



Food and Agriculture
Organization of the
United Nations

Enhanced metrics for tracking food security and nutrition resilience in Afghanistan

A pilot study

FAO AGRICULTURAL DEVELOPMENT ECONOMICS
WORKING PAPER 26-01

ISSN 2521-1838



Co-funded by
the European Union

Enhanced metrics for tracking food security and nutrition resilience in Afghanistan

A pilot study

Yeshwas Admasu

Rebecca Pietrelli

Patrizia Fracassi

Food and Agriculture Organization of the United Nations

Rome, 2026

Required citation:

Admasu, Y., Pietrelli, R. & Fracassi, P. 2026. *Enhanced metrics for tracking food security and nutrition resilience in Afghanistan – A pilot study*. FAO Agricultural Development Economics Working Paper 26-01. Rome, FAO. <https://doi.org/10.4060/cd8081en>

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

ISSN 2664-5785 [Print]

ISSN 2521-1838 [Online]

ISBN 978-92-5-140416-4

© FAO, 2026



Some rights reserved. This work is made available under the Creative Commons Attribution- 4.0 International licence (CC BY 4.0: <https://creativecommons.org/licenses/by/4.0/legalcode.en>).

Under the terms of this licence, this work may be copied, redistributed and adapted, provided that the work is appropriately cited. In any use of this work, there should be no suggestion that FAO endorses any specific organization, products or services. The use of the FAO logo is not permitted. If a translation or adaptation of this work is created, it must include the following disclaimer along with the required citation: “This translation [or adaptation] was not created by the Food and Agriculture Organization of the United Nations (FAO). FAO is not responsible for the content or accuracy of this translation [or adaptation]. The original English edition shall be the authoritative edition.”

Any dispute arising under this licence that cannot be settled amicably shall be referred to arbitration in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL). The parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of such a dispute.

Third-party materials. This Creative Commons licence CC BY 4.0 does not apply to non-FAO copyright materials included in this publication. Users wishing to reuse material from this work that is attributed to a third party, such as tables, figures or images, are responsible for determining whether permission is needed for that reuse and for obtaining permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

FAO photographs. FAO photographs that may appear in this work are not subject to the above-mentioned Creative Commons licence. Queries for the use of any FAO photographs should be submitted to: photo-library@fao.org.

Sales, rights and licensing. FAO information products are available on the FAO website (www.fao.org/publications) and print copies can be purchased through the distributors listed there. For general enquiries about FAO publications please contact: publications@fao.org. Queries regarding rights and licensing of publications should be submitted to: copyright@fao.org.

Contents

Abstract.....	v
Acknowledgements.....	vi
1. Introduction	1
2. Literature review	3
3. Case study	6
4. Analysis.....	13
5. Conclusion	22
References.....	23
Annex.....	26

Tables

1.	Sample size, by full and dietary modules	9
2.	Consent to interview adult female household member, by province (primary male respondent households only)	13
3.	Determinants of household consent for interviewing an adult female member, male primary respondent households only.....	15
4.	Joint distribution of individual and household dietary diversity categories among primary male respondent households	18
5.	Resilience pillars and dietary diversity.....	19
6.	Minimum Dietary Diversity for Women (MDD-W) and resilience capacity: original vs enhanced... ..	21
A1.	Minimum Dietary Diversity for Women (MDD-W) (aged 15–49 years old) module	26
A2.	Minimum Dietary Diversity for Children (MDD-C) (6–23 months old) module	27
A3.	Summary statistics of households with and without dietary data in the pilot provinces.....	29
A4.	Balance of household characteristics by consent status, male primary respondents	31
A5.	Correlates of Minimum Dietary Diversity for Women (MDD-W)	33
A6.	Observed and predicted average Minimum Dietary Diversity for Women (MDD-W) by province... ..	34
A7.	Model fitness: original vs enhanced resilience capacity index (RCI).....	35
A8.	Minimum Dietary Diversity for Children (MDD-C) and resilience capacity	36

Figures

1.	Geographical coverage of the study.....	7
2.	Interview protocol for individual dietary module.....	8
3.	Proportion of women of reproductive age consuming each food group, during the previous day or night	17
A1.	Adjusted probability of consent for an adult female interview, by province (predictive margins).....	28
A2.	Distribution of predicted probabilities of consent	35

Abstract

Metrics commonly used to assess household resilience fail to capture individual-level dietary vulnerabilities, particularly among women and young children. Considering individual dietary adequacy is essential because it reflects a household's ability to maintain nutritional well-being during periods of stress. This study pilots the integration of two indicators of individual-level dietary diversity, Minimum Dietary Diversity for Women (MDD-W) and Minimum Dietary Diversity for Children (MDD-C), into the Resilience Index Measurement and Analysis (RIMA) resilience-capacity framework, using unique household survey data collected in 2024 across eight provinces in Afghanistan. The analysis tests both the feasibility of collecting individual dietary data in fragile contexts and the added value of these indicators in resilience assessment. Findings reveal notable variation in adult female participation rates in the individual dietary modules of the RIMA survey across provinces, with overall engagement remaining low (32 percent). Female enumerators were more likely to secure consent from male primary respondents to interview an adult female household member, which increased participation in the individual modules by 13–15 percentage points. Relative to non-beneficiaries, FAO-supported households were more willing to participate, even when interviewed by male enumerators, suggesting that prior programme engagement fosters trust and facilitates data collection. For women, higher dietary diversity is associated with household wealth, education, and income diversification; for children, it is associated mainly with access to basic services, such as health care, clean water, and markets. In the original resilience framework, which relies on household-level indicators of food access, more than one in five women in the most resilient households still fails to achieve acceptable MDD-W. The enhanced model demonstrates that incorporating indicators of individual dietary diversity into RIMA leads to a more nuanced understanding of household resilience capacity, offering practical lessons for data collection in culturally sensitive, restrictive, and fragile settings.

Keywords: resilience measurement; individual dietary diversity; data collection; fragile contexts.

JEL codes: D10, I32, Q18

Acknowledgements

We appreciate the valuable suggestions provided by Kwame Osei (Food and Nutrition Division [ESN], Food and Agriculture Organization of the United Nations [FAO]) regarding the use of individual dietary diversity indicators. Special thanks to Diana Carter (ESN, FAO) for her valuable contributions during the design phase. The successful implementation of the data collection was made possible through the invaluable contributions and expertise of Mohammad Babury (FAO Representation in Afghanistan), Ziaullah Karokhel (FAO Representation in Afghanistan) and Zikrullah Bahadury (FAO Representation in Afghanistan). The success of this research was entirely dependent on the participation of women enumerators and respondents in Afghanistan. Without their dedication and willingness to engage, this work simply would not have been possible.

Finally, we would like to thank the Agrifood Economics and Policy Division (ESA) Editorial Board, in particular, Ana Paula de la O Campos (ESA, FAO) and Andrea Cattaneo (ESA, FAO) for review, and Daniela Verona (ESA, FAO) and Craig Lawson (ESA, FAO) for editorial and layout support as well as publishing coordination.

1. Introduction

Over the past decade, the world has faced a pandemic and an economic downturn (FAO *et al.*, 2025). These events, combined with protracted conflicts and economic shocks, have contributed to rising hunger, while climate-related disasters have become more frequent. These overlapping crises often erode household assets, disrupt agrifood systems, and reduce economic opportunities, leaving communities highly vulnerable to future shocks. In such contexts, building resilience has become a central focus for many organizations. However, resilience measurement remains complex and often overlooks intra-household food allocation and its implications for individual dietary diversity.

Existing resilience measurements typically focus on the household level, using indicators such as the Food Consumption Score (FCS) or the Household Dietary Diversity Score (HDDS) (FAO, 2020). While these indicators are useful for capturing an overall picture of food access and dietary diversification at the household level, they fail to capture individual-level dietary outcomes (FAO *et al.*, 2020). Access to enough food is a critical step, but it is not sufficient. Adequate nutrition requires more than simply meeting a household's daily calorie needs, it also depends on the quality, diversity and distribution of diets within the household (FAO *et al.*, 2022; Jones *et al.*, 2013; Novotny *et al.*, 2023). A household may be classified as food secure, while individual members, especially women in the household eat inadequate diets, and/or children miss out on the nutrients they need to grow and develop. Without a closer look, those most at risk remain invisible, and household resilience is only partially captured.

To address this limitation, there is growing recognition of the need to expand food security metrics beyond availability and access to include diet quality at the individual level, particularly for nutritionally vulnerable groups. In a major move to advance progress towards achieving Zero Hunger (SDG2), the United Nations officially adopted Minimum Dietary Diversity (MDD) as a Sustainable Development Goal (SDG) indicator at its 56th session in New York.

