frontiers | Frontiers in Sustainable Food Systems

TYPE Original Research
PUBLISHED 08 July 2024
DOI 10.3389/fsufs.2024.1382058

OPEN ACCESS

EDITED BY
Brandy E. Phipps,
Central State University, United States

REVIEWED BY
Chipo Chitereka,
University of Zimbabwe, Zimbabwe
Tong Li,
The University of Queensland, Australia

*CORRESPONDENCE
Melisew Dejene
melisew@hu.edu.et

RECEIVED 04 February 2024
ACCEPTED 11 June 2024
PUBLISHED 08 July 2024

CITATION
Dejene M, Yimer S, Fentaw T and Regassa N (2024) Subjective resilience among women and youth clients of social innovation projects executed in five regions of Ethiopia. *Front. Sustain. Food Syst.* 8:1382058. doi: 10.3389/fsufs.2024.1382058

Subjective resilience among women and youth clients of social innovation projects executed in five regions of Ethiopia

Melisew Dejene[1]*, Semeredin Yimer[2], Tenaw Fentaw[3] and Nigatu Regassa[4]

[1]Institute of Policy and Development Research and Department of Journalism, Hawassa University, Hawassa, Ethiopia, [2]Institute of Policy and Development Research and School of Governance and Development Studies, Hawassa University, Hawassa, Ethiopia, [3]Cordaid Ethiopia and PhD Candidate at Addis Ababa University, Addis Ababa, Ethiopia, [4]College of Development Studies, Addis Ababa University, Addis Ababa, Ethiopia

The European Union (EU) launched an EU-RESET Plus Innovation Fund in Ethiopia, with a goal of building the resilience and improving the livelihood of targeted vulnerable communities in five regions. The respective social innovation projects (SIPs) introduced social innovations that part with the 'business-as-usual' model. Though difficult to study impact due to the limitations of cross-sectional survey design adopted, the study aimed to investigate the level of subjective resilience exhibited by women and youth clients and the predictors of resilience. We collected quantitative data from 910 client households. We also conducted over a dozen case story interviews with project clients. We employed World Food Program (WFP) (2022) subjective resilience score to compute clients' level of subjective resilience. An ordered logistic regression with subjective resilience as an outcome variable was conducted to determine predictors. The unique contribution of this study is the computation of the subjective resilience of project beneficiaries in objective terms, having three categories. The findings revealed that the SIPs contributed to boosting the resilience of women and youth, with significant predictors including active involvement, empowerment, gender, savings, and livestock ownership. Gender differentials are also found to be for future development projects to consider in their design and practice.

KEYWORDS

social innovations, SDGs, subjective resilience, empowerment, women, youth

1 Introduction

The Sustainable Development Goals (SDGs) "recognized as relevant necessity" have drawn a lot of attention, being one of the topmost focuses of research (Ali et al., 2023). The Sustainable Development Goals (SDG 1) aim to eradicate poverty from the face of the planet by 2030; there are a lot of tasks ahead for a country like Ethiopia, should it meet this goal, with 30% of its population living below poverty line [UNDP, 2015; Lemma and Cochrane, 2019; World Bank, 2020; Shkabatur et al., 2022; United Nations Development Programme (UNDP), 2022; Ali et al., 2023]. Ethiopia recorded successive growth over the past 15 years, albeit such growth is

reported to be not inclusive, with vulnerable and marginalized communities lagging behind unless innovative mechanisms are in place to build their resilience. Various actors have been implementing SIPs in different parts of the country. However, their contribution to resilience building is not sufficiently documented.

Ethiopia is predominantly rural where 83.9% of its population resides in the countryside. Women and youth constitute a significant portion of the population, and any development intervention needs to prioritize their needs should it aim to build their resilience toward sustained growth. Women and youth empowerment not a luxury be it from a growth-oriented or a rights-based perspective. A recent World Bank study estimates that the gender gap in adverse health and key socioeconomic outcomes is costing Ethiopia approximately 3.7 billion USD a year, that is, 1.1 billion in the agriculture sector, 1.1 billion in the entrepreneurship sector, and 1.5 billion in wage employment (Buehren et al., 2019).

According to the last census, 63.32% of the population is 29-year-old or below. Youth unemployment is a pressing challenge for Ethiopia's economy where an estimated 27% of the youth are unemployed. Ethiopia's young-working age population who strive to engage in decent jobs is projected to grow by approximately 2 million per year. This flow of young-working age population entering the labor market definitely poses a profound challenge which necessitates strong policy backup and conducive environment. Interventions centered particularly on women and youth, and rural people at large are destined to productive investment for development if they properly read the local context and the need thereof.

On the other hand, Ethiopia has an estimated pastoralist population of 12–15 million, covering 60–65% of the total land mass of the country. The largest pastoralist population is primarily in the Somali, Afar Regions, Borena Zone of Oromia Region, and in South Omo Zone of the Southern Nations, Nationalities, and People's Region (now Southern Ethiopia Region). Pastoralist communities constitute 15% of Ethiopia's total population, use 63% of its land, and contribute approximately 40% of the agricultural gross domestic product. They, however, are among the poorest and most vulnerable who remained at the margins of national economic, social, and political life. This portion of the society has been neglected from the development map of the nation until recently.

Ethiopia is recognized the importance of building a resilient economy by introducing a strategy for Climate Resilient Green Economy, focusing among others on women and the youth. Boosting the resilience of women and youth in any community is vital for sustainable development. While the concept of resilience is defined in different ways, we adopted the definition as "the capacity of a system to absorb disturbance and reorganize while undergoing a change so as to retain essentially still the same function, structure, identity, and feedbacks, and therefore identity, that is, the capacity to change in order to maintain the same identity" (Folke et al., 2010). This suggests the capability of an individual, a group, or a community to withstand shocks and bounce back to grow and sustain. SIPs are of necessity to boost the resilience of individuals, groups, and beyond to realize the country's goal of a "Climate Resilient Green Economy".

This study assessed the contribution of 13 EU-RESET Plus-funded SIPs coordinated by CORDAID and implemented by various non-governmental organizations (NGOs) in different parts of Ethiopia. We need to be clear at the outset that our aim was not to study impact, but contribution of the SIPs, if any, toward improving subjective resilience. It specifically delved into investigating the level of resilience exhibited by project clients due to the contribution of the SIPs. It also investigated the predictors of subjective resilience toward sustained growth. Focusing on subjective resilience is crucial to capture individual and contextual variations. This, we argue, is not given sufficient attention in project implementation and appraisal. The study was financed by RESET Plus Innovation Fund facilitated by CORDAID Ethiopia.

1.1 Setting the context: a brief profile of SIPs implemented

The RESET Plus Innovation Fund was launched in Ethiopia in 2019 by the EU aiming to build resilience using social innovations that target vulnerable communities. The program had approximately 20,000 direct clients with thousands hoped to indirectly benefit from the various SIPs implemented in five regions of Ethiopia. The initiative was implemented in Afar, Amhara, Oromia, former Southern Nations, Nationalities, and Peoples' Region (SNNPR) (now split into three regional states), and Somali regions. Several international and local NGOs were involved as implementing partners with CORDAID in collaboration with Fair and Sustainable Ethiopia as facilitators. The respective projects targeted 13 areas (24 *woredas*/districts).

