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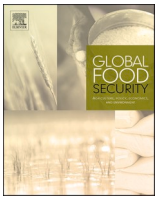

Gender-inclusive, -responsive, and -transformative agricultural insurance: A literature review

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ABSTRACT

In many low-income countries, agricultural producers face significant climate-related risks that undermine the resilience of their production and food supply systems. Agricultural insurance can help mitigate some of these risks, enabling farmers to increase farm investments, incomes, and food and nutritional security. This paper conducts a literature review to evaluate the extent to which agricultural insurance is gender-inclusive and gender-responsive (i.e., reaches and benefits both women and men), and whether there is potential for such insurance to empower women or even become gender-transformative. We find that existing agricultural insurance products are designed and delivered in ways that limit reach and benefits of insurance for women. Empirical research has focused less on the question whether insurance empowers women, let alone whether it has a transformative effect by changing institutional norms that perpetuate gender inequities. We present a case study of a crop insurance program in Kenya to discuss how agricultural insurance, if adequately designed, can have stronger impacts on gender-related outcomes. Empirically testing these approaches to agricultural insurance design is a key priority for future research.

1. Introduction

Women farmers across the world face a host of social, institutional, and economic constraints that increase their vulnerability to climate-related production and income shocks. Compared to men, women tend to own and control fewer productive assets such as land and livestock (Quisumbing et al., 2015; Doss et al., 2020), limiting opportunities to diversify risks and cope with shocks. There also exist systematic gender biases in parental allocation of intra-household resources such as spending on education (Behrman, 1997) , which constrain women's economic opportunities later in life and thus their ability to undertake investments that could help cope with climate risks. Moreover, women carry out more unpaid domestic and caregiving work than men (FAO, 2010; Ferrant et al., 2014; Dinkelman and Ngai, 2022), reducing their time to engage in paid labor work and access climate risk-mitigation services.

This disproportionate vulnerability to climate risks reduces women's long-term agricultural productivity and exposes them to heightened risks of food and nutritional insecurities. Although informal mutual assistance groups can help households manage idiosyncratic risks (di Falco and Bulte, 2013), such arrangements do not function effectively for covariate climatic shocks that affect all community members at the same time. Instead, the rural poor resort to costly coping strategies such as limiting food consumption and reducing dietary diversity (Alderman and Haque, 2007), or selling productive assets and personal valuables, which are an important store of value for women and may contribute to their bargaining power within the marriage (Quisumbing and Maluccio, 2003). Given women's lower bargaining power and asset ownership, their limited access to finance, and the burden of domestic work, they are more likely to resort to, and be harmed by, these coping strategies (Mehar et al., 2016).

Agricultural insurance has been promoted as a promising tool to help poor rural households cope with covariate risks related to climate uncertainties and thereby improve food security (Hazell 1992; Mahul and Stutley, 2010). Financial protection provided by insurance enables farming households to invest more in their farms, thereby increasing their agricultural productivity, and food and nutritional security (Karlan et al., 2014; Cole et al., 2017; Jensen and Barrett, 2016). Households that use agricultural insurance are also less likely to use detrimental coping strategies (Janzen and Carter, 2019). However, there is evidence that in the long-term, agricultural insurance might not deliver the desired welfare gains for all farmers (Binswanger-Mkhize, 2012;

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Tobacman et al., 2017), for instance due to basis risk, which arises from an imperfect correlation between the insurance indices and actual individual losses (Clarke, et al. 2016; Jensen et al., 2016). Agricultural insurance might also inadvertently result in undesired outcomes such as price and market distortions, negative environmental externalities, crowding-out of informal risk-sharing mechanisms, and changes in farm labor demand, which can jeopardize its long-term effectiveness as a risk-coping strategy (Habtemariam et al., 2021).

Access to agricultural insurance and the distribution of its benefits are likely to vary between men and women, given their varying degrees of risk exposure and subsequent coping capacities. As an increasing number of agricultural insurance products are morphing into the commercialization and scale-up phase, understanding the gender dimensions of insurance is important in designing high-quality products that are accessible and beneficial to both men and women, and in ensuring that neither gender is harmed by the negative outcomes. To that end, this paper focuses on evaluating the potential gender-related impacts associated with the introduction and scaling of agricultural insurance. To review existing agricultural insurance literature, the study employs a framework of analyzing gender-related outcomes of agricultural development projects proposed by Johnson et al. (2018) and later extended by Quisumbing et al. (2022). This framework considers four types of outcomes: reach, benefit, empower, and transform (RBET). We also apply this RBET framework to analyze the gender dimensions of a crop insurance program in Kenya to illustrate how insurance programs can be designed to have stronger gender-related outcomes, and to identify ways of designing and marketing a next generation of more impactful insurance products.

The review finds that although there exists a handful of research on gender and agricultural insurance, most of these studies focus on insurance reach (being gender-inclusive) and the distribution of insurance benefits (being gender-responsive). Less attention has been paid to understanding the role of agricultural insurance in promoting women's empowerment, and its role in transforming societal and institutional gender relations. The studies show that the basic design and delivery mechanisms of the existing agricultural insurance products limit uptake among women and their ability to benefit from the products. We show that insurance programs can reach more women by addressing both demand- and supply-side constraints to insurance uptake, for instance through employing gender-inclusive insurance education and extension mechanisms. We also argue that the provision of quality products that offer a wide range of risk coverage, bundling insurance with complementary risk management strategies, and monitoring long-term impacts at the individual level, are gender-responsive strategies to help women and men benefit equally from agricultural insurance programs. Further, based on the case study of an insurance program in Kenya, we provide examples of how insurance can support women's empowerment, including: i) when insurance supports farmers to open and manage personal mobile money accounts, ii) when contracts purchased by women are registered under their names (not their spouses) and payouts are subsequently paid to the policyholders, and iii) when insurance is bundled with advisories on time-saving technologies and practices. Finally, we describe how insurance can even be gender-transformative by changing gender norms, which could be the case if bundled with intentional norms interventions targeting both women and men.

The remainder of the paper is structured as follows. First, section 2 provides a framework for evaluating the gender impacts of agricultural development programs. Section 3 provides an application of the reach, benefit, empower and transform (RBET) framework to evaluate gender-related outcomes associated with agricultural insurance programs. Section 4 uses a case study from ACRE Africa, a crop insurance provider in Kenya to demonstrate how agricultural insurance programs can be designed to promote women's empowerment and be delivered in a more gender-transformative manner, and finally, section 5 concludes with a discussion of our findings.

