimated as indicator for this domain (see time allocation sub-section in Appendix 3), the value of 10.8 h per day of working time corresponds to 0.55 for this indicator, the non-working time ratio. This means that an individual is empowered in time allocation if his non-working time ratio is equal to 0.55 or above. Regarding the IEI, due to the difference between the time allocation threshold scale and the other domain indicators thresholds scale, the IEI_i threshold is the mean value of the six empowerment domains thresholds. This value is 0.75. Therefore, an individual is declared globally empowered if the value of the IEI_i is equal to or greater than 0.75.

Empirical analysis from West-Africa

Data source and sampling

This paper uses data collected in 2019 from lowland rice farmers in West Africa in the framework of the impact assessment of a lowland development technology, the Smart-valleys. The sampling unit used was the rice lowland farmer. A multistage stratified random sampling was used to select villages and lowland rice farmers. Benin and Togo where the Smart-valleys technology was disseminated were covered. Three regions were selected and investigated in each country. From each region, six

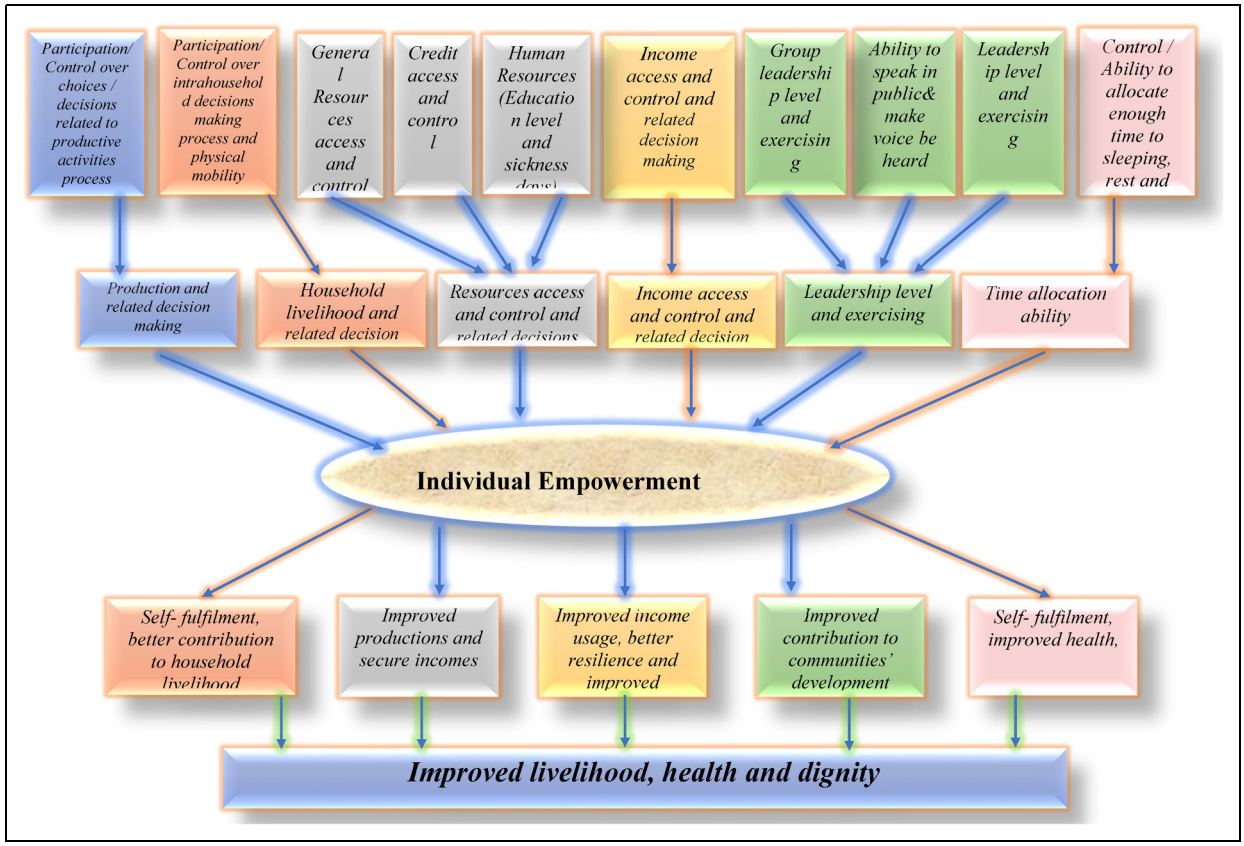

Figure 1. Graphical illustration of the dimensions of the IEI_i.