1.2 The SIPs implemented were as follows

Action Against Hunger introduced innovative Terracing, Agroforestry, and Farm (TAF) practices in South Gondar, Amhara Region, through a social marketing approach aiming to improve the sustainable livelihood and resilience capacity of vulnerable communities.

Cartias implemented Social Innovations to Heighten Innovative Resilience-building Opportunities (SHIRO) project in Bale Zone of Oromia Region with a purpose to boost the sustainable functionality of existing water schemes to contributing toward diversified employment and income generating opportunities for women and youth.

Cooperazione Internazionale (CIFA) implemented livestock insurance for pastoralist resilience building in three districts of Borena Zone of Oromia Region purposed to enhance the resilience and disaster management capacity of the pastoralist community to climate-induced shocks. It adopted Index-Based Livestock Insurance (IBLI) through training and use of mobile applications. It also aimed to introduce alternative livelihood strategies through the production of drought-resistant fodder targeting pastoralists at large and women and youth specifically.

Cooperazione Internazionale (COOPI) "Enhancing farmers" livelihoods via piloting a model that integrates technology transfer, climate smart agriculture and social transformation' targeted communities in Dollo Addo woreda, Liben Zone, Somali Region. The project aims to introduce modern agricultural practices to subsistence farmers who were used to small scale irrigation employing diesel power, introducing climate smart agricultural practices.

CST Ethiopia targeted the Dasenech Pastoralist and agro-pastoralist community in South Omo, SNNPR. It introduced various innovations that aimed to reduce disaster risk and enhance the resilience capacity of the community using a social protection initiative such as IBLI and improving goat marketing value chain. It also introduced a hydraulic ram pump in one of the areas.

HEKS introduced viable innovations for resilience and livelihood that targeted communities in Moyale and Miyo, Oromia Region. The SIPs aimed to bolster animal feed and milk production value chain.

SUCCESS project by HELVETAS implemented in South Gondar, Amhara, employed integrated land management practices for conservation of resources. It aimed improved agricultural productivity by maintaining an intact ecosystem in a cost-effective manner.

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) implemented the ELSAT Project that aims to enhance the resilience capacity of livestock-based livelihoods in Afar and Eastern Amhara in response to the Seqota Declaration of 2015. To such end, the project promoted market-oriented innovations (drought-resistant and nutrient-dense seed systems; taming and storing floods for forage and fodder production).

Oromia Coffee Farmers' Cooperative Union (OCFCU) implemented sustainable clean energy for rural women in Berbere, Bale Zone. They aimed to lessen the burden of women and children and the environment at large that collection of firewood and the cutting of trees, respectively, bring. The project introduced innovations that transformed coffee waste to a clean energy source (briquette), replacing traditional firewood toward generating carbon revenue for the end users. In doing so, the project promised to use farmers' cooperatives and organized SMEs in producing and disseminating the technology.

Oxfam's Integrated Prosopis Management targeted the community in Shinile woreda of Siti Zone, Somali region, to curb the expansion of the invasive alien plant of prosopis. It aspired to utilize it for commercial purposes through innovative approaches toward restoring the ecology by coordinating stakeholders.

SOS Sahel and Christian Aid along with a social enterprise implemented a project on Enset in two woredas of Wolayita aiming to create jobs and transform agricultural technologies. They aimed to tackle food insecurity and migration and improve livelihoods by maximizing the economic value of enset. To such end, they introduced new enset processing technology and livelihood diversification strategies.

TDA's project aimed to address underlying causes of vulnerabilities (hunger, poverty, and lack of biodiversity) among the communities in four woredas of Wolayita Zone. The project aspired climate smart production and value addition employing agri-business strategies.

VSF-Suisse' VDDM GIVE-Women project targeted pastoralist communities in Somali and Afar (Afar and Siti Clusters). The SIP aimed to curb PPR which affects goats and small ruminants that are the livelihood bases of the target communities. It employed advanced model of vaccine service delivery that ensues a multi-stakeholder approach.

2 Literature review

2.1 Conceptualizing resilience

Holling (1973) is credited to introduce the concept of resilience in ecological studies (see Folke et al., 2010). Earlier being a common subject in ecology and engineering, 'resilience' has now drawn more attention from interdisciplinary studies in the broad fields of human development, evolutionary biology, geography, development studies, and anthropology (Holling, 1973; Peterson et al., 1998; Walker et al., 2004; Wald et al., 2006; Folke et al., 2010; Herrman et al., 2011; Masten et al., 2012; Wu et al., 2013).

Resilience is a broad concept that, according to one conception, is set to address "the dynamics and development of complex social-ecological systems (SES)" (Folke et al., 2010). According to Folke et al. (*ibid*), it signifies, "the capacity of a system to absorb disturbance and reorganize while undergoing a change so as to retain essentially still the same function, structure, identity, and feedbacks, and therefore identity, that is, the capacity to change in order to maintain the same identity" (p. 3). From human development perspective, Masten et al. (2012) conceptualize it as "positive adaptation in the context of significant adversity, emphasizing a developmental systems approach" (p. 117). Thiede (2016, quoted Walsh-Dilley et al., 2016) who defined the concept as "The process of learning, organization, and adaptation taking place across scales that enables people to respond to and cope with internal and external stresses in ways that allow them to build and defend healthy, happy, and meaningful lives and livelihoods" (p. 2). Greenberg (2006, cited in Hornor, 2016, p. 384) conceptualizes resilience "as protective or positive processes that reduce maladaptive outcomes under conditions of risk".

2.2 The implication of resilience for individual and community development

Folke et al. (2010) introduced what they termed "resilience thinking" aiming to shed light on the unfolding and development of the intricacies of "complex social–ecological systems (SES)" (p. 1). They outlined the 'resilience thinking' as subsuming three interrelated concepts including "resilience, adaptability, and transformability." The central concept of this study, 'resilience', is defined by them as, "the capacity of a SES to continually change and adapt yet remain within critical thresholds. Adaptability is part of resilience." Adaptability is part of resilience. As for them, it refers to "the capacity to adjust responses to changing external drivers and internal processes and thereby allow for development along the current trajectory (stability domain)." Transformability signifies "the capacity to cross thresholds into new development trajectories. Transformational change at smaller scales enables resilience at larger scales" (p. 1). In 'resilience thinking', the system operates at various levels from micro- to system level. This conceptualization helps us understand how individuals and social groups adapt to change. All three types of resilience in one way or another can be argued as related to the ecosystems of respective communities and their economic activities.

Instrumental for this specific research is the notion that resilience is not confined to the study of the physical ecosystem. It rather refers to the dynamics between the physical ecosystem and the intricacies of the social system that determines its functioning and utilization (Folke et al., 2010; Li et al., 2023a,b). Several natural and human factors affect the proper functioning of socio-ecological systems.

Smythe et al. (2024) noted that exhibiting economic growth though important for development, it is not a guarantee for development sustenance. More important, they argued that in strategic terms, buffering an economy from frequent shrinking is more important than exhibiting higher growth. Their analysis on a longitudinal study of over four decades data on 23 developing economies revealed, inclusive economies were more resilient compared with those with higher inequalities.