2. Conceptual framework for evaluating the gender dimensions of agricultural insurance

Fig. 1 provides an overview of how gender intersects with agricultural insurance, and how it links with household food security, based on the RBET framework. The framework proposes four distinct approaches to achieving and evaluating gender impacts, each with its own indicators to monitor and evaluate these outcomes and impacts, focusing on: *reach* (through gender-inclusive approaches that involve more women in program activities); *benefit* (through gender-responsive approaches that are more likely to directly increase women's well-being); *empower* (through activities that can strengthen women's ability to make life choices and put them into action), and *transform* (using approaches aiming to change gender norms and systems on a larger scale). Achieving equality in each of these gender-component can contribute to improved food security—that is, adequate on-farm food availability, improved food purchasing power, food diversity, improved nutrition, and food safety—among men and women.

The *reach* or *gender-inclusion* component entails including women as participants in program activities and tracking their progress over time using predetermined indicators such as access to extension and training materials and understanding of the program content. In the context of agricultural insurance, this will include approaches to ensure products are available to both men and women, with adequate reach for both genders, and that both men and women perceive the products to be of value (see Fig. 1). This will require equality in terms of men's and women's awareness of the possibility and ways to enroll in insurance. Equality in access to affordable and quality insurance products can help eliminate gender gaps in actual enrollment into insurance schemes. However, reaching women is not always sufficient for gender inclusion. Theis and Meinzen-Dick (2016) show that while counting and facilitating women's participation is important, programs that only record the number of female participants may miss important intrahousehold and community dynamics that might still prevent women from participating. For instance, if a program increases women's workload and time poverty, it might undermine their future participation in the program activities.

The *benefit* or *gender-responsive* component of this framework argues that the project design, implementation, and evaluation should be focused on ensuring that whatever outcomes the project is seeking are captured and valued by both men and women and that a program does not harm either of them. This requires considering both women's and men's needs and constraints in the design, development, and implementation of program activities, and closely tracking benefits at the individual level through monitoring and evaluation. In the context of agricultural insurance, a gender-responsive program will employ mechanisms that ensure that both men and women benefit equally from insurance. *Ex ante*, benefits will include reduced risk exposure, which may lead to increased technology adoption (such as the use of improved seeds, fertilizers, and other inputs), increased access to credit, helping farmers to grow crops at a larger scale, and expand their production, ultimately leading to increased incomes (see Fig. 1). *Ex post*, insurance payouts for farmers experiencing financial hardship due to extreme weather events will help avoid costly coping strategies such as selling off productive assets, limiting food intake, or underinvesting in subsequent seasons.

The benefits of agricultural development programs are however not sustainable for women without increasing their decision-making and bargaining power within the household and transforming the societal and institutional norms that perpetuate the gender inequities (Quisumbing et al. 2013, 2022). When agricultural insurance increases farm productivity and incomes, it can improve an individual's bargaining power and give women a voice to participate in the household decision-making process, as shown in Fig. 1. However, when program benefits are skewed towards women, it may also trigger backlash and cases of gender-based violence from men (Goodman and Kaplan, 2017).

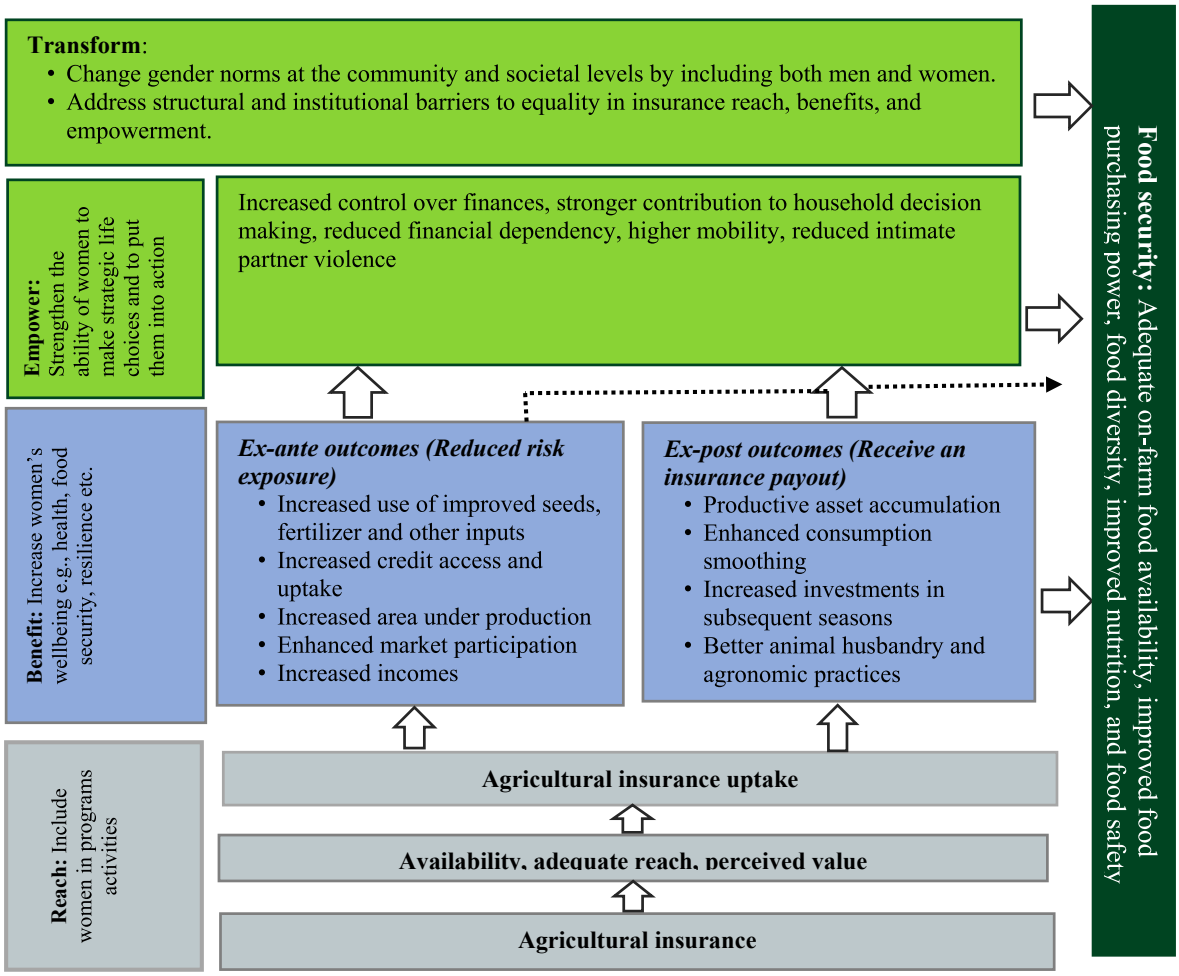

Fig. 1. Conceptual link between agricultural insurance, RBET framework, and food security.