This study seeks to address a key measurement gap by integrating individual-level proxy indicators for dietary diversity, such as MDD, into resilience analysis. Focusing on a pilot study in Afghanistan, a country marked by fragility and food insecurity, we test enhanced resilience metrics that include the Minimum Dietary Diversity for Women (MDD-W) and Minimum Dietary Diversity for Children (MDD-C). The objective of this paper is twofold. First, to assess the feasibility of collecting and integrating individual-level dietary data in fragile settings. Second, to pilot the incorporation of individual dietary diversity indicator into resilience assessment. This paper proposes an enhanced Resilience Index Measurement and Analysis (RIMA) framework (FAO, 2016) that incorporates MDD-W, offering a broader approach to resilience measurement. Although RIMA is computed at the household level, integrating individual-level survey data and dietary diversity metrics allows this refined model to provide a more accurate assessment of household resilience capacity, especially for vulnerable populations, by capturing intra-household variation in model outcomes.

Afghanistan presents a unique context, offering both a critical need and an opportunity to explore food security and dietary resilience. Years of conflict, worsening climate conditions, and global crises have led to failed harvests, livestock losses, and rising food prices that strain coping capacities and make basic nutrition increasingly unaffordable (World Bank, 2024). As a result, hunger and malnutrition remain widespread. Between March and April 2025, around 12.6 million people (25 percent of the population) were facing high levels of acute food insecurity classified in crisis or emergency (IPC Phase 3 or 4), with projections showing an improvement in the food security situation with around 9.5 million (32 percent) by October 2025 (IPC, 2025). Many families rely on limited, low-nutrient diets. In protracted crises, women and children are typically affected disproportionately. For example, only 14.8 percent of Afghan children aged 6–23 months receive the

minimum dietary diversity needed for healthy growth, and fewer than seven percent meet acceptable feeding standards (UNICEF, 2023). Women are also at high risk of nutritional deficiencies, often due to poverty and cultural practices that leave them with less food or poorer-quality meals. This illustrates that food insecurity involves more than access, it also concerns how food is distributed and whether individual nutritional needs are met. Standard indicators based on household-level data often overlook these critical elements. As a result, there is growing support for nutrition-sensitive approaches that go beyond basic food metrics to include individual-level data for understanding and addressing food insecurity in fragile contexts.

For this analysis, we used a unique household survey collected in 2024 across eight purposively selected provinces in Afghanistan. We began by comparing household- and individual-level dietary diversity indicators to assess how well these measures align. Next, we analyzed the relationship between resilience pillars and individual dietary diversity. We then estimate an enhanced RIMA resilience capacity index using a structural equation model, where the latent resilience factor predicts not only household access to food, but also women and children dietary diversity.

Dietary data were collected from adult women following field protocols requiring eligibility and consent. Only one adult woman per household was interviewed. Among households with male primary respondents, only 32 percent granted permission for an interview with an adult female member, highlighting selection constraints in fragile contexts. These findings underscore the importance of developing efficient, context-sensitive strategies to strengthen data collection in complex field settings. Results reveal that mismatches between household-level and individual-level dietary outcomes are common. For example, households classified as food secure often include women or children who do not meet minimum dietary diversity requirements. We observed that women's dietary diversity is positively associated with household adaptive capacity and asset ownership. Furthermore, integrating individual-level dietary diversity indicators into the RIMA framework improved model fit and provided a more robust assessment, with stronger and more consistent household classification.

These findings align with existing literature advocating for an individual lens within household analyses. An important and closely related body of literature that motivates our work is that on multidimensional poverty. The Multidimensional Poverty Index (MPI) illustrates how individual deprivations can be integrated into household indices using a dual-cutoff approach, revealing intra-household disparities masked by aggregate statistics (Alkire and Foster, 2011). Similarly, research on intra-household allocation shows that resources and food are distributed unevenly and that women's bargaining power shapes nutrition outcomes (Duflo, 2003; FAO *et al.*, 2020; Hoddinott and Haddad, 1995). Consistent with this evidence, recent work emphasises that household food security does not equate to individual nutrition and calls for integrating anthropometric and dietary diversity measures with household metrics (FAO *et al.*, 2020; Jones *et al.*, 2013).

Against this backdrop, this study contributes by incorporating individual-level dietary indicators to uncover hidden vulnerabilities overlooked by household-level measures and by examining gender-related barriers to data collection, particularly in contexts where women's participation is constrained by social, cultural, and structural factors. Addressing these barriers is critical for improving data quality and representativeness in settings where such information is most needed.

2. Literature review

Securing food security in fragile and low-income countries is especially challenging because of the overlapping effects of conflict, economic volatility, climate shocks and global disruption such as pandemics. Conflicts not only displace people and limit humanitarian access but also damage infrastructure and the agricultural systems (Vesco *et al.*, 2025). In many cases, food security and conflict reinforce one another. Repeated droughts and floods further erode the capacity of rural households to sustain food production or rebuild their livelihoods.

As food security efforts shift from crisis response to building long-term resilience, interest has grown in how to effectively measure resilience. Although measuring resilience is complex, several analytical frameworks and indices have been developed over the past decades. Barrett and Conostas (2014) identify three approaches to resilience measurement drawing on a systemic scoping review: resilience as capacity, as a normative condition and as return to equilibrium.

Resilience as a capacity is the most widely adopted conceptualization, framing resilience as “the capacity that ensures stressors and shocks do not have long-lasting development consequences” (Constas, Frankenberger and Hoddinott, 2014 pp. 4). In this approach, resilience is a latent multidimensional construct shaped by both observable and unobservable factors, often measured through indicators such as asset ownership, access to basic services, strength of social networks, the ability to adapt to changing circumstances (Birhanu *et al.*, 2017; Stanford *et al.*, 2017). The two most common tools used to quantify resilience capacities are the FAO’s RIMA (Alinovi, Mane and Romano, 2010; d’Errico and Di Giuseppe, 2018; d’Errico, Romano and Pietrelli, 2018) and TANGO’s index of resilience capacity¹ (Smith and Frankenberger, 2018).

RIMA uses factor analysis to estimate four pillars (access to basic services, assets, social safety nets, and adaptive capacity) from standard household and community survey data. The TANGO approach incorporates absorptive, adaptive, and transformative capacities to determine resilience. These tools treat resilience as an explanatory variable of well-being outcomes, not the outcome itself, making it crucial that resilience measures show strong correlation with the outcome of interest (d’Errico, Grazioli and Pietrelli, 2018). Both tools seek to quantify household resilience capacity at the household level (FAO, 2020). Although these resilience frameworks offer valuable insights, particularly through their focus on key pillars such as access to assets, services, and food security indicators, they often fall short in capturing the complex and nuanced dynamics of nutritional resilience, especially among vulnerable populations.

Resilience as a normative condition anchors resilience to a minimum standard of living, similar to how poverty lines are used in poverty assessments (Barrett and Conostas, 2014; Béné *et al.*, 2016; Conostas *et al.*, 2014). This approach defines resilience as a normative condition by focusing on the likelihood of achieving a minimum standard of living despite facing shocks or stressors (Barrett and Conostas, 2014). Cissé and Barrett (2018) developed a statistical approach that estimates this likelihood using observable data such as food consumption.

Resilience as a return to equilibrium defines resilience as the capacity of households to recover their well-being after a shock, focusing on post-shock outcomes rather than underlying capacities (Constas, Frankenberger and Hoddinott, 2014; Hoddinott, 2014; Knippenberg, Jensen and Conostas,

¹ The TANGO resilience measurement approach often calculates an index of resilience using only the capacity indicators, and then separately assess how that capacity predicts changes in food security in the face of shock (FAO, 2020).

2019; Vollenweider, 2015). This approach focuses on the trajectory of recovery, assesses whether well-being indicators like food security return to pre-shock levels.

One of the most widely used approaches, the RIMA, primarily relies on traditional household-level food security indicators such as the Food Consumption Score (FCS), Household Dietary Diversity Score (HDDS), and Coping Strategy Index (CSI). While these indicators effectively capture aspects of food availability and coping mechanisms, they often overlook the quality and adequacy of diets, especially for nutritionally at-risk groups, including women of reproductive age and young children, whose dietary needs are distinct and critical to long-term well-being. While current resilience studies offer useful insights, they often overlook intra-household differences. A household considered food secure may still include individuals with poor dietary diversity due to unequal intra-household food allocation or differences in access and availability within the household, factors that household-level indicators often fail to capture. A more complete resilience analysis would require individual-level data, but collecting this in fragile contexts is often costly and complex (Upton, Cissé and Barrett, 2016). As a result, most studies rely on household-level proxies, such as HDDS and FCS.