Studying resilience from an African perspective, Theron and Theron (2013) indicated that resilience and its conceptualizations are

context-specific. Drawing on 14 African case studies, the authors indicated that communal life style and family structures included extended family arrangements. Their research concluded that "black youth resilience follows communal pathways as emphasised by Africentric culture, in general, and kinship systems, in particular" (p. 391). A study on "ultra poor households" in Ethiopia suggested that the poor viewed resilience as, "tension between meeting short-term subsistence needs and taking actions that contribute to building resilience against future shocks and stresses" (Thiede, 2016, p.1). Thiede (2016) pinpointed that his subjects associated being resilient with resource ownership such as landholding. This may have an interesting implication as adaptive capacity is subject to ownership of assets.

Walsh-Dilley et al. (2016) suggested to align the "resilience thinking" with the rights-based approach. The authors called for the incorporation of resilience thinking in development practice arguing for its capacity of transforming communities and systems. They went further to equate resilience thinking with 'the concept of food sovereignty' that opts for social justice and equitable development. This is in line with the SDGs call of leaving no one behind where countries such as Ethiopia have a lot more to do (Lemma and Cochrane, 2019). The EU-REST PLUS funded SIPs this study focused on targeted vulnerable communities in different parts of Ethiopia with an aim to build their resilience capacity. The success of such projects needed to be contextualized to the specific local realities those social innovation projects dealt with.

3 Materials and methods

3.1 The study setting

The choice of the study sites was determined by the availability of the EU-RESET Plus SIPs as our purpose was to study the contribution of the respective SIPs toward subjective resilience. The study covered all the five regions and the respective woredas the SIPs were implemented.

3.2 Data sources

The primary study populations were women and youth. The study used both primary and secondary sources. Primary data were collected using household survey questionnaires and interviews with women and youth beneficiaries representing each SIP. Relevant literatures were reviewed to corroborate and complement the findings of the field data.

3.3 Study design and approaches

The study employed a mixed-research approach. A combination of quantitative cross-sectional survey design and qualitative community Participatory Action Research (PAR) was used. The cross-sectional design helped us pool a representative quantitative data from all the target projects. The PAR enabled us to produce detailed qualitative data from selected beneficiaries of each project, with engaging and reflective discussions.

3.4 Sampling design

Since the population of beneficiaries of the projects is known, the sample size for the survey was determined by using Yamane's formula (1976), given by:

$$n = \frac{N}{1 + N(e)^2}$$

where n = sample size; N = total population; e = error tolerance or confidence interval; and for 95% confidence interval, 100–95% = 5% or 0.05 error. At the time of the study, there were more than 20,000 direct beneficiaries in the five regions. Based on the above formula, the total sample size estimated was 385. We add 5% (n = 19) for possible attrition. This made up the final initial sample size of 404 households. This initial sample size was adjusted to account for the *design effect* of the sampling technique we pursued. To adjust for the *design effect* of the sample design, we simply multiplied the computed sample size by the *design effect* of D = 3. This is an ideal sample size as a *design effect* of 2 could have sufficed. This resulted in a total of 1,213 project beneficiaries for the survey. The total sample size was proportionally distributed among the respective projects vis-à-vis that of their respective number of beneficiaries.

The regions are intervention regions and were purposefully selected. Thus, the regions included in this study were Afar, Amhara, Oromia, former SNNPR (now Southern Ethiopia), and Somali. The 1,213 women and youth respondents were selected using three-stage sampling technique. At the first stage of sampling, zones were selected: Zone One from Afar, South Gondar and West Gojjam from Amhara, Bale and Borena Zones from Oromia, South Omo and Wolaita from the SNNPR, Siti and Liben from Somali. At the second stages of sampling, the research team selected specific areas from where data were collected; Ebinat and Libo Kemkem (from South Gondar) and North Mecha (from West Gojjam), Amhara; Berbere, Moyale, and Miyo from Oromia; Duguna Fango, Boloso Sore, and Damot Pullassa from Wolayita, SNNPR; Dasenech from South Omo, SNNPR; Shinile and Dollo Ado from Somali. At the third stage of sampling, household samples were randomly selected from the target communities, and one woman (preferably the mother) and one youth were interviewed from each household for the household survey.

We, however, had to change our original data collection strategy only for the Amhara region due to the ongoing active conflict there. The conflict impeded household survey data collection, where we had to switch to qualitative data collection strategies, except some 20 surveys we managed to conduct until telephone communication was cut in the project sites. Hence, we ended up collecting 910 survey data. We, however, had sufficient qualitative data sample for the SIPs in Amhara region to compensate for the survey. For the qualitative data, the sample selection was entirely purposive. This specific study employed case stories to detail the lived experiences of 16 selected relatively successful women and youth clients of the SIPs. We interviewed them to learn their perspectives on their resilience.

3.5 Method of data collection: tools and procedures

Data were collected using a range of tools which included the following:

Desk review: the team reviewed relevant literature on the subject matter of the study.

Household survey: questionnaire was used for surveying households in intervention communities to generate quantitative data. The *questionnaire* had both close-ended and open-ended questions. The questions focused on eliciting information on lesson learned from a new type of effective terracing, optimal land use, social marketing, IBLI, goat market value chain, hydroponic fodder production, and using drought-tolerant strategies and practices.

Case story interviews: we employed case stories to detail the lived experiences of selected women and youth and to learn their perspectives on their resilience and their challenges to build their individual capacity to withstand shocks and exercise agency. The team carried out 14 case-story interviews across all the study regions.

Procedures of data collections: considering the nature of the data collection approach, the research team prepared a detailed instructional manual that covered all aspects of the data collection steps. We recruited researchers, and postgraduate students with field research experience from various Ethiopian universities (Hawassa, Madda Walabu, Borena, and Gondar), situated nearby the study sites. The field staff recruitment was made based on work experience, interpersonal skills, open mindedness, previous experiences related to open-ended investigation, and ethical behaviors. We trained the data collectors on basic interviewing skills, quantitative data collection using Kobocollect, and research ethics. We pilot-tested the instruments for clarity and validation. We then revised some of the quantitative questions based on inputs from the pilot study. In all the study sites, we deployed researchers who have exposure and knowledge about the respective areas. During the data collection process, we assigned data collection supervisors who coordinated the overall data collection activities per respective region. The data collectors had to read out the informed consent statement before they continue their interview. The quantitative household level data were collected using Kobocollect and centrally managed and approved on daily basis. The data were later cleaned before analysis.

3.6 Ethics and informed consent

The study passed through rigorous ethical review process at different stages. The proposal for the wider study was reviewed by Hawassa University's Research Ethics Review Committee (RERC). RERC evaluated the proposal on the basis of major principles of ethics including 'respect for persons', beneficence, justice, if 'the objectives were ethically achievable', and if 'the proposed research methods were ethically sound'. RERC approved the proposal for implementation with a reference number RERC14/2023. Beyond, the proposal had to go through a rigorous competitive review for both quality and ethical issues where there were over 51 proposals from other institutions. The panel of reviewers on the donor side selected and approved our proposal. Then, we filed a support from Hawassa University's Office of the Vice President for Research. The Office reviewed the proposal and gave us support letter for field research. We also had to validate our proposal and the instruments in a workshop organized by the donor where stakeholders including implementers and researchers from five government universities were in attendance. We got inputs and validated our proposal and instruments. We also conducted pilot studies on individuals similar to our target participants using Kobocollect before the actual field.