Theis and Meinzen-Dick (2016) show that projects that increase women's bargaining power and change underlying power balances between men and women are less prone to such a backlash. The *empowerment* approach therefore entails strengthening an individual's ability to make strategic life choices (including financial decisions, expenditures, and investments) in a context where this ability was previously denied. Empowering goes beyond reaching and benefiting women, but instead, focuses on increasing women's agency and changing gender norms and attitudes among participants or program beneficiaries, in order to strengthen women's ability to make life choices and put them into action.

Finally, it is important to recognize that agricultural insurance does not operate in a vacuum. There exists a set of formal and informal institutions (such as government policies, individual and institutional practices, and social norms) that govern its operations among providers and users. In some cases, these institutional arrangements might exacerbate power inequities between different genders. Gender-transformative approaches (*transform*) seek to address existing gender inequities by examining, challenging, and changing unequal power relations that are enforced by regulatory frameworks, social norms, attitudes, behaviors, and social systems. By doing so, gender-transformative approaches depart from the notion that gender defines what women and men can have, do, or be (Njuki et al., 2019). Martinez and Wu (2009) and Morgan (2014) highlight three dimensions of outcomes related to gender-transformative approaches: i) changes in individual or collective empowerment; (ii) changes in intrahousehold and external relationships; and (iii) changes in the regulatory systems that determine gender relations. By changing the structures and institutions that contribute to and perpetuate gender inequities, such approaches can remove fundamental barriers to participating in or benefiting from a program, and contribute to women's empowerment, meaning that gender-transformative approaches will have a wider and longer-lasting effect than gender-inclusive, gender-responsive, or women's empowerment approaches can have on their own.

3. Gender dimensions of agricultural insurance

This section employs the framework illustrated in Fig. 1 to document gender inequalities in the reach and benefits derived from agricultural insurance. We also discuss mechanisms through which insurance can empower women or even transform gender relations. A literature search was performed to identify the relevant published and unpublished articles that directly analyze agricultural insurance reach and benefits, focusing on studies that analyze these aspects at either household level or differentiated by gender within the household. Given the limited literature on agricultural insurance and women's empowerment and gender transformation, we supplement our literature review with relevant articles on the topics. Reference lists of cited articles were also reviewed to identify further relevant studies. Table 1 identifies the relevant agricultural insurance studies included in this section. For each study, the table indicates whether it provides gender-disaggregated findings related to the reach, benefit, empower, and transform components of the RBET framework. We distinguish between studies that focus on crop insurance and those that focus on livestock insurance (Column 3), given that gender dynamics are likely context-specific, and given that pooling these studies could mask subtle differences in the gender-related

Table 1
Reviewed agricultural insurance studies.

Study	Country of study	Type of insurance	Objective of the study	Addresses gender gaps in insurance			
				Reach	Benefit	Empower	Transform
Delavallade et al. (2015)	Senegal and Burkina Faso	Crop	The gendered uptake of insurance and savings products and their impacts on farm yields, and shock coping capacity	✔	✔	✖	✖
Clarke and Kumar (2016)	Bangladesh	Crop	The gendered willingness to pay for an index-based insurance product	✔	✖	✖	✖
Akter et al. (2016)	Bangladesh	Crop	Gender preferences for index insurance attributes and the differential uptake by men and women	✔	✔	✖	✖
Bageant and Barrett (2017)	Ethiopia	Livestock	Evaluates how gender differences in resource endowment, risk aversion, and information influence insurance uptake	✔	✖	✖	✖
Gine et al. (2008)	India	Crop	The role of social networks, basis risk, and risk-aversion on insurance uptake	✖	✖	✖	✖
Cole et al. (2014)	India	Crop	The role of insurance experience (via payouts) on subsequent insurance demand	✖	✖	✖	✖
Hill et al. (2016)	India	Crop	The role of basis risk, price, risk-aversion, and experience on insurance uptake	✖	✖	✖	✖
Fletschner and Kenney (2011)	Global theory		Evaluates strategies to enhance rural women's access and use of financial services	✔	✔	✖	✖
Casaburi and Willis (2018)	Kenya	Crop	Impact of delayed premium payment on insurance uptake	✖	✖	✖	✖
Belissa et al. (2019)	Ethiopia	Crop	The role of informal risk-sharing institutions and delayed payment in enhancing insurance uptake	✖	✖	✖	✖
Shee et al. (2019)	Kenya	Crop	Designing a rainfall-linked risk-contingent credit	✖	✖	✖	✖
Clarke (2016)	Bangladesh	Crop	The role of basis risk in index-based insurance demand	✖	✖	✖	✖
Cole et al. (2013)	India	Crop	The role of price and non-price factors in agricultural insurance adoption	✖	✖	✖	✖
Karlan et al. (2014)	Ghana	Crop	Effect of liquidity and price on insurance demand and the subsequent impacts of insurance on agricultural investment and farmer risk-taking capacity	✖	✖	✖	✖
Cai (2016)	China	Crop	The impact of insurance on household production, borrowing and savings behavior	✖	✖	✖	✖
Jensen et al. (2017)	Kenya	Livestock	Conducts a comparative analysis of the differences in impacts of cash transfers and index insurance	✖	✖	✖	✖
Hobbs (2020)	Kenya	Livestock	Evaluates the distribution of index insurance benefits within the household	✔	✔	✖	✖
Hill et al. (2019)	Bangladesh	Crop	The role of price, risk and ambiguity aversion, time preference, and basis risk on insurance demand, and the effects of insurance of farm investment, yield and area under cultivation.	✖	✖	✖	✖
Tafere et al. (2019)	Ethiopia	Livestock	The effect of index-based insurance on household subjective wellbeing	✖	✖	✖	✖
Timu et al. (2022)	Ethiopia	Livestock	The gendered index-based insurance uptake and its effect on household food consumption	✔	✔	✖	✖
Janzen and Carter (2019)	Kenya	Livestock	The heterogenous impacts of index-based insurance on household choice of coping strategies	✖	✖	✖	✖
Matsuda et al. (2019)	Kenya	Livestock	The heterogenous direct and indirect impacts of index-based insurance on various welfare outcomes	✖	✖	✖	✖
Bulte and Haagsma (2021)	Global theory	Livestock	Develop a theoretical model to demonstrate the effect of livestock insurance on use of communal lands	✖	✖	✖	✖
Möhring et al. (2020)	France, Switzerland	Crop	The relationship between insurance uptake, land use and pesticide use decision by farmers	✖	✖	✖	✖
Weber et al. (2016)	USA	Crop	Effect of insurance subsidies on land, fertilizer and agrochemical use (environmental externalities)	✖	✖	✖	✖
Dercon et al., 2014	Ethiopia	Crop	The complementarity between index insurance and informal risk-sharing mechanisms, and the effect of training on insurance uptake	✔	✖	✖	✖
Clarke et al. (2015)	Bangladesh	Crop	Farmers' demand for a suite of insurance products covering various risks as opposed to stand-alone index insurance product and substitution between savings and insurance	✔	✔	✖	✖
Farrin and Miranda (2015)	Malawi	Crop	Evaluates the impacts of index insurance on credit performance and technology adoption	✖	✖	✖	✖
Boucher and Matthieu, 2014	Global theory	Crop	The relationship between formal agricultural insurance and informal risk-sharing mechanisms	✖	✖	✖	✖
Ceballos and Robles (2020)	Uruguay	Crop	The effects of offering heterogeneous insurance products covering various risks on farmer uptake decisions	✖	✖	✖	✖