These resilience measurement approaches have been applied in various contexts. For example, the RIMA-II framework has been widely applied in regions such as Latin America and the Caribbean (Sibrian *et al.*, 2021), and Mali (Murendo, Kairezi and Mazvimavi, 2020). The TANGO approach has been used in China (Han, X. *et al.*, 2024). In the literature, the outcome indicators representing food security and wellbeing typically focus on the household level, including measures like the FCS, HDDS, food insecurity experience scale (FIES), and per capita food expenditure. These indicators assess whether households can maintain consumption and avoid hunger during shocks. However, individual-level dietary diversity, micronutrient intake, and nutritional status have rarely been directly included in resilience measurements. This gap underscores the need to evaluate not only whether households have sufficient food but also whether members within those households can maintain a diverse, nutritious diet and good nutritional status.

The absence of individual-level indicators, such as the MDD-W and MDD-C, limits the ability of existing frameworks to assess dietary diversity. Moreover, conventional household-level analysis tends to mask intra-household disparities, making it difficult to identify whether vulnerable members are benefiting from food security interventions. Without disaggregated data, the specific needs and risks faced by women and children remain hidden, leading to an incomplete understanding of resilience at the individual level.

Our approach relates to the literature on intra-household allocation and gendered nutrition outcomes, which shows that household resources within households are not necessarily pooled and that women's control over assets and income is linked with improved child diet and growth (Doss, 2013; Hoddinott, 2014). For instance, Doss (2013) highlights the importance of women's economic empowerment in promoting positive dietary and growth outcomes for children. Headey, Hoddinott and Park (2017) indicate that household wealth, asset and parental education are important predictors of nutritional improvements in many countries.

Recent literature increasingly acknowledges that food security does not automatically equate to good nutrition (Simelane and Worth, 2020), and does not directly reflect individual dietary adequacy (FAO *et al.*, 2020). Tools like RIMA-II provide a structured way to assess resilience at household-level, but they often neglect the gendered and individual dimensions of nutrition. In response, there is a need to integrate more targeted indicators like MDD-W and MDD-C, which are better suited to capture dietary diversity within households. Empirical evidence supports this shift. Studies in Mali (d'Errico and Pietrelli, 2017) and Nepal, Bangladesh and Uganda (Zaharia *et al.*, 2021) indicate strong links between household resilience and improved dietary outcomes for children. d'Errico and Pietrelli

(2017) found that in Mali, household resilience is negatively correlated with both the probability and the number of malnourished children, based on measures like stunting, wasting, and underweight.

However, few studies have gone further to incorporate gender-sensitive measures or to address the challenges of collecting reliable dietary data in contexts where women's participation may be limited due to social or cultural constraints. To address this, we incorporated MDD-W and MDD-C, that reflect dietary diversity and micronutrient adequacy for women of reproductive age and children into resilience assessment. These indicators can be linked to resilience components such as assets, education (adaptive capacity), and social protection where previous research has documented significant correlations and programme effects.

3. Case study

Dietary diversity is a key indicator of diet quality and micronutrient adequacy, particularly for vulnerable groups such as women and children. We propose incorporating two commonly used dietary diversity indicators, MDD-W and MDD-C, into the RIMA framework to provide insight into food security and nutritional resilience. Integrating these indicators will enable better assessment of micronutrient adequacy, particularly among women and children, who are frequently overlooked in resilience analyses. We selected these indicators due to their relevance in capturing individual-level dietary diversity, a critical dimension of dietary resilience. These indicators are endorsed by global standards and are widely used as proxies for diet diversity monitoring, including Sustainable Development Goal (SDG 2) indicators.

MDD-W reflects the micronutrient adequacy of women's diets. It assesses whether women of reproductive age (15–49 years) within the household have consumed a diverse diet, at least five out of ten defined food groups consumed, in the previous 24 hours (Table A1). A higher proportion of women meeting this threshold indicates greater likelihood of micronutrient adequacy in the population (FAO, 2021). Given their vulnerability to nutrient deficiencies and their central role in household food allocation and preparation, MDD-W serves as a proxy for micronutrient adequacy. Similarly, MDD-C captures the diet quality of children aged 6–23 months, a critical window for growth and development (WHO and UNICEF, 2021). Children in this age group are highly sensitive to nutritional shocks, and inadequate dietary diversity is strongly linked to stunting and wasting. Using MDD-C allows assessment of whether households can protect child diets during times of stress, a key dimension of resilience.

These indicators go beyond household-level averages to reveal intra-household food distribution and use, especially for nutritionally at-risk members. This makes them highly suitable for integration into resilience analysis. Furthermore, these indicators have gained importance because a lack of diversity in diet is strongly associated with micronutrient deficiencies and poor health outcomes (Moursi *et al.*, 2008). For example, in Afghanistan and similar contexts, dietary diversity scores are low: only 14.8 percent of Afghan children aged 6–23 months meet the minimum dietary diversity threshold for healthy growth, and fewer than seven percent meet acceptable feeding standards (Moursi *et al.*, 2008). Likewise, fewer than one-third of women in crisis-affected areas meet the minimum dietary diversity threshold. This indicates widespread nutritional insecurity, despite food availability at the household level.

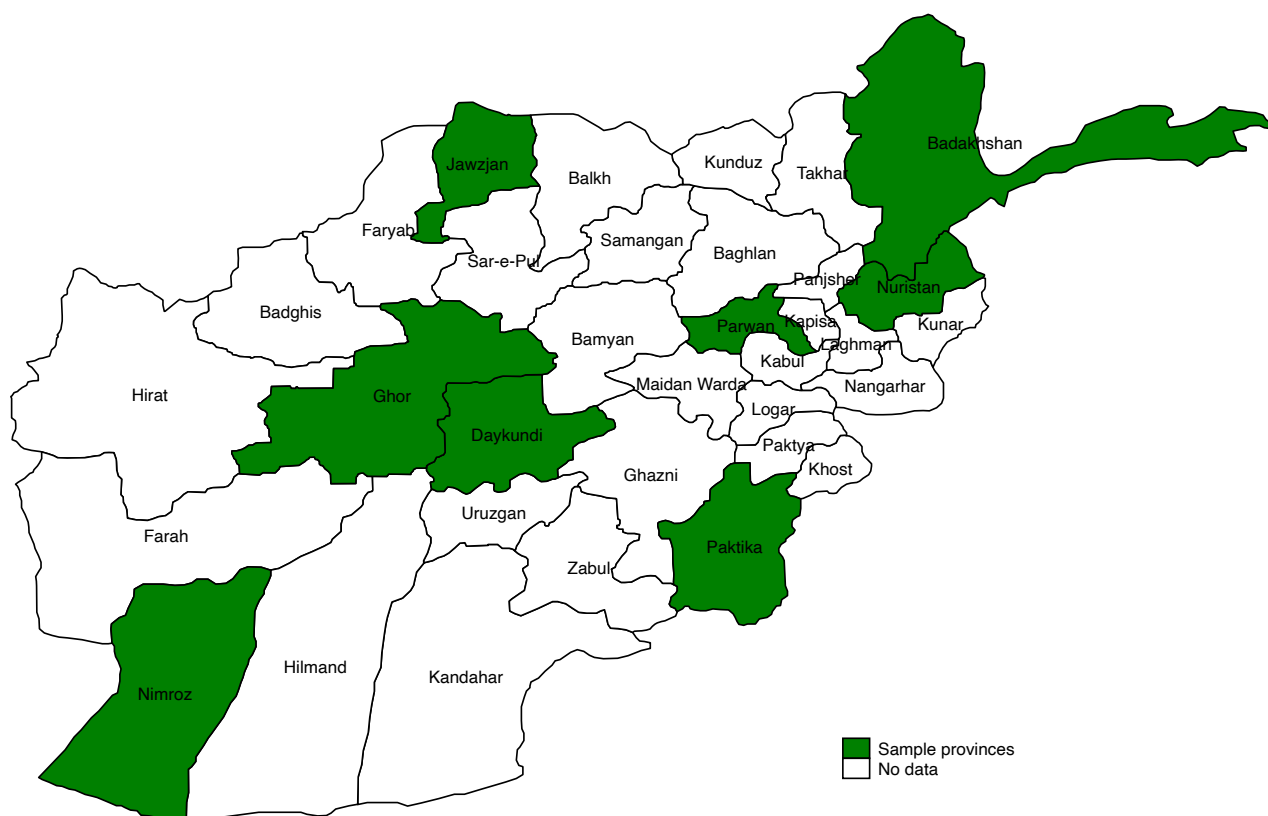
There is a notable gap in the incorporation of individual-level dietary diversity indicators into resilience measurements. We build on the RIMA framework, using its core pillars to measure resilience, and extend the outcome focus to include individual dietary diversity indicators. We argue that resilience should reflect not only a household's ability to cope with shocks, but also its capacity to maintain diverse diets for its members during crisis. To capture this, we propose nutrition sensitive resilience framework that introduces MDD-W and MDD-C as key outcome measures. Enhancing RIMA with nutrition-sensitive indicators will improve targeting interventions, and policy effectiveness.