In terms of informed consent, as we used Kobocollect for the survey along with the qualitative interviews, data collectors asked the verbal consent of participants reading out the purpose of the study, information sought, promising confirmation of anonymity, and confidentiality. We had no refusal from any individual or household sampled. The data were anonymized and kept confidential in a way that no one could know the specific informant of the study.

3.7 Method of data analysis

The quantitative survey data were encoded and analyzed using SPPS Version 27. Descriptive statistics such as mean, percentage, and graphs were used to portray the quantitative data. We also used a formula to develop Subjective Resilience Score based on nine questions (on anticipatory capacity, absorptive capacity, transformative capacity, adaptive capacity, financial capital, social capital, institutional capital, human capital, and informational capital). We collected data on these from the participants of the household survey (WFP, 2022, 2023). Once responses to each of the statements have been gathered, we numerically converted the responses that were in a Five-Point Likert Scale questions (Strongly disagree = 1, Disagree = 2, Neutral =3, Agree = 4, strongly agree = 5). Individual answers are then used to compute an overall resilience score for each household as an equally weighted average of the nine responses. The resilience score is standardized by minimax normalization, transforming the results into a score that ranges from 0 (not at all resilient) to 100 (fully resilient).

$$RCS_i = \frac{\left(\frac{\sum_{Qi=1}^{n} Resilince\ Indicators}{9}\right) - 1}{Maximum - Minimum} * 100$$

Once the Resilience Capacity Score (RCS) are calculated, households are divided in low–medium–high to show the distribution of the RCS within the target population (WFP, 2022). Therefore:

- If RCS < 33, then the household is categorized as reporting a low RCS.
- If RCS > = 33 < 66, then the household is categorized as reporting a medium RCS.
- If RCS > = 66, then the household is categorized as reporting a high RCS.

On top of that, we conducted an ordered logistic regression, having resilience as an outcome variable with selected predictors including gender, level of education, family size, livestock ownership, non-farm income activities, cash saving, innovation practice, and empowerment categories. The bivariate proportional odds regression was conducted to select the most promising explanatory variables for multivariable proportional odds regression, and those with a p-value<0.20 were selected for the initial multivariable proportional odds. We also conducted a multicollinearity test among the predictor variables using the variance inflation factor (VIF), and the outcome for all the predictor variables was below 4.

We analyzed the qualitative data from the case studies using thematic categorization of issues (Maxwell, 2012). The thematic

analyses were made in conjunction with data collection. Digitally audio-recorded data were transcribed to produce text transcripts. The transcribed data were then translated from the respective local languages (Amharic, Afaan Oromoo, and Af Somal) to English. Data coding was done after all the data were fully transcribed and translated. Explorations of coded data were done to make further analytical activities, such as querying the data to find out frequently recurring concepts, themes, and relationships among codes and themes. Finally, the qualitative and quantitative data were analyzed employing the triangulation technique.

4 Results

4.1 Sociodemographic profile of the study participants

We collected 910 survey data. Beyond, we conducted in-depth interviews with 16 relatively 'successful' clients. First, these clients identified themselves to be "successful". Second, local authorities and stakeholders all confirmed the same.

As shown in Table 1, majority of the participants of the household survey, nearly 75% of the study participants were women. Approximately two-thirds (66%) of the study participants were aged 18 years and below. In terms of marital status, a landslide majority of the study participants, 82.6% were married. The average household size was 6.6 children with a higher dependency ratio of approximately 51.2%.

As Table 2 depicts, there is a considerable illiteracy level in the study areas where 40% of the study participants had no formal education. The highest level of education that majority of the study participants were able to achieve was primary education with the average number of school years being 3.17.

TABLE 1 Respondents' basic demographics, $n = 910$.

Indicators	Response	Frequency	Percentage
Gender	Male	300	33.0
	Female	610	67.0
Marital status	Married	752	82.6
	Single	94	10.3
	Divorced	20	2.2
	Widowed	45	4.9
Age composition of HH	% 0–5 age	144	15.8
	% 6–18 age	404	44.4
	% 19–64 age	353	38.8
	% above 64 age	8	0.9
HH size	Average HH size	6.6	
Age of respondent	Average age	35.01	

Source: field survey, September 2023.

TABLE 2 Sociodemographic profile, $n = 910$.

Indicators	Response	Frequency	Percentage
Level of education (%)	No formal education	367	40.3
	Primary	450	49.5
	Secondary or higher	93	10.2
Main occupation (%)	Agriculture	299	32.9
	Craftsman	2	0.2
	Home-maker (housewife)	92	10.1
	Livestock rearing	206	22.6
	Neither studying nor working nor seeking work.	8	0.9
	Non-agricultural laborer	43	4.7
	Other	21	2.3
	Salaried	16	1.8
	Self-employed	58	6.4
	Shopkeeper and petty trade	81	8.9
	Student	20	2.2
	Unemployed and seeking work	63	6.9

Source: field survey, September 2023.

4.2 Estimation of subjective resilience

We computed the subjective resilience score using United Nations Development Programme (UNDP) (2022) as stated earlier. The resilience capacity scores indicated that encouraging progress has been achieved in transformative adaptive capacity, absorptive adaptive capacity, and the resilience capacity scores. As shown in Table 3, approximately 55% exhibited 'High Resilience Score', approximately 42% showcased 'Medium Resilience Capacity Score', and 4% of the study participants fell under the 'Low Subjective Resilience Score'.

4.2.1 Predictors of resilience

We assume that it is crucial to know the predicators of resilience for sustainability and future investment. Inspired by WFP (2023), we identified pertinent variables to regress against the computed outcome variable, SRCS. To such end, ordinal logistic regression analysis was conducted to estimate the ordinal outcome variable, SRC, from a set of predictor variables, such as gender, age, level of education, family size, livestock ownership, non-farm income activities, cash saving, innovation practice, and empowerment categories. The full model containing all predictors was found to be statistically significant, $\chi 2$ (10, $N = 869$) = 273.28, $p < 0.001$, indicating that the model was able to provide a better fit than the null model with no independent variables in predicting the outcome variable. The model as a whole explained between 19.1% (McFadden R square), 27% (Cox and Snell R square), and 33.5% (Nagelkerke R squared) of the variance in subjective resilience capacity score category status. As shown in Table 4, the strongest predictor of the odds of being in the category of high RC was empowerment status, recording an odds ratio of 9.152. This indicated that respondents who had empowerment scores of more than 75% were over 9 times more likely to be in the category of high RC status than those who scored below 75%, controlling for all other factors in the model.

TABLE 3 Computed subjective resilience score (*n*).

Resilience (%)	Overall	CARITAS	CIFA	COOPI	CTS	HEKS	OCFCU	OXFAM	SOS	TDA	VSF
Low RCS	3.9 (34)	4.5 (4)	0.0 (0)	0.0 (0)	0.0 (10)	0.0 (0)	7.4 (9)	8.2 (5)	10.0 (7)	6.1 (6)	3.4 (3)
Medium RCS	41.5 (362)	31.8 (28)	17.6 (21)	0.0 (0)	13.9 (10)	12.8 (15)	52.9 (64)	78.7 (48)	71.4 (50)	67.7 (67)	67.8 (59)
High RCS	54.6 (477)	63.6 (56)	82.4 (98)	100.0 (39)	86.1 (62)	87.2 (102)	39.7 (48)	13.1 (8)	18.6 (13)	26.3 (26)	28.7 (25)

Source: based on field survey, September 2023.