municipalities were selected in Benin against eleven in Togo based on their potentiality in inland valleys and their smart-valley introduction status. Villages were randomly selected from the list of lowland rice producing villages in each municipality. Both Smart-valleys (villages where Smart-valleys technology was introduced) and non-Smart-valleys villages were selected. In total, 53 villages were selected and investigated in Benin against 50 in Togo. Among these villages, 13 in Benin were Smart-valleys villages against 19 in Togo. In each village, 20 lowland rice farmers were selected from each Smart-valleys village against 10 from each of the non-Smart-valleys village in Benin while 12 lowland rice farmers were selected from each Smart-valleys village against 10 from each of the non-Smart-valleys villages in Togo. To consider the sex composition of the lowland farmers in the global sample, each village list was split into two: male lowland farmers list and female lowland farmers list. The proportions of male and female farmers were calculated at village level and were applied to the number of farmers to be sampled in each village to determine the number of men and women to be sampled in each village. In total, 660 lowland rice farmers were selected in Benin and 588 in Togo. After the data collection and cleaning, data from 1120 lowland farmers were finally used for data analysis with 610 and 510 in Benin and Togo, respectively.

Data used were collected through a Computer Based Personal Interviews (CAPI) approach using Census and Survey Processing System (CSPro) to create the data entry application. Tablets were used to collect the data on the field (See Appendix 1 for the questionnaire).

Results

Table 1 presents the estimated individual empowerment index IEI_i and its domains empowerment indicators over sex, age, marital status, household headship, origin, Smart-valleys technology adoption status, country, and regions. Globally, the estimated IEI_i for West Africa varied from 0.28 to 0.92 with an average of 0.71. This means that lowland rice farmers achieved 71% of their full empowerment potential with higher power and ability for males to control over their own lives and futures. The average disempowerment score of 29% shows that farmers can still increase their power and improve their ability to make strategic and life choices for their future. Only 40% of them were globally empowered. The global empowerment index and status vary over sex, age, marital status, household headship, origin, Smart-valleys technology adoption status, country and regions. The *GPG* is equal to 0.07 indicating that male farmers have on average higher control over resources and their own lives and futures. Adults have higher control than youths, household heads than non-household heads, village natives than non-natives, farmers from Benin than farmers from Togo and farmers from central regions than farmers from southern regions and those from northern regions. The same

Table 1. IEI and domain indicators over key sociodemographic factors and adoption status.