In this framework, each household provides one observation for women's dietary diversity (an adult women of reproductive age, often the mother), and one for a child aged 6–23 months. These individuals serve as a key reference for examining intra-household food access and diet diversity. While traditional resilience pillars support household food access, our framework also checks whether that access translates into diverse diets at the individual level. For example, a resilient household may maintain food quantity during crises, but if cultural norms prioritize men, women and children may still have poor-quality diets. Conversely, a low-resource household may demonstrate resilience by prioritizing nutrition for women and children.

3.1 Data

The data used in this paper come from the FAO-RIMA Afghanistan Survey,² conducted in two rounds to monitor household resilience to food insecurity among FAO-supported households. In the 2024 survey round, a pilot dietary diversity indicator module was implemented in eight purposively selected provinces (Figure 1). A purposeful sampling strategy was used to select provinces where female respondents could participate more openly. Openness was assessed based on prior survey experiences and consultations with local experts regarding attitudes toward women's participation. Out of the country's 34 provinces, eight were chosen based on their relatively high level of openness to female household members participating in the survey.

Figure 1. Geographical coverage of the study



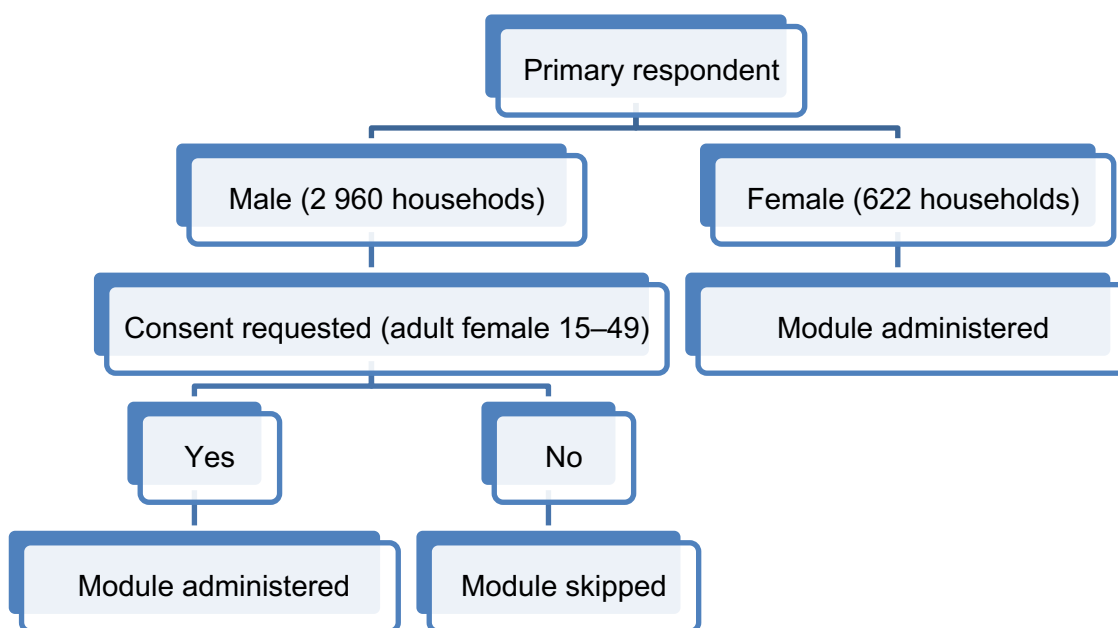
Notes: Refer to the disclaimer on page ii for the names and boundaries used in this map. The Resilience Index Measurement and Analysis (RIMA) core survey covers all provinces. Provinces shaded in green are the eight where the 2024 pilot module was administered; white provinces had the core RIMA only (no pilot). The map illustrates study coverage and is not nationally representative. Administrative boundaries are for reference only and do not imply official endorsement.

Sources: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted in August 2024 and HDX (The Humanitarian Data Exchange) 2024. Common Operational Dataset (COD) – Subnational Administrative Boundaries. GeoBoundaries. [Accessed on 28 October 2024]. <https://data.humdata.org/dataset/geoboundaries-admin-boundaries-for-afghanistan>. Licence: CC BY-IGO, modified by the authors.

² Please refer to the first-round survey available at: <https://microdata.fao.org/index.php/catalog/2696/study-description>

This pilot was administered to all the households drawn from the RIMA sample in the selected eight provinces (3 582). Among these households, 83 percent had a male primary respondent and 17 percent had a female primary respondents. Given that the dietary diversity module requires responses from an adult female household member, a specific interview protocol was followed based on the gender of the main respondent (Figure 2). First, when the primary respondents were male, enumerators requested permission to privately interview one adult female household member (aged 15–49) for the dietary module. If permission was obtained, the module was administered privately to the woman, at the end of the interview conducted with the male respondent.³ In cases where direct access was not granted, the dietary diversity module was skipped to maintain data integrity. This approach respected cultural sensitivities and prioritized the collection of reliable, gender-specific and child-level data on dietary practices. Second, when the primary respondent was female, the module was administered directly without additional protocol to collect information on the household consumption and dietary practice, as well as her personal individual dietary information. In each consenting household, only one eligible woman was interviewed, and household that did not provide consent were excluded from the individual dietary modules and from the analysis. This approach ensures that the MDD-W data were collected only from female respondents. For the child indicator, data were collected only in households with an eligible child (aged 6–23 months) and a consenting caregiver.

Figure 2. Interview protocol for individual dietary module



Notes: The diagram summarizes how the individual dietary module was administered. Among households with male primary respondents, consent was requested from an eligible adult woman (aged 15–49). If consent was granted, the module was administered; if not the module was skipped. Among households with female primary respondent, the module was administered directly without additional consent.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

³ Households where the primary respondent was male were asked for their consent for an adult female household member to participate in the nutrition modules. “Now, I would like to ask one female member of your household, aged between 15 and 49, a few questions about nutrition modules. Are you willing to proceed? (Yes/No)”.

Table 1. Sample size, by full and dietary modules

	Primary respondent		Total
	Male	Female	
Resilience Index Measurement and Analysis (RIMA) full sample	2 960	622	3 582
Minimum Dietary Diversity for Women (MDD-W) sample	960	622	1 582
Minimum Dietary Diversity for Children (MDD-C) sample	520	201	721

Notes: Number of households interviewed in the eight provinces. Primary respondents refer to the person who completed the core Resilience Index Measurement and Analysis (RIMA) modules. a) Resilience Index Measurement and Analysis (RIMA) sample includes all households with completed core modules. b) Minimum Dietary Diversity for Women (MDD-W) sample includes households where an adult woman (15–49) completed the women’s dietary modules. Households without consent is excluded. c) Minimum Dietary Diversity for Children (MDD-C) sample includes households with at least one child aged 6–23 months and a consenting caregiver.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Collecting women’s dietary data presented challenges due to restriction on female movement and employment under the de facto authorities. Fieldwork was carried out by mixed-gender teams, with 19 percent of the enumerators being female. Wherever possible, female enumerators privately interviewed female respondents. Where this was not possible, male enumerators had to administer the dietary modules in the presence of a male guardian or through a senior female household member. Enumerators were trained to use culturally appropriate food examples to support understanding.

After adhering to the described data collection protocol, the final analytical sample comprised 1 582 adult female respondents for MDD-W and 721 households with eligible children for MDD-C (Table 1). These samples were obtained from two groups: households with male primary respondents who permitted a female adult to participate, and households with a female primary respondent.

Due to the nature of the sample, caution should be exercised when interpreting the findings of this study. While the survey is representative of FAO beneficiary households at the province level for the entire country, the dietary pilot sample is representative of FAO beneficiary households within the selected eight provinces. Importantly, the pilot sample is not representative of women or children living in these provinces. First, the results cannot be used to provide province-level representative information on individual indicators, as the sample frame was drawn from FAO beneficiaries, not from a population-based frame. Therefore, external validity pertains to households eligible for or reached by FAO programming, rather than to the general population in each province. The estimate including individual-level dietary information are computed using FAO’s beneficiary-frame sampling weights. Second, the individual-level outcomes are not representative at individual level. A full household roster was not implemented and, consequently, the target respondent was not randomly selected, which may introduce selection risk for individual-specific indicators. This suggests the findings cannot be generalized beyond the study group.

On the other hand, data serve two important purposes. First, they help us assess the feasibility of collecting individual-level dietary indicators in project contexts where sampling frames are designed at the household level and baseline individual data are not available. This approach builds on other work such as the Women’s Empowerment in Agriculture Index (WEAI) that uses household-based sampling with an adult male and female individual interviews to capture intra-household outcomes (Alkire *et al.*, 2013; Malapit *et al.*, 2019), we adapt this logic into resilience measurement. Second,

they provide a testing ground for methodological advances in resilience estimation, with potential future applications in projects. Thus, the analysis is intended to provide insights into program feasibility and methodological testing, rather than to generate country-wide estimates.