outcomes of the two insurance types.

3.1. Agricultural insurance reach

The reach of agricultural insurance is the most studied gender gap in the literature that we reviewed, as it is discussed by all eight reviewed articles that have a gender dimension to it (Table 1). Overall, insufficient insurance demand among men and women is an important deterrent to the development of insurance markets, as evidenced by many failed attempts at scaling non-subsidized insurance to date (Kramer et al., 2022a). The reviewed literature however highlights gender-based disparities in reach and the subsequent demand of agricultural insurance products. For instance, field experiments conducted in Senegal and Burkina Faso show that crop insurance demand is much stronger among men than women (Delavallade et al., 2015). Similar results were obtained through experiments in southern Asia (Clarke and Kumar, 2016; Akter et al., 2016). In Ethiopia, findings from a livestock insurance program shows that although men and women had equal access to the

product, women were likely to purchase lower-value coverage (Bageant and Barrett, 2017). The low access and usage of agricultural insurance is attributed to demand-side problems, and others to challenges in developing and supplying gender-inclusive insurance products. We discuss these challenges, the gender dimensions of the challenges, and potential solutions below.

Lack of liquidity is one of the most important barriers to the take-up of insurance and thus its use as a risk coping tool among men and women (Gine et al., 2008; Cole et al., 2014; Hill et al., 2016). Lack of liquidity is expected to be more constraining for women given their lower ownership of and control over assets, and their more limited access to both formal and informal financial services relative to men (Quisumbing and Maluccio, 2003; Fletschner and Kenney, 2011). Recent research has evaluated ways to address liquidity challenges. For instance, a delayed payment system that allows farmers to pay their insurance premiums at the end of the insurance cycle has been shown to help overcome liquidity-related challenges, with the added benefit that it helps build farmers' trust (Casaburi and Willis, 2018; Belissa et al., 2019). This model however requires strong institutional structures where farmers can be held accountable to pay their premiums on credit, which is the case in contract farming schemes whereby premiums can be deducted from a farmer's earnings. Another option would be to bundle insurance with loans, as is done in India's national crop insurance scheme and in pilots of risk contingent credit in Kenya (Shee et al., 2019).

Education and financial literacy challenges are another potential cause of gender gaps in uptake. Studies on populations targeted by agricultural insurance schemes have found that compared to male beneficiaries, female beneficiaries have lower educational and financial literacy levels (Clarke and Kumar, 2016; Hill et al., 2016; Bageant and Barrett, 2017), making it potentially more difficult to understand complicated insurance contract designs and compensation mechanisms inherent to agricultural insurance. Behavioral field experiments have also found that women, on average, tend to have higher degrees of risk aversion and that they make less risky choices than men (Eckel and Grossman, 2008; Clarke and Kumar, 2016; Bageant and Barrett, 2017). This could increase demand for insurance in a context where insurance contracts provide adequate coverage and insurers can be trusted to pay out when they are contractually required to pay. However, risk aversion is associated with reduced demand when there is basis risk or a perceived risk of contract failure (Clarke, 2016). Further, since agricultural insurance products are targeted at clients with little to no prior experience with insurance, consumer trust becomes an important aspect in insurance purchase decisions (Cole et al., 2013; Jensen and Barrett, 2017). Even for a given level of risk aversion, a lack of trust could significantly reduce women's take-up of agricultural insurance if they are less likely than men to trust others when making financial decisions, as is the case in Buchan et al. (2008) and Akter et al. (2016).

The level of insurance coverage is also a major barrier to insurance uptake. Compared to men, women face heightened levels of health risks related to their reproductive roles, and health risks for women farmers who are pregnant can get worse due to an increased exposure to heat stress as global temperatures rise (Spencer et al., 2022). In addition, extreme climate events enhance shortage of essential natural resources like water and firewood, which increases women's domestic workload (Dinkelman and Ngai, 2022). Most agricultural insurance products however tend to cover climate risks associated with farm production (that is, crop and livestock losses), leaving many risks uninsured. Such background risk may reduce investments in agriculture and demand for agricultural insurance (Mastenbroek and Kramer, 2022). An experiment conducted among livestock farmers in Kenya indeed shows that women bought significantly more insurance when its benefits were framed around household expenses than when they were framed around livestock (Hobbs, 2020).

Finally, the training and extension activities through which insurance is typically marketed are male dominated and use non-local trainers. Research from Ghana however shows that women farmers prefer to learn from community-based women extension officers (Hird-Younger and Simpson, 2013). In addition, most agricultural insurance providers offer a one-off single-day training which is likely to exclude time-constrained women who are involved in household production activities. Further, training sites can be more difficult to visit for women with limited access to transport or facing restrictive gender norms that prevent them from participating (Fletschner and Kenney, 2011).

Interestingly, the reviewed literature finds relatively similar gender gaps in the reach of both crop and livestock insurance, and reviewed papers on barriers associated with limited take-up are drawn from both the literature on crop and livestock insurance. This suggests that the two insurance types face similar challenges in reducing gender gaps in reach.