Parameters	ALL	SEX		AGE		MARRIED		HH. HEADSHIP		ORIGIN		SV. ADOPTION		COUNTRY		REGION		
		F	M	Y	A	NM	M	NH	H	NN	N	NA	A	BENIN	TOGO	S	C	N
IEI_i	0.71	0.67***	0.74	0.69***	0.71	0.71	0.71	0.65***	0.74	0.67***	0.71	0.70	0.71	0.72***	0.69	0.69***	0.73	0.69
EIEI	40	22***	54	30***	43	42	40	12***	56	29**	42	39	43	44***	35	38***	49	31
PES_i	0.85	0.84***	0.87	0.85	0.85	0.87*	0.85	0.82***	0.87	0.83**	0.86	0.85**	0.87	0.87***	0.84	0.87***	0.87	0.82
EPES	0.77	68***	83	75	77	81	76	64***	84	71	78	76	78	77	76	83***	80	66
$HLES_i$	0.69	0.67*	0.71	0.67	0.70	0.66	0.70	0.64***	0.72	0.56***	0.71	0.70	0.69	0.78***	0.59	0.62***	0.76	0.68
EHLES	51	40***	59	44**	53	55	50	30***	62	34***	53	50	52	57***	44	46***	62	41
RES_i	0.68	0.61***	0.74	0.69	0.68	0.74***	0.68	0.59***	0.74	0.67	0.69	0.68	0.68	0.66***	0.71	0.68	0.69	0.67
ERES	16	05***	25	22**	14	26**	15	04***	23	12	17	16	17	13***	21	15	17	18
IES_i	0.78	0.78	0.78	0.77	0.78	0.80	0.78	0.76**	0.79	0.76*	0.78	0.79***	0.76	0.80***	0.75	0.77	0.78	0.78
EIES	47	45	49	45	47	57*	45	41**	50	37*	48	48	44	52***	40	47**	42	53
LES_i	0.56	0.53**	0.58	0.48***	0.58	0.53	0.56	0.50***	0.59	0.51*	0.57	0.54***	0.62	0.60***	0.51	0.53***	0.62	0.51
ELES	47	45	49	45	47	57*	45	41**	50	37*	48	48	44	52***	40	47**	42	53
$TAES_i$	0.67	0.59***	0.74	0.67	0.67	0.67	0.67	0.59***	0.72	0.68	0.67	0.67	0.68	0.64***	0.71	0.67	0.68	0.67
ETAES	81	61***	96	82	80	77	81	63***	90	82	81	80	83	76***	86	80	83	78

*$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$. Source: AfricaRice/LADyD-FSA, ETES RICE Survey, Benin and Togo, 2019.
F = Female; M = Male; Y = Youth, A = Adults; NM = Non-married; M = Married; NHH = Non-household head; HH = Household head; NVM = Non- village native; VN = Village native; SVNA = Smart-Valleys non-adopters; SVA = Smart-Valleys adopters; S = South; C = Central; N = Northern.

trends were observed for the proportion of groups who were globally empowered (Table 1). This reveals that household headship, sex, origin and age are key factors influencing individual empowerment. The proportion of male empowered farmers was more than twice the one of empowered female farmers.

Moreover, throughout all the domains, women are less empowered. Figures 2 shows that 26% of farmers were not involved in all the six empowerment domains. Also, 19% of women against 48% of men were empowered in more than three domains (Figure 3) with only less than 1% of female against 6% of male empowered in all the six domains. On average, farmers were empowered in three domains with higher number for men (Figure 4). Concerning the empowerment domain indicators, farmers were more empowered in the production domain, followed by income, household livelihood, resources and time allocation domains. The leadership domain is the one in which lowland rice farmers were relatively less empowered. Apart from income domain where there was no significant difference, male farmers got higher empowerment scores than female farmers in all the other empowerment domains. It was also the case for the percentages of empowered farmers in each domain. Household headship, sex, origin and age were also found to be key factors influencing domain indicators.

Figure 5 reveals that time allocation domain (21%) contributed the most in farmers empowerment index than the other domains. This means that lowland farmers had greater power and ability to allocate enough time during the day for sleeping, rest and leisure. This domain was followed by the production, income, household livelihood and resources domains. The leadership domain contributed the less to the empowerment index. These results indicate the priority domains in which actions should be undertaken to improve lowland farmers empowerment: leadership, resources, household livelihood, income, production and time allocation. Regarding the domain empowerment status, the highest empowered percentage was obtained in time allocation domain. Some disparities were also noted in both the global empowerment index and empowerment status over sex, age, marital status, household headship, origin, Smart-valleys adoption status, country, and region. For instance, in all the domains, more male farmers were empowered than female farmers. The highest domain gender parity gap was obtained in time allocation domain (35%) while the lowest gender domain parity gap was obtained in income domain (4%).