Finally, the dietary modules focus on collecting key information related to dietary diversity of non-pregnant women aged 15–49 years (MDD-W) (Table A1) and young children aged 6–23 months (MDD-C) (Table A2). The integration process involved a discussion with nutrition experts, country office colleagues and a careful adaptation of the FAO’s MDD-W guide (FAO, 2021) to align with local Afghan dietary practices. This was critical in capturing more accurate data on women’s and children’s dietary diversity data, which is often inadequately represented in traditional resilience survey methods. To support collection of quality data, four training sessions were conducted to enumerators and supervisors, including on dietary data collection, probing techniques, ethical considerations, and interviewing female respondents in male-primary respondent households. Trainers include local practitioners familiar with the Afghan context. For validity and cultural relevance, the tool was pre-tested through small-scale pilot in two selected districts.⁴

3.2 Empirical method

First, we model household consent for adult women’s participation in the dietary module. Second, we correct for nonrandom consent and generate out-of-sample predictions for women’s dietary diversity. Third, we analyse the association between resilience pillars and dietary diversity using the RIMA capacity framework to propose an enhanced model of resilience capacity.

To investigate factors influencing consent, we employ the following probit specification:

$$\Pr(C_{ip} = 1 | X_{ip}, \gamma_p) = \Phi(X_{ip}\beta + \delta fem_{ip} + \gamma_p) \quad (1)$$

Where C_{ip} is a binary indicator equal to 1 if household i residing in province p gives consent for an adult female household member to participate in the dietary modules, and 0 otherwise, X_{ip} is a vector of household- and individual-level characteristics, which includes age and literacy status of the household head, household composition, wealth and agricultural asset indices, access to electricity, number of income sources, land size, livestock holding (measured in Tropical Livestock Units, TLU), shock exposure, and receipt of assistance (see summary statistics of variables in Table A4 in the annex). We also control for survey conditions, such as the gender of enumerators (fem_{ip}). γ_p is province fixed effect that account for unobserved regional differences that could impact household consent behaviour. Average marginal effects are reported, with standard errors clustered at village level.

Next, we generate provincial-level estimates of MDD-W in provinces where the dietary diversity module was administered but including household not directly observable (see summary statistics of variables in Table A3 in the annex). To address potential selection bias and to extrapolate dietary diversity beyond the observed households, we employ a two-step procedure combining inverse-probability weighting (IPW) and out-of-sample prediction. Due to consent procedures, not all households in the pilot-sample provinces consented to the MDD-W module. To correct for potential nonrandom consent, we first estimate a probit model for consent (Equation 1) that includes the outcome covariates X_{ip} and consent-only predictor used as exclusion restrictions, an indicator for female enumerator (fem_{ip}). This variable plausible affect the likelihood that an adult woman consent

⁴ The pilot test conducted on 17 and 18 July 2024 in Mohammadagha and Mahmood Ragi districts, in Logar and Kapisa provinces respectively.

to be interviewed but, conditional on X , do not directly determine individual dietary diversity. We then computed predicted probabilities of consent and constructed inverse-probability weights as the mean consent rate divided by each household's predicted probability, thereby re-weighting the outcome sample to resemble the full pilot-sample province. Extreme values of the weights are trimmed to improve stability. As a robustness check, we also use a control-function approach by including the inverse Mills ratio from consent equation in the outcome model.

Using the weighted sample of consenting households in the pilot provinces where MDD-W module was administered, we then estimate the outcome model for MDD-W (Equation 2). The weighted probit model as:

$$\Pr(Y_{ip} = 1 | Z_{ip}) = (Z_{ip}\beta + \gamma_p) \quad (2)$$

Where Y_{ip} is the main outcome variable (MDD-W or MDD-C), is an indicator variable equal to 1 if individual i met minimum dietary diversity, 0 otherwise. Z_{ip} includes the same vector of covariates as in the consent model (Equation 1). The model includes province fixed effects and estimated using consent weights (w_{ip}^C) to correct for selection bias. After estimating the model (Equation 2), coefficients are then used to predict probabilities of achieving dietary diversity for households where the MDD-W module was not administered, allowing out-of-sample inference on dietary outcome. Finally, we obtain province-level estimates as a weighted means of predicted probabilities. Our estimates are based on the assumption that all relevant predictors of dietary diversity are observed, unobserved factors at the household or province level may bias the out-of-sample prediction. Thus, reliance on observable characteristics is a limitation as omitted variable bias could lead to under-or over-estimation of dietary diversity in observation lacking direct data.

Finally, we examine how resilience capacities are associated with dietary outcomes using the RIMA framework. In this study, resilience is estimated using latent variable statistical techniques to estimate the RCI (FAO, 2016). The methodology is based on four key resilience pillars: access to basic services (ABS), assets (AST), social safety nets (SSN), and adaptive capacity (AC). These are integrated with food security measures such as the FCS, CSI, and HDDS. We also tested the model by replacing HDDS with MDD-W and MDD-C.

We first constructed the resilience pillars and overall index. The MDD-W and MDD-C are not included as inputs to the RCI to avoid mixing outcomes with capacities, but we used them in two ways. First, as outcome indicator to assess whether RCI aligns with individual dietary outcomes. We examined how RCI correlates with the individual dietary diversity outcomes, which tests whether the existing resilience index predicts dietary resilience. To this end, we estimate the following probit regression model:

$$\Pr(Y_{ip}) = \alpha_0 + \beta_1 ABS_i + \beta_2 AST_i + \beta_3 AC_i + \beta_4 SSN_i + X_{ip}\delta + \gamma_p + \varepsilon_i \quad (3)$$

Where Y_{ip} is the main outcomes of interest (MDD-W or MDD-C), is an indicator variable equal to 1 if individual i met minimum dietary diversity, 0 otherwise.⁵ Resilience capacity pillars are constructed using RIMA-II, ABS_i (access to basic service), AST_i (assets), AC_i (adaptive capacity), and SSN_i (social safety nets). X_{ip} is household and individual level characteristics including household composition, shocks, receipt of assistance, gender and age of household head. γ_p are province level fixed effects,

⁵ Following Tabe-Ojong (2024), we used MDD-W as the dependent variable in the regression analysis.

and ε_i is the error term. This approach helps identify whether resilience capacity predicts individual-level dietary diversity, controlling for other factors.

Second, we build an enhanced resilience index that integrates dietary information directly. We estimate two structural equation models: (i) an original RIMA in which latent resilience factor is measured by ABS, AST, SSN, and AC and predicts DCS and HDDS; (ii) an enhanced model in which the same latent factors also predict MDD-W and MDD-C. For both the original and enhanced RIMA models, we conducted a standard validation check. Overall model fit is evaluated using the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). These metrics are reported side by side to determine whether incorporating MDD-W and MDD-C leads to an improvement or worsening in model fit. This allows us to see how strongly dietary results load into the resilience score and to generate updated model fit.

4. Analysis

This section presents the results, starting with a discussion of the determinants of women’s participation in the survey. We then compare household food security scores with individual dietary indicators to assess the extent to which household-level and individual-level results align. Next, we explore how dietary indicators can enhance a RIMA-based resilience capacity assessment. We begin by examining the relationship between RIMA’s resilience pillars and dietary diversity indicators. Finally, we compare the original resilience capacity model, based solely on household-level data, with an updated version that integrates individual-level dietary information. This comparison highlights how indicators such as MDD-W offer additional insights into resilience analysis beyond what household-level data alone can provide.

4.1 Consent for participation of female respondents

The analysis of adult female participation in the survey within male-headed households reveals significant regional disparities, highlighting how cultural and social norms strongly influence the data collection process. Overall, 32.47 percent of households expressed willingness, while a substantial majority (67.53 percent) declined (Table 2). Particularly, provinces such as Badakhshan (59.77 percent), Ghor (52.32 percent), and Daykundi (49.44 percent) show higher levels of consent for female participation, indicating moderate openness within their socio-cultural landscapes. In contrast, provinces such as Nimroz (0.54 percent) and Parwan (5.57 percent) reported significantly low or no willingness rates. Paktika (22.27 percent) and Jawzjan (32.79 percent) also demonstrated lower participation rates, reinforcing the existence of region-specific dynamics that shape household decision-making. These findings underscore the necessity of employing culturally sensitive and contextually informed methodologies in survey design and implementation.