TABLE 4 Results of the multiple proportional odds model (POM) using resilience capacity status as response for three ordered categories.

Predictors	Model 1 (full model), *n* = 869					Model 2 (female only model), *n* = 583				
	B	*p*-value	OR	95% CI of OR		B	*p*-value	OR	95% CI of OR	
Family size	−0.009	0.783	0.991	−0.072	0.054	0.022	0.603	1.022	−0.061	0.105
Age	−0.003	0.626	0.997	−0.013	0.008	−0.009	0.365	0.991	−0.029	0.011
TLU score	0.096	0.002	1.101	0.034	0.157	0.093	0.018	1.098	0.016	0.170
Gender (female as reference)										
Male	0.437	0.013	1.548	0.093	0.781	–	–	–	–	–
Level of education (secondary and higher as reference)										
No formal Education	0.140	0.626	1.150	−0.424	0.704	−0.007	0.987	0.993	−0.795	0.781
Primary	−0.148	0.580	0.862	−0.672	0.376	−0.229	0.547	0.796	−0.972	0.515
Non-farm income (no as reference)										
Yes	0.055	0.743	1.057	−0.276	0.386	0.070	0.734	1.072	−0.334	0.474
Cash saving (no as reference)										
Yes	0.610	0.000	1.840	0.283	0.936	0.529	0.012	1.697	0.118	0.940
Innovation practice (no as reference)										
Yes	0.627	0.013	1.872	0.134	1.120	0.318	0.328	1.375	−0.320	0.956
Empowerment (not empowered as reference)										
Empowered	2.214	0.000	9.152	1.885	2.542	2.344	0.000	10.428	1.940	2.749
Score test for the proportional odds assumption:	Chi-square = 7.163, df = 10, *p*-value = 0.710					Chi-square = 7.214, df = 9, *p*-value = 0.615				
Goodness-of-fit test of overall model (likelihood Ratio):	Chi-square = 273.28, df = 10, *p*-value = 0.000, Pseudo R2 = 0.191					Chi-square = 190.34, df = 9, *p*-value = <0.001, Pseudo R2 = 0.198				

Source: based on field survey, September 2023.

Taking gender as a predictor, OR = 1.55, which was greater than 1. It indicated that the odds of being in the category of high RC versus below that category for male project clients were 1.55 times larger than those of their female counterparts, holding all the other predictors constant. This indicated that male project clients were over 1.55 times more likely to be in the category of high RC than their female counter parts, controlling for all other factors in the model. Taking age predictor, OR = 0.997 which almost equaled 1. It implies that there existed no relationship between age and the cumulative odds of being in high RC status.

For 'participating in the non-farm activity' as a predictor, B = 0.06, $p = 0.0.74$; the result was not significantly different from those who reported as not engaging in 'non-farm income activity'; OR = 1.06, which almost equaled 1. It implies that there existed no relationship between being engaged in non-farm economic activities and the cumulative odds of being in high RC status. Simply put, there was no significant difference in the odds of being in high RC status between those who engaged in non-farm economic activities and those who did not. 'Cash saving' as a predictor yielded an OR = 1.87, which was greater than 1, implying the odds of being in the category of high RC controlling all other factors in the model.

The 'livestock ownership' predictor, OR = 1.101, which was greater than 1 indicated that the odds of being in the category of high RC status increased by 1.101 for a unit increase in the predictor, using tropical livestock unit (TLU) score. For the household size predictor, OR = 0.986 was less than 1. By implication, the odds of being in the category of high RC decreased by a factor of 0.986 for a unit increase in family size, and other predictors remained constant. Another important predictor in our model was participating in/practicing a RESET Plus innovation, and OR = 1.872 indicated that the odds of being in the category of high RC for those who practiced a RESET Plus innovation were 1.872 times more likely than those who did not practice any of the innovations, holding all the other predictors constant. This implies that the SIPs had contributions in building the resilience of their women and youth clients.

Since the gender predictor was found significant, to add nuance to the SRC predictors, we computed ordinal logistic regression for female beneficiaries separately. The female only model containing all predictors found to be statistically significant, $\chi 2$ (9, $N = 583$) = 109.34, $p < 0.001$, indicating that the model was able to provide a better fit than the null model with no independent variables in predicting the outcome variable. The model as a whole explained between 19.8% (McFadden R square), 27.9% (Cox and Snell R square), and 34.5% (Nagelkerke R squared) of the variance in subjective resilience capacity score category status. As shown in Table 4, all the predictors included, except the variable RESET Plus Innovation Practice, in the full model have a similar result. In the full model, participating in/practicing a RESET Plus innovation, OR = 1.872, $p = 0.13$, which was greater than 1. It indicated that the odds of being in the category of high RC for those who practiced a RESET Plus innovation were 1.87 times more likely than those who did not practice any of the innovations, holding all the other predictors constant. However, the predictor participating in/practicing a RESET Plus innovation was not statistically significant in the 'female only' model.

4.2.2 Results of the qualitative study

The findings of the qualitative study indicated almost all of the study participants witnessed that they personally believed the SIPs contributed in supporting them to withstand shocks. A woman project client from one of the study areas indicated that the innovations supported her and her family to improve their livelihood. The funds from her saving enthused by project income enabled her husband engage in fishing by the side of The Omo River that they were able to buy a modern fishing net from the Kenya Border. Some of the women reported that they were able to feed their children and even sell their surplus to the community (Inf 7, Dasenech, South Omo). Some were able to utilize project income for supporting the family (Inf 2, Madda Walabu, Bale; Informant 3, Borena). A woman project beneficiary from Dasenech, South Omo, opined that due to the project arrangements in their village level saving association (VESA), they "have saved more than 150,000 Birr in our VELSA. So, I am glad that I have benefited from all this" (Personal Interview, September 2023). Another young woman from the SIP implemented in Shinile, Somali Region, had the following to say,

> "I had no income of my own that can support me and my family. But many thanks to the NGO VSF that gave us chance to have the skill and knowledge through the training on how to engage in the vaccination job that is currently changing our livestock's health, giving service to the livestock rearing community customers in our village. The training I received has empowered me with skills and financial capacity" (Personal Interview, September 2023).

Most of the women we interviewed concurred with the idea that the SIPs enhanced their capacity and improved their livelihood. Some, however, feared about the sustainability of the projects' outcomes, for the fact that their period of execution was short (2 to 3 years), and the resources provided were limited. Education is found to be important for a better utilization of the outcomes of the innovations. However, the illiteracy level in the project areas was high and that needs consideration for a better future outcome. Here is a representative case of a client from one of the innovative projects.