3.2. Agricultural insurance and distribution of benefits

Agricultural insurance products, like many other consumer products, come with both individual and social costs and benefits. On the one hand, several studies show evidence that when adopted at scale, both crop and livestock insurance can yield positive welfare outcomes. Studies in Ghana, China and Bangladesh have found that crop insurance helps farmers to increase investments in higher-risk yet also higher-yielding production technologies, such as improved seeds and other inputs that could increase farm productivity, revenues, and food security (Karlan et al., 2014; Cai 2016; Hill et al., 2019). Research in Kenya finds that providing pastoralists livestock insurance increases adoption of better animal husbandry practices and market partcipation (Jensen et al., 2017). Insurance can also crowd-in credit as households with asset or income insurance pose less risk to lenders (Alderman and Haque, 2007; Farrin and Miranda, 2015). Empirical evidence from a livestock insurance scheme further suggests that even without payouts, the peace of mind of having insurance coverage increases subjective well-being (Tafere et al., 2019).

However, of the eight reviewed studies that have a gender dimension, only five articles discuss gender gaps in the benefits of agricultural insurance (Table 1) and only two, on livestock insurance in Kenya (Hobbs, 2020; Timu et al., 2022), provides empirical evidence of the differential welfare impacts by gender. Few other studies evaluate the heterogeneous impacts of livestock insurance by household wealth (Janzen and Carter, 2019; Matsuda et al., 2019). So far, the findings on heterogeneous welfare assessments are mixed, but overall, it appears that both crop and livestock insurance can help women farmers manage climate-related production risks via increased agricultural productivity, incomes, food consumption, and asset accumulation. One main downside of the existing insurance gender-benefit studies is that they primarily focus on changes reported at the household level, but do not shed light on the distribution of welfare impacts within households. Given that most women live in male-headed households, between-household comparisons are likely misrepresenting insurance impacts on women.

On the other hand, insurance can result in inadvertent negative consequences on both the targeted and untargeted population. First, studies reveal that agricultural insurance access can induce moral hazard and the adoption of risky production practices, which might have negative effects on the environment. For example, farmers with access to insurance, particularly heavily subsidized products, might adopt environmentally risky behaviors such as overgrazing for livestock insurance (Bulte and Haagsma, 2021), and production on unsuitable land, and overuse of agrochemical inputs, for crop insurance (Weber et al., 2016; Möhring et al., 2020). These practices can have negative consequences on groundwater, biodiversity, and general human and livestock health. Although the gender dimensions of the distribution of these externalities are not explicitly documented, we expect women to be disproportionately affected because of their increased dependence on natural resources and biodiversity compared to men. Given their role in managing these resources, negative environmental externalities will also increase their workload, and the time spent on caring for family and livestock. In addition, OECD (2001) shows that the poor and women are generally

more likely to suffer from negative environmental externalities than men and richer farmers.

Second, formal insurance has the potential to crowd-out informal risk-sharing arrangements and risk coping mechanisms (Boucher and Matthieu, 2014; Will et al., 2021). This might be the case especially when insurance is offered at individual levels and the trigger levels are set in a way that a product triggers frequently, including during non-catastrophic weather shocks that informal risk-sharing arrangements could have managed by themselves. When this happens, women—who mostly rely on mutual assistance groups to manage agricultural risks but who are also more likely to be excluded from the formal insurance markets (Perez et al., 2015)—will be left with slimmer options to self-insure. This outcome ultimately increases exposure to risks, meaning that insurers would need to provide more comprehensive insurance coverage, which can further increase commercial loadings and premium rates.

A third concern is that access to agricultural insurance promotes the specialized production of cash crops and high-yielding livestock species at the expense of farm diversification, on-farm food diversity, and locally adapted varieties. Women are more likely than men to plant indigenous and locally adapted crop varieties, such as millet and sorghum in Africa (Nchanji et al., 2021). As such, an insurance-related loss in genetic diversity and long-term reduced ecological resilience is likely to affect women farmers more than their male counterparts. In addition, when farm production becomes commercially oriented, there is a possibility that men may come in and control the incomes from a crop that was previously controlled by women, thereby relegating women to the role of labor providers, reducing their say in how agricultural decision-making or in how proceeds from the sales of agricultural produce are being used (Quisumbing et al., 2015; Orr et al., 2016). Finally, farm specialization might result in a surplus supply of the insured commodity, which can in turn suppress the prices of the commodity (Habtemariam et al., 2021). Such price distortions can have more severe impacts on women farmers due to their limited market integration compared to men's (Baden 2013).

A priority for designing gender-responsive insurance products is understanding the differential risks faced by men and women crop and livestock farmers, designing the right insurance products to maximize benefits for each group, and ensuring that neither group is harmed by the potential negative outcomes. This might entail offering farmers a menu of insurance options for various risks as opposed to a homogenous standalone product that is targeted at a specific risk (Ceballos and Robles, 2020). Another strategy is bundling insurance with complementary risk management strategies such as improved seeds, fertilizer, or credit, but this is only gender-responsive if both women and men have equitable access to these types of solutions, which may not always be the case (see, e.g., Brearley and Kramer, 2020). Group-level insurance and fostering communication around the value of insurance as a mechanism to strengthen group functioning could also be a mechanism to increase insurance take-up, without individual group members free-riding on the informal support from their peers. The final approach is understanding how insurance costs and benefits are distributed among men and women; not just by comparing male- and female-headed households, but also by comparing outcomes within households. This can be achieved by collecting gender-disaggregated individual-level data and conducting holistic gender-based needs assessments, impact assessment studies, and long-term monitoring of impacts at individual levels and capturing broader insurance outcomes such as environmental externalities, price and market distortions, and change in labor demand.

3.3. Agricultural insurance and women's empowerment

Insurance can be a direct source of empowerment if it allows individuals to make strategic life choices (including financial decisions, expenditures, and investments) in a context where this ability was previously denied. Insurance can however be a source of disempowerment under given circumstances, for instance when it aggravates time poverty, when it increases the role that men play in agricultural production at the expense of women's decision-making power, or when it erodes informal risk-sharing mechanisms. The literature has neglected the question of whether agricultural insurance can be a source of women's empowerment; in our literature review, we did not find any published articles that discuss the (positive or negative) impacts of agricultural insurance on women's empowerment (Table 1).