Table 2. Consent to interview adult female household member, by province (primary male respondent households only)

Provinces	Number observations	Percent
Badakhshan	353	59.77
Daykundi	356	49.44
Ghor	388	52.32
Jawzjan	369	32.79
Nimroz	367	0.54
Nuristan	409	33.25
Paktika	431	22.27
Parwan	287	5.57
Total	2 960	32.47

Notes: Percent is the share of sampled households that granted permission for an adult woman to be interviewed in the household survey. “Number observations” is the count of households with a recorded consent outcome in each province (N = 2 960 across 8 provinces), and “Percent” is the proportion of households that grant consent. Figures are simple (unweighted) proportions. The measure reflects willingness at the time of interview only. The sample includes only male primary respondent’s households.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

We test whether differences in consent rates across provinces are driven by household composition or reflect genuine location effects by estimating a probit model with province fixed effects and household- and individual covariates (see Equation 1).

Figure A1 in the annex presents the adjusted probability of household consent for adult female interview across provinces, based on predictive margins with 95 percent confidence intervals (Figure A2 in the annex). As shown, the adjusted predictive margins closely track the actual participation rate in Table 2. Badakhshan, Daykundi, and Ghor remain the most permissive provinces in terms of consent rates. In contrast, Jawzjan and Paktika show substantially lower rates. Parwan stands out as an extreme outlier, with a predictive rate close to zero and non-overlapping 95 percent confidence intervals, suggesting a high degree of certainty about its low participation. Further, Nimroz's also exhibits a near-zero consent rates that produces quasi-separation, prompting additional data and fieldwork checks.

Beyond the analysis of provincial patterns, we use a probit model to explore associations between various factors and participation at both the household and individual levels. Table 3 presents results from three probit models of consent to the MDD-W dietary diversity module for an adult female. Model 1 includes all households where the primary respondent is male. Model 2 restricts the sample to those interviewed by male enumerators and controls for gender interactions. Model 3 examines only FAO-supported households to assess whether programme participation influences the determinants of consent. Consistent associations emerge across all models.

As anticipated, households were more likely to consent to women's participation in the individual-level dietary module when interviewed by female enumerators, with an increase of approximately 13 to 15 percentage points. This positive effect is consistent across the full sample of male primary respondent and the subsample of FAO-supported households, highlighting the importance of enumerator gender in securing consent and improving the quality of data collected on women's dietary practices. The observed effect of enumerator gender in this study aligns with findings reported in other survey contexts, such as in Congo (Harris and van der Windt, 2023), Ethiopia (Kadam *et al.*, 2025), Morocco (Benstead, 2014), Uganda (Di Maio and Fiala, 2020). In the context of Afghanistan, where fragility and restrictive gender norms often limit interaction between women and unrelated men, respondents appear more willing to engage with female enumerators on topics related to diet and household food practices. This finding suggests that enumerators' gender is one of the key determinants of data quality in settings where women's participation in surveys is socially and culturally constrained.

FAO-supported households are consistently more likely to consent, with an increase of four to five percentage points in both the full sample and in the group interviewed by male enumerators. We interpret this as higher trust and familiarity with the survey process linked to prior FAO programme engagement, which reduces barriers to collecting individual-level dietary data. This may be because households involved in FAO-supported programs may have broader exposure to international organizations, which could facilitate smoother interactions and higher participation rates in survey activities.

The analysis reveals that households with greater wealth, those engaged in market activities such as selling crops or livestock, and those with literate household heads are significantly more likely to permit women's participation. This relationship is observed across all three models. In contrast, households with larger agricultural assets, owning more land, and having a higher number of male adult members are less likely to consent to women's involvement, suggesting that traditional agricultural communities may have more rigid gender roles. This might be linked to the low participation in Nimroz, one of the most rural provinces included in the study, where cultural norms tend to restrict women's public engagement and reinforce traditional gender roles, thereby reducing female participation.

External shocks – such as droughts, floods, rising food prices, and household illnesses – also influenced household willingness to allow women’s participation. In the full sample and the subset interviewed by male enumerators, these shocks reduce the likelihood of consent. However, in the FAO-supported households, this association is not statistically significant. In FAO-supported households, possible due to ongoing support and positive experience with external organizations taht help buffer these effects and maintain engagement.

Table 3. Determinants of household consent for interviewing an adult female member, male primary respondent households only

	Consent		
	(1)	(2)	(3)
Female enumerators	0.151***		0.131***
	(0.03)		(0.03)
FAO beneficiary	0.039**	0.041**	
	(0.016)	(0.017)	
Age of respondent	–0.001**	–0.001	–0.001
	(0.000)	(0.000)	(0.000)
Number of male adults	–0.037***	0.042***	–0.037***
	(0.001)	(0.001)	(0.011)
Number of female adults	0.006	0.009	0.011
	(0.001)	(0.001)	(0.011)
Household head literacy	0.107***	0.102***	0.123***
	(0.016)	(0.017)	(0.019)
Wealth index	0.0297***	0.025***	0.035***
	(0.006)	(0.006)	(0.007)
Agricultural wealth index	–0.030***	–0.028***	–0.021***
	(0.006)	(0.006)	(0.007)
Market participation	0.170***	0.179***	0.173***
	(0.018)	(0.018)	(0.020)
Access to electricity	0.109**	0.104**	0.00447
	(0.043)	(0.043)	(0.062)
Number of income sources	0.012	0.005	–0.006
	(0.014)	(0.015)	(0.017)
Land size (ha)	–0.0398***	–0.0389***	–0.0508***
	(0.015)	(0.015)	(0.017)
Tropical Livestock Units (TLU)	–0.008*	–0.010**	–0.009*
	(0.004)	(0.004)	(0.005)
Shock exposure	–0.0494***	–0.063***	–0.018
	(0.017)	(0.018)	(0.021)
Fixed effect (Province)	Yes	Yes	Yes
Observations	2 960	2 705	1 955

Notes: FAO – Food and Agriculture Organization of the United Nations. The dependent variable is Consent (=1 if the household permitted an adult female member to be interviewed; =0 otherwise). Estimates are from probit models with province fixed effects, robust standard errors in parentheses. Column (1) uses the full sample of households with a male primary respondent. Column (2) restricts to those households interviewed by a male enumerator. Column (3) restricts to those households that received FAO support. The average (arithmetic mean) consent rate in the full sample is 0.3247. Significance level * p <0.10, ** p <0.05, *** p <0.01. Sample restricted to households with a male primary respondent.

Source: Author’s own elaboration using the Resilience Index Measurement and Analysis (RIMA) Afghanistan Household Survey 2024.

Overall, the results indicate that wealthier and more literate households may feel more comfortable engaging with enumerators or may have greater awareness of the survey's purpose, leading to higher rates of women's participation. Similarly, households that are better connected to markets or that were interviewed by female enumerators may be more open to participating, due to increased trust, familiarity, or cultural acceptance. In contrast, households engaged primarily in agrarian livelihoods may face time constraints or cultural norms that limit women's participation, resulting in underrepresentation. This suggests that individual-level dietary indicators collected conditional on women's participation could overrepresent more open and better-connected households. Consent-driven selection is reflected in the diversity results.

Finally, we conducted an out-of-sample prediction exercise to assess the likely prevalence of MDD-W in the same provinces, including households where the individual dietary module was not administered due to lack of consent. Predicted MDD-W values for non-respondent households in the eight provinces were broadly consistent with observed values, although some regional differences were observed (Table A5 and Table A6 in the annex). Out-of-sample estimates show significant heterogeneity, with predictive prevalence ranging from as low as 11 percent to as high as 66 percent across provinces. These results are based on model-based and predicted probabilities generated from probit regression of MDD-W on household covariates. Missing outcomes were imputed using the model, and province-level estimates were computed as a weighted average. The prediction accounted for selection into consent using a consent model with inverse-probability weights and uncertainty was quantified via nonparametric bootstrap.