4.2.3 A story of a project client from bale: a beneficiary of OCFCU

My name is M. I live in Gabe Kebele. I completed 10th grade in 2001 E.C. I had no chance to continue up to 12th grade because I failed in the exam. I had been unemployed until I joined this project. I was dependent on my parents and later got married and gave birth to two kids. My husband is a daily laborer. I was dependent on him. There were times we did not get enough money to meet our basic needs. During difficult times, we sought support from his parents and mine. They used to provide us food and money. I was also experiencing psychological problems. I had a problem of maintaining good relationship with my neighbors. Life was very difficult. In 2013, some individuals contacted me and told me about the project. I felt lucky for getting the opportunity and registered. Then, they provided us training on charcoal stove production for about a week. Then, we started producing charcoal stoves. We had to stop producing the charcoal stove after nine months, for we lacked raw materials and the stoves were easily damaged due to the unsuitable soil we had to use. Few of the community members informed us about their disappointments in our products. We have still 60 stoves, which are not yet sold. In addition, the cost of iron sheet is very high. And we could not get them on time. Later, we were advised to produce injera stove, which does not require iron sheet. Currently, we are selling injera stove. I am generating income through selling the stoves in different kebeles. We used to sell the charcoal stove for 500 Birr. Currently, we sell each injera stove for 900 Birr. Our income increased from time to time. The injera stove is also easy to produce as compared to the charcoal stove. The project provided us with sand and cement. We can produce about 10 stoves per day. Many people now loved our products. There are people who come to the project site in order to buy the stoves. We have both shared and personal saving accounts. I bought household furniture and utensils. I am supporting my husband too. My husband is supportive as well. He encourages me to work hard. He has never been disappointed in me when I was not able to return to home for lunch. He cooks, babysit and picks our children from school. I now have the freedom that I am no longer locked in the house like before. My mind is free. I am healed! We the project clients also help each other both financially and psychologically, whenever we need it. We face various challenges in this project. First, we did not sell our products as we expected. We only have one-day market in this area. We also do not have enough working space. We used the room where the project's briquette machine was installed. Now, we do not have any suitable place where we produce the stoves. We also lacked safety and protection materials like gloves and uniforms. There are only 3 gloves that are shared among 60 of the project clients working in the workshop. We work without uniforms. Should we get our basic issues met, I believe we could be more resilient. Our immediate priorities for support include additional workshop rooms where we can produce more stoves, support on promotion of our products to different Kebeles and Woredas to improve our visibility, and a shop where we can sell our products to community members.

5 Discussion

This study primarily focused on examining the main predictors of subjective resilience among women and youth clients of social innovation projects executed in five regions of Ethiopia. The SIPs executed by various implementers were aimed to part with 'the business-as-usual model' to build the resilience of target vulnerable communities.

The findings of this study suggested that the SIPs such as that of the EU-RESET Plus-funded initiatives have the potential to enhance the resilience capacity of their target clients. This possibility, however, is subject to various factors including involvement in a social innovative project, gender, saving, clients' empowerment, and Tropical Live Stock Unit score (see Table 4). The findings resonate with previous studies in discerning the capacity of social/technological innovations in boosting the resilience of their target system and enhance growth if executed at a scale (Wang and Liu, 2016; Lv et al., 2018; Dejene et al., 2024).

The multivariable analysis has shown that a range of variables determine the level of subjective resilience among women and youth. Evidence shows that men and women are differently exposed and have different preferences and capacities to respond to shocks and stressors. The findings revealed that men had relatively higher resilience behavior compared to women. This finding is consistent with the study conducted in Ghana, which reported that female-headed households had reduced capacities to prepare, cope, and recover from the impacts of natural disasters (such as flooding) due to their expected gender roles, relatively larger family sizes, care responsibilities, lower levels of employment, and limited access to resources (Gaisie et al., 2022). This observation of larger family size as a limitation impeding the resilience capacity of the household is challenged by the findings by Theron and Theron (2013) who found that larger family size and kinship being a source of resilience in a South African setting. We can deduce here that it all depends on the capacity of the family members in the sense that those with a greater number of dependent children and adults in a resource-constrained setting may struggle while those having members capable of earning income and raising funds are likely to boost the family's resilience capacity. A study on the Productive Safety Net Program (PSNP) beneficiaries in Ethiopia indicated that resource constraints and other related factors compromised program contributions where beneficiaries had to resort to maladaptive strategies like skipping meals and selling assets to withstand livelihood shocks (Lemma and Cochrane, 2020; Dejene and Cochrane, 2021). It is crucial to safeguard an economic unit be it at macro- or micro-level from shrinking due to such maladaptive measures (see Smythe et al., 2024). The PSNP, however, was vital as it supported a quarter of its beneficiaries to achieve a "mildly food insecure status" (Dejene and Cochrane, 2021).

Gaisie et al. (2022) observations for female-headed households' challenge toward resilience suggest considering gender differentials in project design. This is crucial as resilience is subject to various factors. Female-headed households are often more exposed and sensitive to natural disasters given their lower socioeconomic status, reduced access to information, and limited agency to make adaptive choices. In support of this argument, a case study conducted in Ethiopia found that female-headed households were more likely to reduce meals and eat less preferred foods (Ramilan et al., 2022) during crisis time, implying that women use weak and limited resilience capacities that negatively influence their wellbeing or future adaptive capacities (Theis et al., 2019). A study from southern Ethiopia also consolidates the previous findings that women beneficiaries of the Ethiopian Productive Safety Net Program (PSNP) were found to be affected more than their men counterparts due to inequitable practices and patriarchal gender norms resulting in lack of resources for them resulting in maladaptive coping strategies (Lemma et al., 2023). Men, on the other hand, were reported to have greater resilience capacities with more options to protect and improve their livelihoods and wellbeing over the long term (Ramilan et al., 2022). By implication, SIPs need to strive to facilitate for more possibilities and pathways toward women resilience.

One of the strongest determinants of subjective resilience was the level of empowerment. It was found that women with higher level of empowerment (measured by a set of variables) had much better resilience capacity. This finding simply implies that gender disparities in access and control over strategic household resources such as land and other productive assets determine their level of building and safeguarding productive assets (Kabeer, 2009; Buehren et al., 2019; Ortiz-Ospina and Roser, 2023). In relation to women empowerment, it is important to highlight the importance of women's education as important for resilience capacity. People with better education, knowledge, and skills have more options to tap into government assistance programs (absorptive capacity), adopt new technologies (adaptive capacity), or diversify their livelihoods (transformative capacity) (Evans et al., 2021). This being the case, the gender gap in education among the study population was unacceptably high. The story of M that we recounted in our representative case study for our qualitative study sample proves most of these. She reported a better subjective resilience after she was provided with access to resources, control over assets, and finance due to the opportunities by the SIP in her area. The resilience thinking should eye beyond bouncing back from an adverse situation toward rearranging one's capacity to be productive (Walker et al., 2004; Wu et al., 2013; Tschakert and Shaffer, 2014; Walsh-Dilley and Wolford, 2015; Walsh-Dilley et al., 2016).

The findings revealed that the odds of being in the category of high RC were higher among those who had cash saving compared to those who did not. Previous studies reported that income diversification into wage employment and rural entrepreneurship increased saving which in turn significantly impact resilience (Rota and Urbani, 2021). An influential study by Kabeer (2009) also revealed that women access and control over economic assets is vital for their empowerment. The study suggested that increased number of animals measured in Tropical Livestock Unit (TLU) had in turn increased households' subjective resilience. Having a large number of livestock usually helps as a safety net for drought, and animals tend to be less vulnerable to drought than crop production (Ramilan et al., 2022). Dorward et al. (2009) mentioned four important functions of livestock keeping: buffering against seasonality in income from other activities; supporting complementary (commonly cropping) activities; providing for subsistence consumption; and providing some assets for insurance against unpredictable demands for cash. Given that most of the study households were drawn from pastoral and agro-pastoral areas of Ethiopia, where animal husbandry is a common practice, promoting the quality and quantity of the Livestock would make a big difference in improving resilience.