This sub-section conceptualizes the potential impact of agricultural insurance on women's empowerment. We structure our discussion using domains and indicators from the recently developed project-level Women's Empowerment in Agriculture Index (pro-WEAI; Malapit et al., 2019). Pro-WEAI constitutes 10 empowerment indicators mapped to three domains: instrumental agency (power to), intrinsic agency (power within), and collective agency (power with). Instrumental agency has six indicators: input into productive decisions, ownership of land and other productive assets, control over the use of income, access to and decisions on financial services, work balance, and ability to visit important locations. Intrinsic agency has three indicators: autonomy in income, self-efficacy, and attitudes about intimate partner violence against women. Collective agency is measured through an indicator of group membership.[1]

First, we evaluate possible pathways through which agricultural insurance can impact women's instrumental agency. One of the main sources of women's disempowerment is their reduced bargaining position due to their high economic dependency on men (Kabeer and Natali, 2013). As such, we expect that increased agricultural productivity and incomes due to insurance can directly improve women's bargaining power and give women a voice to participate in household decision-making, and access to and control of productive resources. This is especially true if rural women remain central actors in controlling income from livestock products such as milk and eggs (McPeak and Doss 2006; Kristjanson et al., 2010), and in shaping household food consumption decisions (Nisbett et al., 2017).

Some insurance programs require clients to operate a bank account or mobile money account. Providing women with the right financial tools to save money and make or receive payments is an important empowerment pathway (Field et al., 2021). Further, when lenders use insurance premiums as collateral against borrowing, insured women can access formal credit services thereby increasing their financial freedom. Bundling insurance with agricultural advisories can help women learn about, and ultimately adopt, time-saving agricultural technologies, thereby freeing their time to pursue other activities that enhance their wellbeing. Finally, when insurance increases input use and unlocks access to new market opportunities, women's physical mobility can be improved, contributing to greater agency.

In terms of intrinsic agency, we expect that effects will be primarily driven by women having peace of mind and knowing that they will receive insurance payouts in the face of severe climatic shocks, and this, in turn, gives them the confidence or opportunity to take up credit and invest in profitable technologies and practices, allowing them to realize improved agricultural payoffs. As a result, they will not only experience some autonomy in income use but also experience an enhanced sense of well-being and self-efficacy. Tafere et al. (2019) indeed find that when livestock producers in Ethiopia have insurance coverage, their sense of well-being is significantly higher relative to that of non-insured households, even without a payout. Another pathway to improved intrinsic agency is that insurance payouts could help reduce stress and tension within households, potentially reducing violence towards women. When women receive the insurance payouts, it could reduce their economic

[1] Originally, pro-WEAI included 12 indicators, but two indicators were dropped from the index after final validation: respect among household members (intrinsic agency) and membership in influential groups (collective agency).

dependence on men, which could in turn reduce cases of intimate partner violence (Heath et al., 2020; Breiding et al., 2015). At the same time, this could also introduce conflicts and tension within the household, potentially triggering violence (Finoff, 2012; Heath, 2014; Gracia and Merlo, 2016). Thus, for programs that may reduce women's economic dependence on men, it is important to monitor closely for such a backlash, even if an insurance program is not directly aiming to reduce the incidence of such violence.

Moving to collective agency, it is important to note that strong informal risk-sharing networks could reduce the benefits derived from insurance, and thus demand for formal insurance; especially when offered as individual contracts. For instance, an experiment with jointly liable microfinance groups in Tanzania finds that group members forgo health insurance because they can free-ride on other group members' contributions to loan repayment when incurring health expenses (Janssens and Kramer, 2016). Offering group insurance as opposed to individual insurance could increase take-up, stabilize group welfare, and make it more attractive for non-members to join groups, strengthening collective agency. Also, studies on crop insurance in Ethiopia and Bangladesh find that group contracts might benefit groups (Dercon et al., 2014; Clarke et al., 2015; Hill et al., 2016). Conditions under which group insurance might indeed be more beneficial is when group contracts help promote dialogue around insurance and thereby allow group members to better understand the product and improve their financial literacy; when by acting collectively, groups are better placed to enforce insurance contracts, which might help overcome trust-related barriers; and when group contracts reduce the cost of marketing for the insurer and diversify insurance pools, which can lower the cost of providing insurance and thus insurance premiums. In other words, the benefits from group insurance will be context-specific, and research in other settings is needed to gain a deeper understanding of when group contracts strengthen collective agency.

3.4. *Agricultural insurance and gender-transformative effects*

Agricultural insurance can have gender transformative effects when it enhances gender relations within and outside the household. However, the question on whether and how agricultural insurance can be gender-transformative is not addressed in the reviewed literature. In this section, we highlight pathways through which agricultural insurance can potentially create gender transformative effects. First, identifying and challenging the underlying norms and power structures that create gender inequity in agricultural insurance reach and benefit is an entry point into promoting gender transformative change; for instance, promoting women in positions of agricultural leadership can raise awareness about gender roles and relations in the society. Second, agricultural insurance could be combined with intentional messaging or behavioral change communication targeted at both women and men to strengthen women's agency in household decisions, improve their ownership and control of resources, promote dialogues about economic goals among men and women, and thereby transform gender relations. Third, group insurance can promote collaboration among men and women, as well as more equitable and affirmative gender relations, which can reduce women marginalization and promote critical reflection about the social and gender norms. Finally, by promoting the use of complementary financial services such as savings accounts and credit by both women and men, insurance can challenge existing institutional norms and gender biases in financial inclusion. However, such effects will likely not arise from providing insurance without gender-intentional interventions to challenge existing gender norms.

4. Practical application of the RBET framework: A case study from Kenya

This section uses a case study from a crop insurance program in Kenya to provide a practical application of the RBET framework and demonstrate how agricultural insurance can be adapted to become more gender-inclusive, -responsive, empowering, and -transformative. The program, implemented by ACRE Africa in partnership with the Kenya Agriculture and Livestock Research Organization (KALRO), International Food Policy Research Institute (IFPRI) and Wageningen University, provides two different types of insurance: A first product, weather index-based insurance (WBI), makes payouts when farmers are in a region where satellite-derived rainfall measures are indicative of either drought or excess rainfall. A second product, picture-based insurance (PBI), provides insurance coverage for damage detected from a time-lapse of the insured crop, built from both pre- and post-damage georeferenced pictures that farmers take themselves using regular, low-cost smartphones (Ceballos et al., 2019).

To ensure that its insurance program is equally accessible for women as for men, ACRE Africa uses community-based village extension service providers (VESPs), also referred to as champion farmers, to provide insurance education, enroll farmers into the program, and market and distribute the insurance products. Moreover, ACRE Africa purposively recruits a higher number of female VEPS (about 60 percent) to ensure increased reach among women farmers. Using community-based extension service is a gender-inclusive approach aimed at improving trust and accessibility of insurance products. A recent study on the ACRE Africa program indeed found that female VESPs enrolled relatively more women clients than male VESPs, thereby increasing reach of the insurance program among women (Cecchi et al., 2021). These findings suggest that including women as actors in the insurance value chain (not just as end-users) has the potential of closing the gender gap in insurance uptake.