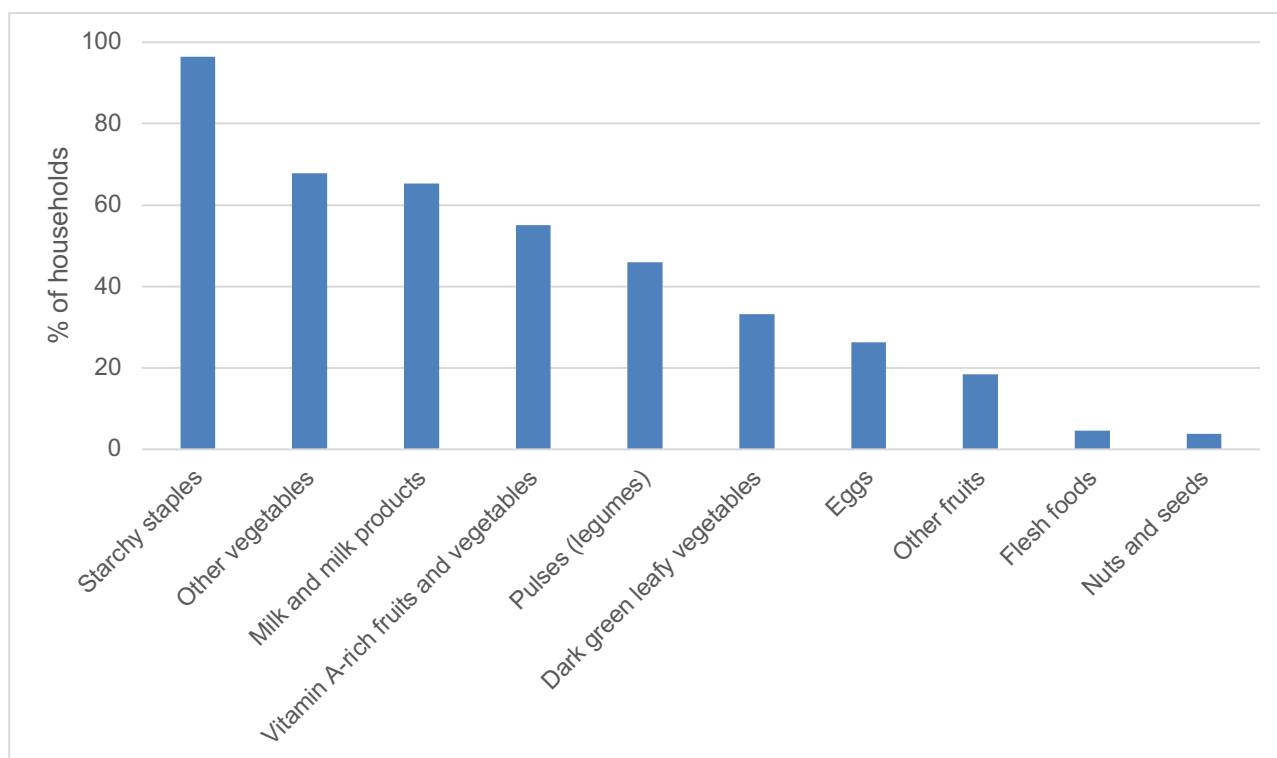
Because these figures are derived from model-based predictions rather than direct observations, they may be influenced by limitations or unobserved factors not captured in the pilot data. The purpose of this exercise is exploratory, aiming to assess the potential use of predictive approaches in extreme cases, such as when tracking the evolution of dietary indicators among beneficiary households that, for various reasons, do not permit adult female members to respond to the survey. These estimates should therefore be interpreted with appropriate caution. Moreover, the models are based on data from only eight pilot provinces, which may not fully reflect dietary patterns or consent dynamics in other regions. In this context, "consent behaviour" refers to whether households permit adult female participation in dietary survey modules, a factor that directly affects data coverage and representativeness. For these reasons, we advise against using this predictive approach for extrapolation beyond the provinces included in the study.

4.2 Household- and individual-level dietary outcomes

This section examines how household- and individual-level dietary metrics align and diverge, when assessed with standard food security tools. Traditional food security metrics such as HDDS capture the breadth of foods available or consumed at the household-level but may overlook intra-household allocation and micronutrient adequacy. In contrast, MDD-W is an individual-level, nutrition sensitive indicator linked to micronutrient sufficiency. We begin by comparing the categories between MDD-W and HDDS, which is commonly used in resilience analysis, to identify mismatches, households that appear food secure on HDDS yet include women with inadequate dietary diversity and vice versa. Highlighting these gaps demonstrates the added value of integrating individual-level indicators into resilience assessment to better capture nutrition resilience. To the best of our knowledge, this is the first application within a resilience assessment.

In the eight pilot provinces where the MDD-W module was administered, about 44 percent of respondent women achieved the minimum dietary diversity threshold. This suggests that fewer than half of the women consumed at least five of the ten recommended food groups in the 24 hours preceding the interview.

Figure 3. Proportion of women of reproductive age consuming each food group, during the previous day or night



Notes: Percent of women reporting consumption of each food group in a 24-hour recall. Food groups follow the 10-group Minimum Dietary Diversity for Women (MDD-W) taxonomy. Sample restricted to households where the MDD-W module was administered (N = 1 584).

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

More in detail, Figure 3 shows the categories of food consumed by women in the sample. The results show that nearly all women reported consuming starchy staples. Milk and milk products as well as other vegetables were also relatively common, where over 60 percent of women reporting consumption. Moderate consumption levels were observed for vitamin A-rich fruits and vegetables and pulses (legumes). However, the diversity of women’s diet remains limited, as many women are not consuming a broad range of nutrient-rich food groups. This is reflected in the low intake of eggs, other fruits and dark green leafy vegetables. Furthermore, consumption of flesh foods and nuts and seeds was notably low, with less than five percent of women reporting intake. This indicates a significant limitation in access to diverse sources of protein and micronutrients.

The low consumption of several MDD-W food groups, such as flesh foods, nuts and seeds, and dark green leafy vegetables, in Afghanistan can be attributed to a combination of economic, geographical, and seasonal factors. Nutrient-rich foods may be too costly for low-income households, particularly in rural areas with limited income opportunities (FAO and WFP, 2022). In remote provinces, poor infrastructure and insecurity further limit access to a variety of foods. Food choices are also influenced by cultural norms and gender roles, which may affect women’s access. As a result, diets often rely heavily on staple foods, which can reduce women's access to the nutrients required for proper health.

The comparison between MDD-W and the HDDS highlights the contrast between individual-level and household-level food security measures (Table 4).

Table 4. Joint distribution of individual and household dietary diversity categories among primary male respondent households

Indicator	Level	Household dietary diversity score (HDDS) (%)			
		Poor	Borderline	Acceptable	Total
Minimum Dietary Diversity for Women (MDD-W)	Poor	21.1	32.1	6.9	60.1
	Acceptable	3.80	12.5	23.7	39.9
	Total	24.8	44.6	30.6	100
Minimum Dietary Diversity for Children (MDD-C)	Poor	29.0	31.2	21.7	81.9
	Acceptable	2.7	9.6	5.8	18.1
	Total	31.7	40.8	27.5	100

Notes: Cells report the percentage of individuals in the overall sample falling into each combination of household HDDS category (poor/borderline/acceptable) and individual dietary status. For women, MDD-W = 1 (acceptable) if ≥ 5 of 10 food groups in the past 24 hours; for children 6–23 months, MDD-C = 1 (acceptable) if ≥ 5 of 8 groups. HDDS categories follow standard cut points (poor = 0–3; borderline = 4–5; acceptable ≥ 6). “Number of observations” rows give the column distribution of the analysis sample across HDDS categories; totals show the overall share poor/acceptable. Sample is restricted to households with male primary respondents; women’s/children’s modules were administered where consent is granted. Sample sizes: women = 959; children = 520.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

A significant share of women classified as having poor dietary diversity under the MDD-W indicator (39 percent) live in households that fall under the borderline (32.1 percent) or even acceptable (seven percent) HDDS categories, suggesting that household-level food diversity does not always translate to adequate dietary diversity for individual women. This misalignment indicates that, while a household may have access to a variety of food groups, women within the household may still experience dietary limitations, potentially due to intra-household food distribution inequalities, cultural food norms, or gender-based food access disparities.

The results for MDD-C demonstrate a significant contrast. Overall, only 18 percent of children meet the minimum dietary threshold, while a striking 82 percent are classified as having poor diets. This highlights a significant gap in dietary diversity among young children, even in households that are classified as food secure at the household level. While 27.5 percent of children reside in households classified as having acceptable dietary diversity based on HDDS, only about six percent meet the minimum dietary diversity threshold for children. Notably, 21.7 percent of children in these same HDDS-acceptable households still have poor individual diets. This indicates that even in food-secure households, children may not be receiving sufficient variety in their diets, highlighting the importance of collecting individual-level data.

HDDS captures overall household food variety, suggesting that a household can achieve a high score if it has access to multiple food groups, even if those foods are not equally distributed among members. In contrast, MDD-W focuses on individual women’s dietary intake, making it more sensitive to micronutrient adequacy but less reflective of overall household food availability. This suggests that HDDS may overestimate actual dietary diversity for vulnerable individuals, while MDD-W may underestimate overall dietary diversity if the household has diverse but unequally shared food resources.

4.3 Resilience pillars and individual dietary diversity

Table 5 presents probit estimates of the association between household resilience pillars and individual-level dietary diversity indicators, restricting the sample to households where a female adult respondent completed the dietary module. Adaptive capacity and assets are strong and robust predictors of women’s dietary diversity. This indicates that households with a greater ability to adapt to and absorb shocks are more likely to achieve dietary diversity for women and children. Contributing factors may include higher income diversification, higher education levels, and crop diversification. For example, households with better diversified income sources may be better able to purchase a variety of foods year-round. These findings further suggest that household wealth plays a role in meeting women’s dietary diversity.