The study witnessed that participation in RESET Plus innovation program made a statistically significant difference in the level of resilience among respondents. A recent study in Ethiopia confirmed that participation in formal safety net programs can shield a household from the consequences of economic shocks and stress (Mengistu and Assefa, 2019). Based on data drawn from East Hararghe (Ethiopia),130 adopters and 158 non-adopters of irrigation technologies, Dawid et al. (2023) reported that adopters were better off on all indicators of resilience, including access to food and income, assets, agricultural production, stability, and adaptive capacity.

5.1 Implications of the major findings to policy and practice

Harnessing the capacity of SIPs toward resilience building requisites for such projects to be designed in a way is community engaging. This

is crucial for their success as well as their sustainability. The SIPs were found to contribute to boosting the resilience of women and youth, with significant predictors including active involvement, empowerment, gender, savings, and livestock ownership. The implication here is that program and project designers and their stakeholders at large need to ensure the active engagement of their target community throughout the process. Empowerment is foundational. Implementers need to design SIPs in a way they could empower women and youth should they aim to an impactful change toward resilience. This, as evident in previous studies (Tschakert and Shaffer, 2014; Folke, 2016; Thiede, 2016; Li et al., 2023a,b), highlighted the importance of tackling structural issues beyond individual layers. Confirming the findings of this study, Gaisie et al. (2022) pinpointed gender as one of the determinants for a gainful project impact. Hence, project designers need to take gender differentials into account. Saving is another variable noted to boost the resilience capacity of project beneficiaries. Arrangements promoting the saving culture of project beneficiaries could facilitate for sustaining the legacies of SIPs, positively impacting community resilience. This conforms with the findings by Li et al. (2023a,b) in Western China that natural and financial resources proved significant determinants for socio-ecological resilience and sustainable livelihood.

5.2 Limitations of the study and suggestion for further research

Finally, it is worth mentioning that the present study has strength and some limitations. One of the most important strengths of the study is that we have used a representative data collected from the five regions where the selected innovations were implemented. The findings, thus, can be used by authorities as a base for strategic planning, monitoring, and evaluation of programs implemented in various regions. However, the study is not immune to limitations. One peculiar limitation we observed in this study is related to the cross-sectional design adopted, which entailed collection of information at a specific period in time. This limits the ability of the study to make casual inferences. Future studies could add nuance should they adopt advanced designs that enable them pool longitudinal data or evidence from comparative groups. Another focus of study could be how best could such SIPs be scaled out and scaled up with implications of advancing the SDGs.

6 Conclusion

Based on the data collected from 910 households and over a dozen case story interviews, this study concludes that SIPs are crucial in building the resilience of their target clients to withstand shocks. Improving the resilience capacity of vulnerable groups helps the realization the SDGs in lifting up the poor out of poverty. The level of subjective resilience of women and youth clients of SIPs, however, is determined by gender, education, level of empowerment, household size, and participation in the social innovation project and ownership of livestock. Such interventions need to consider these important variables from managerial perspective to better untap their potential. The findings also imply that future interventions that aimed to boost women and youth resilience should consider building access and control of key household resources, encouraging savings, and enhancing human capital (education and training such as financial literacy), and due consideration for alternative pathways to women community members. NGOs, government bodies, and concerned stakeholders need to consider gender differentials from project design to implementation.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Hawassa University Research Ethics Review Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was not obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article because it was verbal informed consent read out to participants and the consent statement was reviewed and approved by the Hawassa University Ethics Review Committee.

Author contributions

MD: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. SY: Writing – review & editing, Writing – original draft, Validation, Software, Methodology, Formal analysis, Conceptualization. TF: Writing – review & editing, Writing – original draft, Validation, Formal analysis, Conceptualization. NR: Writing – review & editing, Writing – original draft, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This research was funded by the EU RESET Plus Innovation Fund through CORDAID Ethiopia, grant number 550363-3 and the APC was funded by the same. However, overall implementation of the study and the conceptualization were conducted independently from the funder.

Acknowledgments

We acknowledge the EU RESET Plus Innovation Fund, The EU Delegation in Ethiopia, CORDIAD Ethiopia and the entire staff, Hawassa University Administration, and our dedicated field data collectors without whom this study could not have been materialized.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Ali, S. M., Appolloni, A., Cavallaro, F., D'Adamo, I., Di Vaio, A., Ferella, F., et al. (2023). Development goals towards sustainability. *Sustain. For.* 15:9443. doi: 10.3390/su15129443

Buehren, N., Gonzalez, P., and Copley, A. (2019). What are the economic costs of gender gaps in Ethiopia? Washington, DC: World Bank.

Dawid, I., Haji, J., and Aman, M. (2023). Evaluating farm household resilience and perceptions of the role of small-scale irrigation in improving adaptability to climate change stress: evidence from eastern Ethiopia. *Front. Clim.* 5:1193910. doi: 10.3389/fclim.2023.1193910

Dejene, M., and Cochrane, L. (2021). Safety nets as a means of tackling chronic food insecurity in rural southern Ethiopia: what is constraining programme contributions? *Canadian J. Dev. Stud.* 43, 157–175. doi: 10.1080/02255189.2021.1914559

Dejene, M., Matewos, T., and Adem, A. (2024). Social innovations for empowering pastoralist women: evidence from Dasenech, south Omo, Ethiopia. *Soc. Sci.* 13:233. doi: 10.3390/socsci13050233

Dorward, A., Anderson, S., Bernal, Y. N., Vera, E. S., Rushton, J., Pattison, J., et al. (2009). Hanging in, stepping up and stepping out: livelihood aspirations and strategies of the poor. *Dev. Pract.* 19, 240–247. doi: 10.1080/09614520802689535

Evans, D. K., Akmal, M., and Jakiela, P. (2021). "Gender gaps in education: the long view" in CGD Working Paper. Washington, DC: Center for Global Development. Available at: https://www.cgdev.org/publication/gender-gaps-education-long-view

Folke, C. (2016). Resilience (Republished). *Ecology and Society*, 21. Available at: http://www.jstor.org/stable/26269991

Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., and Rockström, J. (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecol. Soc.* 15:20. doi: 10.5751/ES-03610-150420

Gaisie, E., Adu-Gyamfi, A., and Owusu-Ansah, J. K. (2022). Gender and household resilience to flooding in informal settlements in Accra, Ghana. *J. Environ. Plan. Manag.* 65, 1390–1413. doi: 10.1080/09640568.2021.1930522

Greenberg, M. (2006). Promoting resilience in children and youth: preventive interventions and their interface with neuroscience. *Ann. N. Y. Acad. Sci.* 1094, 139–150. doi: 10.1196/annals.1376.013

Herrman, H., Stewart, D. E., Diaz-Granados, N., Berger, E. L., Jackson, B., and Yuen, T. (2011). What is resilience? *Can. J. Psychiatry.* 56, 258–265. doi: 10.1177/070674371105600504

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annu. Rev. Ecol. Syst.* 4, 1–23. doi: 10.1146/annurev.es.04.110173.000245

Hornor, G. (2016). Resilience. *J. Pediatr. Health Care* 31, 384–390. doi: 10.1016/j.pedhc.2016.09.005

Kabeer, N. (2009). *Women's control over economic resources and access to financial resources, including microfinance*. World Bank.