Discussions

Empowerment of disadvantaged and marginalized people including women, youths and people living in poverty is a key factor to a peaceful, just, equitable and prosperous world. Accurate ways to measure empowerment have been a key subject for many researchers in gender equality and poverty area. Much attention has rightly been paid to the development of women empowerment measurement in a specific area because women are often identified as

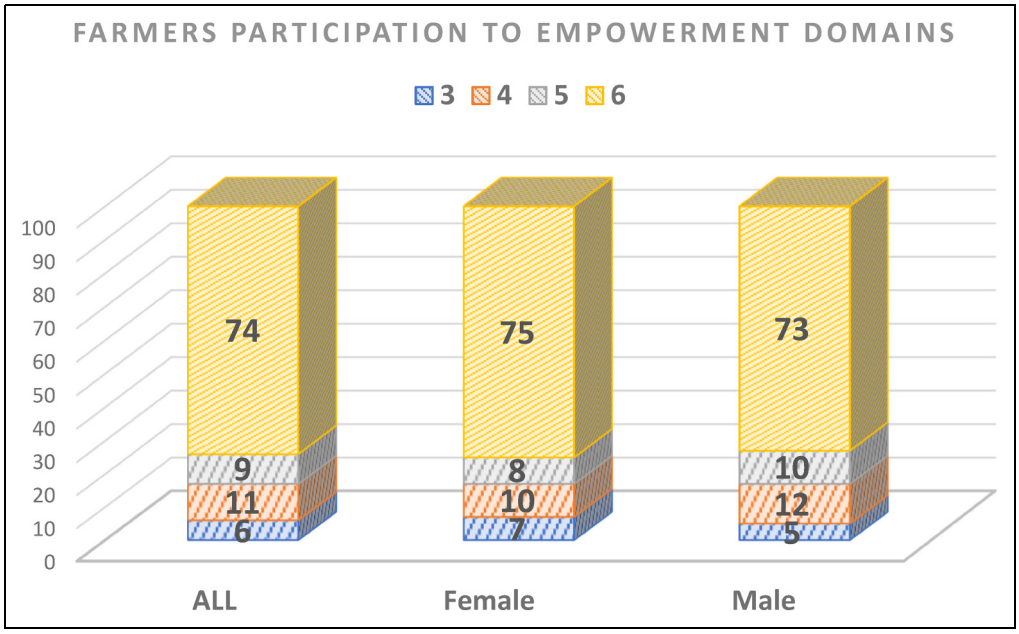

Figure 2. Distribution of farmers over number of domains to which farmers participated and sex. *Source: AfricaRice/LADyD-FSA, ETES RICE Survey, Benin and Togo, 2019.*

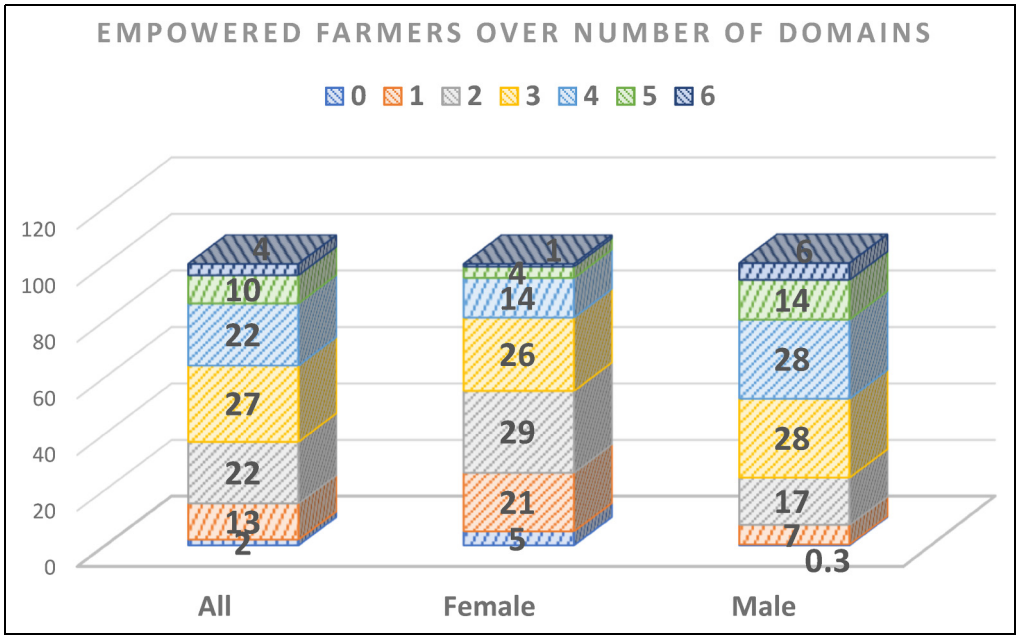

Figure 3. Distribution of farmers over number of domains in which farmers are empowered over sex.