ACRE Africa has also leveraged the rapid growth of digital economy to provide insurance registration and payouts via mobile phones. Using mobile phones to purchase insurance cover and receive payouts is a gender-inclusive strategy that can help in overcoming mobility and time-burden barriers that women face in accessing insurance (Fletschner and Kenney, 2011). However, this strategy will require women to have their own mobile money accounts, which will not be the case in many rural settings (Koo et al., 2022). An experiment to elicit farmers' willingness to pay (WTP) for an insurance product where insurance payouts are made to the farmers' own mobile money account ('self') as opposed to the spouse's account ('spouse') shows that both men and women are willing to pay significantly more ($p < 0.05$) when payouts are made to own mobile money account, highlighting that take-up will be substantially lower among women if they do not own a mobile money account (Fig. 2, based on Kramer et al., 2022b).

A second area that we explore is the potential for the program to be gender-responsive and improve gender equity in the distribution of

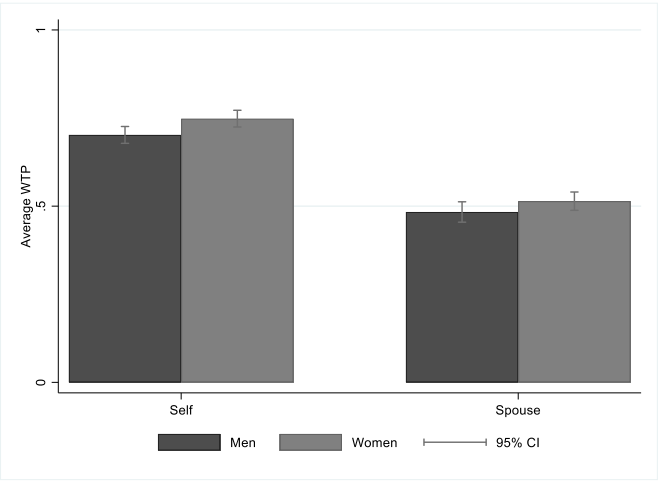

Fig. 2. Willingness to pay (as a proportion of the total product cost) by gender.

insurance benefits. To increase the benefits that women derive from insurance, ACRE Africa bundles insurance with high-quality seeds of improved varieties. An experiment to elicit farmers' WTP for insurance products bundled with seeds or bundled with seeds and pesticides shows that the WTP for both products is higher (but not significantly higher) among women than among men (Fig. 3, based on Kramer et al., 2022b). These relatively small gender differences nuance the idea that bundling risk management strategies might be beneficial, especially to women. In the Kenyan study context, providing access to complementary agricultural services such as seeds and pesticides does not increase women's willingness to pay for insurance more than men's, as these inputs are equally accessible to women and men; however, in settings with greater gender gaps in access to productive inputs, bundling may have stronger effects. The program has also collected representative sex-disaggregated data to separately monitor program impacts at the individual level. Currently, there is ongoing work to evaluate the impacts of the program on agricultural production, coping strategies, household consumption and women's dietary diversity, to provide insights into the gendered distribution of the program benefits (Cecchi et al., 2022).

The final components of the RBET framework analyze to what extent, and how, the program reduces gender gaps in empowerment and its potential in transforming the social and institutional norms to enhance gender equality. A recent study shows that women in the ACRE Africa study area are more disempowered than men. The primary sources of disempowerment among both women and men include excessive workload, limited control over the use of income, limited autonomy in decision making; and, mainly among women, the perception that domestic violence is acceptable (Cecchi et al., 2021). To narrow these empowerment gaps, the program is aiming to help reduce farmers' workload and especially women's time poverty by bundling insurance with agricultural advisories on time-saving technologies and practices, including for instance appropriate planting times. The program is also supporting women in opening and managing personal mobile money accounts and ensuring that insurance contracts purchased by women are registered under their names (not their spouses) and payouts are subsequently paid to the policyholders.

Besides providing benefits in farm households, a private insurance provider could benefit from increased women's empowerment in their target population if this is associated with an increased take-up of agricultural insurance; in that case, there would be a business case for private insurers to address gender gaps in empowerment among their clientele. To shed light on the association between empowerment and insurance demand, we combine individual-level pro-WEAI data with the experiment used to elicit WTP for agriculture insurance. Fig. 4 plots the WTP for insurance for women (left figures) and men (right figures), comparing individuals who are disempowered versus empowered based on their instrumental agency (top row), intrinsic agency (middle row), and collective agency (bottom row). These plots are indicative of correlations and should not be interpreted as causal.

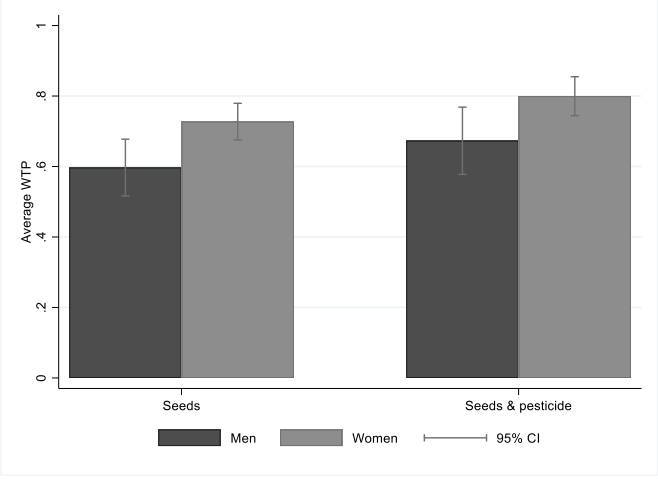

Fig. 3. Willingness to pay (as a proportion of the total product cost) by gender and type of bundle.

For women, higher achievements in instrumental, intrinsic, and collective agency are associated with greater WTP for insurance, regardless of whether insurance is bundled with seeds only, or with seeds and pesticides (but differences are not significantly different). Also, for men, achieving empowerment is associated with a greater WTP for insurance in both intrinsic and instrumental domains (with significant differences when focusing on instrumental agency and bundling with seeds, $p < 0.05$); however, the association for collective agency is reversed and again not significantly different from zero. Men without group membership are willing to pay more for both insurance bundles than men who are members of an agricultural group. It is important to reiterate that these results should not be interpreted as causal and do not necessarily imply that empowering men and women increases insurance demand. Future research could analyze the impacts of empowerment on demand for insurance more systematically and rigorous, to analyze the business case for private companies such as ACRE Africa to explicitly target women's empowerment.