Lemma, M., and Cochrane, L. (2019). Policy coherence and social protection in Ethiopia: ensuring no one is left behind. *Societies* 9:19. doi: 10.3390/soc9010019

Lemma, M. D., and Cochrane, L. (2020). Social protection implementation issues in Ethiopia: client Households' perceived enablers and constrainers of the productive safety net program. *Societies* 10:69. doi: 10.3390/soc10030069

Lemma, M. D., Kukem, T. S., Vercillo, S., and Cochrane, L. (2023). Norms, equity and social protection: a gender analysis of the productive safety net Programme in Ethiopia. *Forum Dev. Stud.* 50, 159–181. doi: 10.1080/08039410.2022.2096482

Li, T., Singh, R. K., Cui, L., Xu, Z., Liu, H., Fava, F., et al. (2023b). Navigating the landscape of global sustainable livelihood research: past insights and future trajectory. *Environ. Sci. Pollut. Res. Int.* 30, 103291–103312. doi: 10.1007/s11356-023-29567-6

Li, T., Singh, R. K., Pandey, R., Liu, H., Cui, L., Xu, Z., et al. (2023a). Enhancing sustainable livelihoods in the three Rivers headwater region: a geospatial and obstacles context. *Ecol. Indic.* 156:111134. doi: 10.1016/j.ecolind.2023.111134

Lv, W.-D., Tian, D., Wei, Y., and Xi, R.-X. (2018). Innovation resilience: a new approach for managing uncertainties concerned with sustainable innovation. *Sustain. For.* 10:3641. doi: 10.3390/su10103641

Masten, A. S., Cutuli, J. J., Janette, E. H., and Reed, M.-G. J. (2012). "Resilience in Development" in The Oxford handbook of positive psychology. eds. S. J. Lopez and C. R. Snyder. *2nd* ed (Oxford Academic: Oxford University Press).

Maxwell, J. (2012). Qualitative research design: an interactive approach. Sage Publications, Inc.

Mengistu, F., and Assefa, E. (2019). Farmers' decision to adopt watershed management practices in gibe basin, Southwest Ethiopia. *Int. Soil Water Conserv. Res.* 7, 376–387. doi: 10.1016/j.iswcr.2019.08.006

Ortiz-Ospina, E., and Roser, M. (2023). Economic inequality by gender. Our World in Data. Available at: https://ourworldindata.org/economic-inequality-by-genderPeterson

Peterson, G., Allen, C. R., and Holling, C. S. (1998). Ecological resilience, biodiversity, and scale. *Ecosystems* 1, 6–18. doi: 10.1007/s100219900002

Ramilan, T., Kumar, S., Haileslassie, A., Craufurd, P., Scrimgeour, F., Kattarkandi, B., et al. (2022). Quantifying farm household resilience and the implications of livelihood heterogeneity in the semi-arid tropics of India. *Agriculture* 12:466. doi: 10.3390/agriculture12040466

Rota, A., and Urbani, I. (2021). The small livestock advantage: A sustainable entry point for addressing SDGs in rural areas. IFAD Advantage Series. Rome: IFAD.

Shkabatur, J., Bar-El, R., and Schwartz, D. (2022). Innovation and entrepreneurship for sustainable development: lessons from Ethiopia. *Prog. Plan.* 160:100599. doi: 10.1016/j.progress.2021.100599

Smythe, A., Martins, I., and Andersson, M. (2024). Inequality, poverty, and resilience to economic shrinking. *Int. J. Dev.* 23, 40–81. doi: 10.1108/IJDI-06

Theis, S., Bryan, E., and Ringler, C. (2019). Addressing gender and social dynamics to strengthen resilience for all. In 2019 Annual trends and outlook report: Gender equality in rural Africa: From commitments to outcomes, Vol. 9. Eds. A. R. Quisumbing, R. S. Meinzen-Dick and J. Njuki (Washington, DC: International Food Policy Research Institute) 126–139.

Theron, L. C., and Theron, A. (2013). Positive adjustment to poverty: how family communities encourage resilience in traditional African contexts. *Cult. Psychol.* 19, 391–413. doi: 10.1177/1354067X13489318

Thiede, B. (2016). Resilience and development among ultra-poor households in rural Ethiopia. *Resilience* 4, 1–13. doi: 10.1080/21693293.2015.1094166

Tschakert, P., and Shaffer, L. J. (2014). "Ingredients for social-ecological resilience, poverty traps, and adaptive social protection in semi-arid Africa" in Social–ecological Systems in Transition, global environmental studies. eds. S. Sakai and C. Umetsu (Japan: Springer).

UNDP. (2015). NATIONAL HUMAN DEVELOPMENT REPORT 2014 ETHIOPIA: Accelerating inclusive growth for sustainable human development in Ethiopia. Available at: https://planipolis.iiep.unesco.org/sites/default/files/ressources/ethiopia_nhdr_2014.pdf

United Nations Development Programme (UNDP) (2022). Unpacking deprivation bundles to reduce multidimensional poverty: Global multidimensional poverty index 2022: United Nations. Oxford, UK: Oxford Poverty and Human Development Initiative, University of Oxford.

Wald, J., Taylor, S., Asmundson, G. J. G., Jang, K. L., and Steplton, J. (2006) Literature review of concepts: Psychological resiliency. Toronto (ON): Defence R&D Canada; Contract Report DRDC Toronto CR 2006–073. Available at: https://apps.dtic.mil/sti/citations/ADA472961 (Accessed 17 May 2024).

Walker, B., Holling, C. S., Carpenter, S. R., and Kinzig, A. (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecol. Soc.* 9:5. doi: 10.5751/ES-00650-090205

Walsh-Dilley, M., and Wolford, W. (2015). (un)defining resilience: subjective understandings of 'resilience' from the field. *Resilience* 3, 173–182. doi: 10.1080/21693293.2015.1072310

Walsh-Dilley, M., Wolford, W., and McCarthy, J. (2016). Rights for resilience: food sovereignty, power, and resilience in development practice. *Ecol. Soc.* 21:11. doi: 10.5751/ES-07981-210111

Wang, Y., and Liu, S. (2016). Education, human capital and economic growth: empirical research on 55 countries and regions (1960-2009). *Theoret. Econ. Lett.* 6, 347–355. doi: 10.4236/tel.2016.62039

WFP. (2022). Resilience capacity score. Asset creation, livelihoods and resilience unit (PROR-L) & climate & disaster risk reduction(PRO-C). Thousand Oaks, CA.

WFP. (2023). Resilience capacity score (RCS). I. OUTCOME INDICATORS. Available at: https://docs.wfp.org/api/documents/WFP-0000140225/download/

World Bank. (2020). Ethiopia-poverty-assessment-harnessing-continued-growth-for-accelerated-poverty-reduction.Pdf. International bank for reconstruction and development. Available at: https://documents1.worldbank.org/curated/en/992661585805283077/pdf/Ethiopia-Poverty-Assessment-Harnessing-Continued-Growth-for-Accelerated-Poverty-Reduction.pdf

Wu, G., Feder, A., Cohen, H., Kim, J. J., Calderon, S., Charney, D. S., et al. (2013). Understanding resilience. *Front. Behav. Neurosci.* 7:10. doi: 10.3389/fnbeh.2013.00010