the most marginalized people (Alkire et al., 2013; Ewerling et al., 2020; Galiè et al., 2019; Hunger Project, 2015; Lombardini et al., 2017; Malapit et al., 2019; Markel, 2014; Rettig et al., 2020). However, apart from the raising interest in gender intersections, many programs and projects are increasingly interested in measuring the empowerment of other disadvantaged groups such as youths (male and female or female compared to male), poor (male and female or female compared to male), migrants, etc.; and in assessing the impact of a given technology on the adopters empowerment (male, female, or other groups). The IEI approach presented in this paper responds to these needs with a more global, but individual empowerment measurement tool. IEI measures the level of power and ability of any individual to have access to and control over resources and make strategic and life choices. It is an individual parameter because i) the survey unit from which IEI data are collected is the individual actor, not necessary the household head or necessary two primary adult of a household; ii) all the questions in the questionnaire used to estimate IEI are formulated for the individual actor which has to answer them based on his own relationship and interaction with his

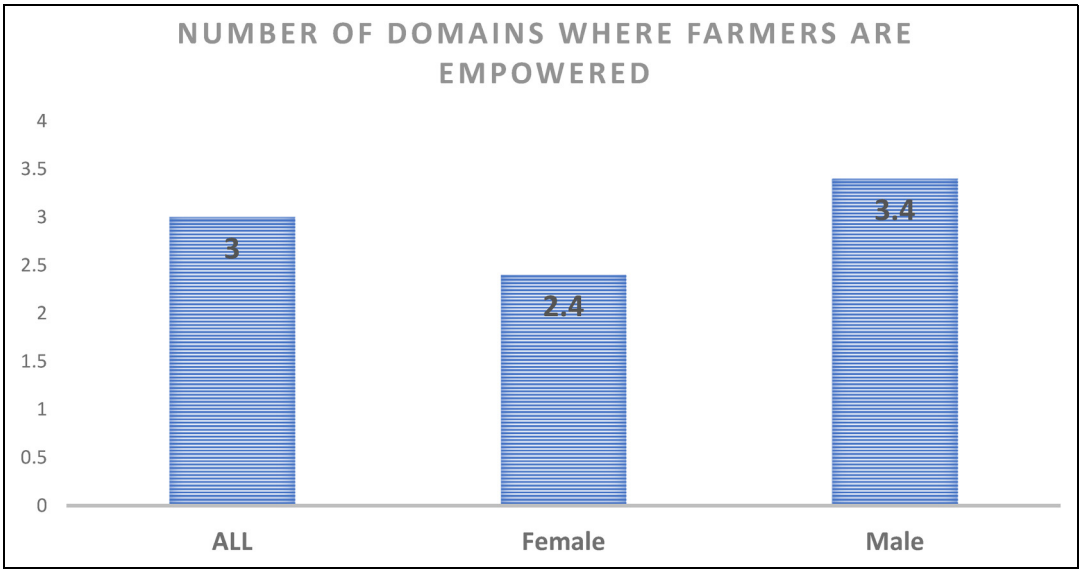

Figure 4. Number of domains to which farmers participated over sex.