In terms of gender transformation, the program has developed edutainment materials—a short movie from the producers of the popular TV show Shamba Shape Up—to challenge existing gender norms and particularly the acceptability of domestic violence, encourage joint decision-making in important household decisions, and highlight the knowledge that women can bring to the table when it comes to important agricultural decisions. A field experiment randomizing men's and women's exposure to gender edutainment shows that exposure reduces implicit gender biases in terms of whose recommendations a farmer will follow, and it increases the extent to which households engage in joint decision making (Aju et al., 2022).

5. Conclusion

This study provides an overview of the literature on how to create gender equity within the context of agricultural insurance schemes. Using a framework originally developed by Johnson et al. (2018), and later extended by Quisumbing et al. (2022), the paper goes beyond gender inclusivity to evaluate the extent to which insurance can be more gender-responsive, empowering, and gender-transformative.

The review finds that most studies with a gender dimension have focused on differences in the reach of agricultural insurance. The reviewed studies indicate that compared to men, women are less likely to purchase insurance, and when they do, they take out lower amounts of coverage. Our literature review shows that insurance providers can promote gender equity in reach, and therefore gender inclusivity, by addressing constraints on both the demand side (such as low liquidity, low financial literacy, risk aversion, low trust, and cultural barriers), and supply side (such as high costs of premiums, narrow risk coverage, and non-inclusive extension approaches). Fewer studies discuss gender equity in the distribution of benefits from agricultural insurance. The main conclusion based on these studies is that designing insurance products that offer a wide range of risk coverage, bundling insurance with complementary risk management strategies, collecting sex-disaggregated data, and monitoring long-term impacts at individual levels can promote gender equity in the distribution of insurance benefits.

The literature review did not identify any studies discussing the impacts of agricultural insurance on indicators of women's empowerment, or studies discussing the potential for insurance to be gender transformative. Based on a case study of an agricultural insurance program in Kenya and the structure and indicators that are at the core of the project-level Women's Empowerment in Agriculture Index (pro-WEAI), we show how agricultural insurance, if adequately designed, can potentially contribute to women's empowerment; we argue that

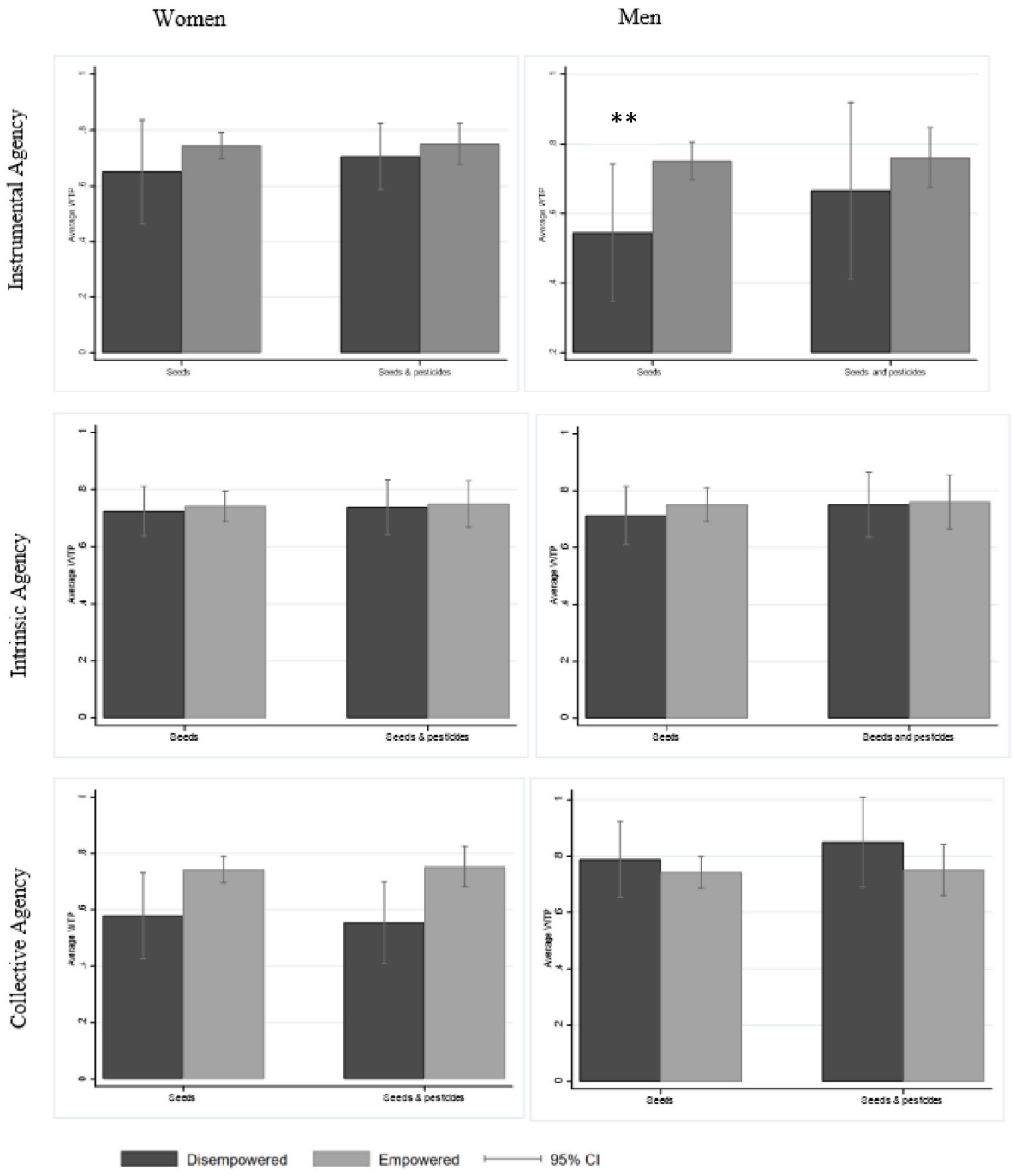

Fig. 4. Willingness to pay (as a proportion of the total product cost) by gender and empowerment.

women's empowerment can be achieved when insurance providers help women to open and manage their bank/mobile accounts, when contracts purchased by women are registered under their names and payout are directly paid to the policyholders' bank or mobile money accounts, and when insurance is bundled with advisories, or time-saving technologies. Finally, based on the case study, we also illustrate how insurance can promote gender transformation when bundled with intentional norms interventions targeting both women and men.

Overall, our study shows that it is possible to tailor insurance programs to support gender equity in reach, and benefits, improve women's empowerment and enhance gender transformation.

Declaration of competing interest

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

Data availability

Data will be made available on request.

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