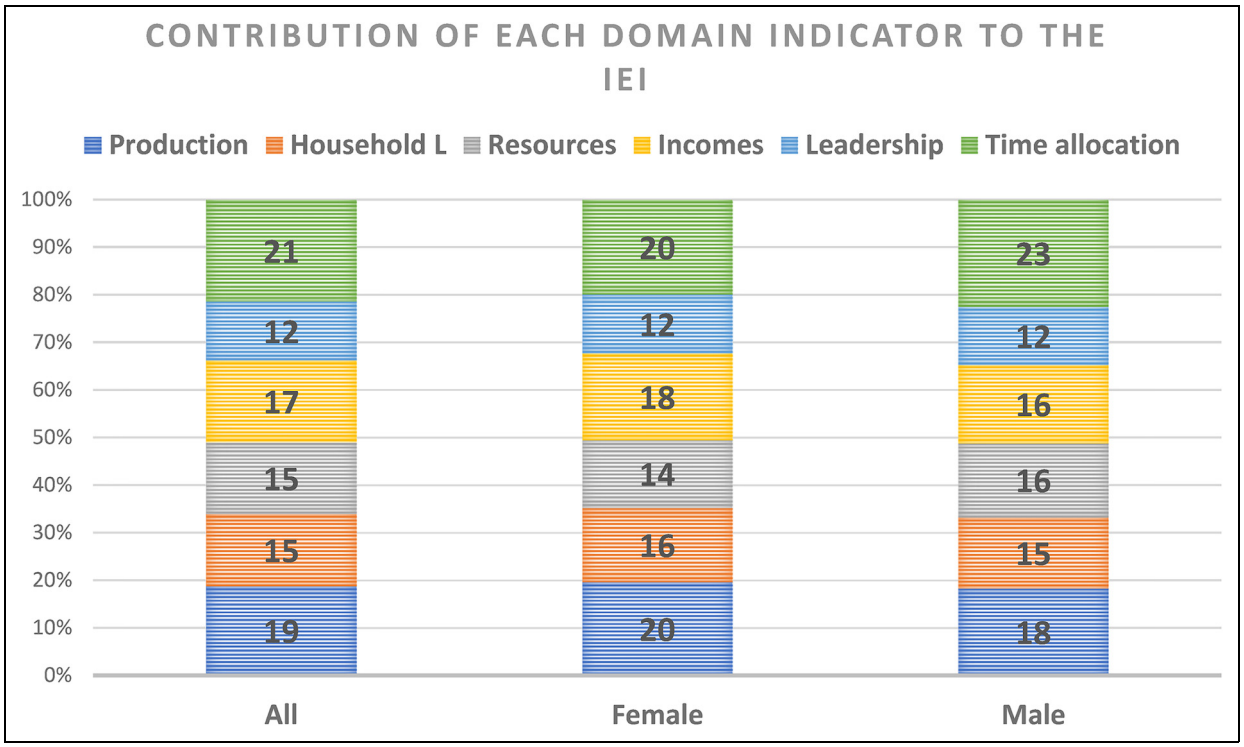

Figure 5. Contribution of each domain indicator to the IEI.

environment (household, groups, community, etc.); iii) the Kabeer empowerment conceptual framework is first of all an individual level framework; iv) the IEI estimates are for the individual actor, and two members of a given household will have different value of IEI based on the personal power and ability of each of them to control over his/her own life and future. However, it can be measured for any group of any sector and encompasses six key empowerment domains with its specificity of the intrahousehold and household livelihood decision-making domain. IEI is a flexible, survey-based and multidimensional method to measure individual empowerment which can be generated at individual, households, community or national levels, or for any social group. It is constructed using an appropriate methodology based on simple or weighted mean with a scale survey questionnaire. The IEI is strongly recommended for monitoring and evaluation, and impact assessment specialists of programs and projects aiming to

improve disadvantaged people livelihoods. For instance, in the empirical case of adoption of Smart-Valleys adoption, a deeper investigation reveals that the production and income domains are empowering but leisure is disempowering. Another key advantage of the IEI is that different household members (even husband and wife) can have different IEI and status. This specificity is in the same line with the heterogeneity of households raised by many researchers (Doss, 1999; Uttaro, 2002). The estimates of IEI and the comparison between the estimates within female group (Women Individual Empowerment Index – WIEI) and other women empowerment indexes estimates show reasonable correspondence despites the difference in the methodology. For instance, the WIEI estimates for West Africa is smaller than the WEAI scores estimated in West Africa (Ghana = 0.71, Liberia = 0.69), in East Africa (Kenya = 0.81, Uganda = 0.92; Rwanda = 0.96), in Southern Africa (Zambia = 0.89; Malawi = 0.91), in Latin America and Caribbean (Honduras = 0.75; Haiti = 0.85) and in Asia (Tajikistan = 0.69, Nepal = 0.80 and Cambodia = 0.98) (Malapit et al., 2014). In opposite, the WIEI estimated is greater than the WEAI estimated in Bangladesh (0.66) and the pro-WEAI estimated based on a combined data from many countries (0.59) (Malapit et al., 2019). These results can hold for the validity of the IEI approach in measuring not only women empowerment index, but also the empowerment index of any other target group. Nonetheless, further research should be carried out in other countries and other economic sectors to confirm the robustness of the new tool. Despite the proven advantages of the IEI, some limitations can be raised: the year-basis stylized question method used in time allocation data collection allowed to cover effectively all the four categories of activities, however the probing approach used to minimize the data inaccuracy was time consuming. Moreover, incorporating some other dimensions related to physical mobility, respect and mutual consideration inside households, self-efficacy and attitudes about domestic violence could improve IEI estimates, mainly the outcomes on the personal changes.

Conclusion

The paper presents a new empowerment measurement tool, the IEI. IEI is an individual empowerment tool which can be applied to any disadvantaged group, women, youths (male or female), poor, etc. or any economic sector. Women empowerment indicator or youths' empowerment indicator can be generated from the IEI. It is a continuous variable comprised between 0 and 1 and is more suitable for rigorous impact assessment studies. The IEI is based on the Kabeer conceptual empowerment framework and combines individual empowerment score in six empowerment domains: Production, Household livelihood, Resources, Income, Leadership and Time Allocation. Unlike some tools, IEI incorporates the intrahousehold decision-making power relation related to household livelihood.

IEI is based on a specific methodology starting from questionnaire design. The survey unit is the individual actor, including non-married actors. The questionnaire is designed in such a way that all the possible values taken by the corresponding variables to the questions are ordinal variables so that higher values necessary mean higher empowerment scores. Moreover, the construction of the empowerment domains indicators, apart from time allocation, is based on a general five main steps. After the construction of all the six domain indicators, the IEI and status are finally generated with related other indicators. EIEI indicates whether the individual or the group is empowered or not.

Evidence from West Africa shows that lowland rice farmers globally achieved on average 71% of their full empowerment potential with a disempowerment score of 29%. Female rice farmers had higher disempowerment score than male farmers. IEI_i as well as domain indicators vary over sex, age, marital status, household headship, origin, Smart-valleys technology adoption status, country and regions. Farmers still have the possibility globally to increase their power and improve their ability to make strategic and life choices for their future.

Further improvement of the IEI can consider incorporating these empowerment dimensions and improvement of time allocation data collection method to ensure not only the effective collection of data on the four categories of activities, but also the data accuracy due to respondents' fatigue. The time use combination approach suggested by Seymour et al. (2020) can be also explored.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. These composite parameters include the Women Empowerment in Agriculture Index (WEAI) jointly developed by the United States Agency for International Development (USAID), the International Food Policy Research Institute (IFPRI), and the Oxford Poverty and Human Development Initiative (OPHI) in 2012 (Alkire et al., 2013), the Women Empowerment Index in Rice-based Agriculture (WEIRA) developed by the International Rice Research Institute, the Women Economic Empowerment (WEE) developed by the Donor Committee for Enterprise Development (DCED) (Markel, 2014), the Women Empowerment Index (WEI) developed by the Hunger Project (Hunger Project, 2015), the Women Empowerment Index (WEI) developed by Oxfam in 2017 (Lombardini et al., 2017), the Women's Empowerment in Livestock Index (WELI) developed by the International Livestock Research Institute (ILRI) and Emory University (Galiè et al., 2019), the Economic Empowerment Index for the Young and Adolescents (EEIYA) developed by Jonathan Kaminski (2018), the project-level Women's Empowerment in Agriculture Index (pro-WEAI) developed by Malapit et al. (2019), the Women's Empowerment in Nutrition Index (WENI) developed by Narayanan et al. (2019), the Women Empowerment Index (WEI) developed by the Kenya National Bureau of Statistics (2020), the Survey-based Women's Empowerment indicator (SWPER Global) developed by Ewerling et al. (2020) and the Female Empowerment Index (FEMI) developed by Rettig et al. (2020).

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