For children, access to basic services is significantly associated with improved dietary diversity, indicating that infrastructure such as health care, clean water, roads, and markets play an important role in shaping feeding behaviour and access to food for young children. Access to health care, clean water and improved sanitation (toilet) can directly impact children’s dietary status by reducing illness and improving food utilization (through an individual’ ability to maximize the consumption of adequate nutrition and energy). Additionally, adaptive capacity is a strong predictor of child dietary diversity, enabling households to maintain a diverse diet for their children.

Table 5. Resilience pillars and dietary diversity

	MDD-W	MDD-W	MDD-C	MDD-C
	(1)	(2)	(3)	(4)
Access to basic services (ABS)	-0.026 (0.017)	-0.026 (0.017)	0.040** (0.016)	0.040** (0.017)
Asset (AST)	0.116*** (0.016)	0.132*** (0.021)	0.044*** (0.016)	0.026 (0.020)
Adaptive capacity (AC)	0.060*** (0.016)	0.054*** (0.016)	0.027* (0.015)	0.031** (0.015)
Social safety nets (SSN)	-0.0227 (0.025)	-0.0212 (0.025)	-0.041 (0.025)	-0.040 (0.027)
Mills ratio	0.040* (0.024)	0.092*** (0.031)	0.032 (0.021)	0.012 (0.026)
Fixed effects (Province)	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes
Observations	1 582	1 582	721	721

Notes: The dependent variables are indicators for meeting Minimum Dietary Diversity for Women (MDD-W), ≥ 5 of 10 groups) in columns (1)-(2) and Minimum Dietary Diversity for Children (MDD-C), ≥ 5 of 8 groups) in columns (3)-(4). Key regressors are the four Resilience Index Measurement and Analysis (RIMA) pillars, access to basic services (ABS), assets (AST), adaptive capacity (AC), and social safety nets (SSN). The “Mills ratio” is the inverse Mills term from a consent/selection equation used to correct potential selection into women/child dietary modules. All specifications include province fixed effects; columns 2 and 4 further adjust for age of household head, highest education, numbers of male and female adults, shock exposure, market participation, assistance received, land size (ha), tropical livestock units (TLU), number of income sources, and electricity access. Estimates are probit; robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Sample sizes: MDD-W = 1 582; MDD-C = 721.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024. FAO. 2025. e-RIMA: Household Resilience Tool. [Accessed on 27 June 2025]. https://foodandagricultureorganization.shinyapps.io/ShinyRIMA_HHresilience

A key limitation of this analysis is that both MDD-W and MDD-C are based on 24-hour recall and do not capture usual intake or long-term dietary patterns. While these indicators are useful for assessing population-level dietary diversity, they are not designed for individual-level conclusions. In our regression analysis, they are used to explore associations with key variables, and findings are interpreted accordingly. This approach follows guidance from FAO (2021) and aligns with the intended use of these indicators.

4.4 Enhanced vs original Resilience Index Measurement and Analysis (RIMA) – Resilience capacity index (RCI)

This section introduces an enhanced RIMA resilience capacity that integrates individual-level dietary indicators into the resilience analysis. As detailed in the methods section, we estimate an enhanced RCI using a structural equation framework that incorporates the individual diet indicator as an outcome of resilience. The latent resilience factor is identified by the four pillars and then linked to food security outcomes. Traditionally, the model uses HDDS as an outcome measure. In the enhanced RCI, we replace HDDS with individual-level dietary outcomes, specifically the MDD-W. This provides a diet quality sensitive measure that better captures micronutrient adequacy across the population. We report construct reliability (factor loading), model fit, and predictive validity (MDD thresholds and correlation with HDDS benchmarks and resilience levels).

The results indicate that the enhanced model demonstrates a modest improvement in overall model fit compared to the original model (Table A7 in the annex). In particular, the Root Mean Square Error of Approximation (RMSEA) improves and shifts from acceptable to good fit category. The other two tests Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) show consistently good fit across all models. Overall, the results suggest that the enhanced model maintains strong fit while modestly improving on the original model, mainly due to the integration of MDD-W.

Moreover, we also examined how RCI relates to dietary diversity outcomes under both the original and modified framework. Households were categorized into RCI terciles (low, medium, and high resilience capacity), and we investigated how dietary diversity outcomes differ across these groups, focusing on the percentage of women who met acceptable MDD-W (Table 6). The relationship between RCI and dietary outcomes is weaker than expected under the original framework. Although 55.8 percent of women overall fall below the dietary adequacy threshold, more than one in five women in the most resilient households still fail to achieve acceptable MDD-W. In contrast, one-quarter of women in the least-resilient group report adequate diets. Specifically, 74.8 percent of women in the least resilient households exhibit poor dietary diversity, compared to 22 percent in the most resilient households. While the share with acceptable MDD-W rises from 25.3 percent in the least resilient group to 76.7 percent in the most resilient group. These patterns highlight the original index only imperfectly discriminates between households in terms of dietary-related outcomes, with substantial overlap across resilience levels.

The enhanced resilience index, by contrast, produces a sharper alignment between resilience status and dietary outcomes. Among the least resilient households, nearly all women (99 percent) have poor dietary diversity, whereas in the most resilient households this figure drops dramatically to just under ten percent. The share of women with acceptable MDD-W rises from almost zero (0.4) among the least resilient to over 90 percent among the most resilient, with those in the borderline group showing an intermediate profile (42 percent achieving acceptable diets). Compared to the original framework, which showed considerable overlap in dietary outcomes across resilience terciles, the modified index more effectively discriminates between households. Dietary outcomes improve systematically as resilience rises, with almost no women in the least resilient group meet the

minimum dietary adequacy threshold, while the majority in the most resilient group achieve it. This sharper alignment highlights the importance of refining measurement tools.

For children, the pattern is weaker, only 21 percent living in the most resilient household group have adequate diets and over 78 percent have poor dietary diversity (Table A8). Across all resilience categories, most children fail to meet minimum dietary diversity, highlighting widespread vulnerability regardless of household resilience level. This indicates that household resilience, when referred to composite indices like HDDS, does not consistently align with individual dietary outcomes. Several factors might explain this inconsistency.

First, targeted assistance, such as food aid or women-focused nutrition programs, may be more frequently directed toward the most vulnerable households. Second, in certain contexts, intra-household food distribution norms may prioritize women’s dietary needs during periods of hardship. Third, resilience measures may overlook local dynamics, such as informal support networks, home food production, or women’s decision-making power, all of which affect dietary diversity. Finally, recent shocks or displacement may impact household resilience scores without immediately reducing dietary quality, particularly when external support is available. These findings highlight the need to integrate individual-level indicators, like MDD-W, into resilience frameworks. It also emphasizes the importance of gender-sensitive analysis, as women’s diets may not always mirror household economic status or resilience scores.

Table 6. Minimum Dietary Diversity for Women (MDD-W) and resilience capacity: original vs enhanced

Minimum Dietary Diversity for Women (MDD-W)	Least	Borderline	Most	Total
Resilience level original (%)				
Poor	74.8	70.6	22	55.8
Acceptable	25.2	29.4	78	44.2
Number of observations	526	528	528	1 582
Resilience level modified (%)				
Poor	99.6	58	9.9	55.8
Acceptable	0.4	42.1	90.2	44.2
Number of observations	526	528	528	1 582

Notes: This table cross-tabulates women’s dietary diversity (MDD-W: poor <5 of 10 food groups; acceptable ≥5/10) by resilience tiers defined as terciles of the resilience capacity index (RCI), least, borderline and most, under two specifications: the original Resilience Index Measurement and Analysis (RIMA) RCI (four pillars: access to basic services (ABS); assets (AST); adaptive capacity (AC); social-safety nets (SSN) and a diet-sensitive (modified) RCI that retains the pillars but links the latent factor to MDD-W/MDD-C (see Section 3.2). Cells report row percentages within each resilience tercile; “No. observations” gives counts per tercile (total = 1 582). These contrasts illustrate how the share with acceptable MDD-W rises with resilience, more sharply under the modified RCI.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

5. Conclusion

In fragile contexts such as Afghanistan, strengthening the resilience capacity of households and communities has become increasingly urgent. However, current tools used to measure resilience still rely on household-level food security indicators. These indicators capture household-level access to food but do not reflect how food is distributed and consumed within families, especially by individuals who may be nutritionally vulnerable, such as women and young children. Using pilot data from eight Afghan provinces, the study tests the feasibility of collecting individual-level information from women respondents in fragile settings and examines how these indicators can enhance resilience analysis.

The findings show that only 32 percent of households with male primary respondents gave permission for an adult female household member to participate in the dietary modules, while a significant majority declined. This reflects broader gender-related challenges in collecting dietary related data in the Afghan context. Sociocultural norms often result in male heads of household serving as the primary respondent, which limits the ability to collect accurate information on women's and children's diets. The limited number of female enumerators further restricted direct interviews with women. In cases where permission was obtained, female household members were interviewed, but these cases remained a limited subset.

The analysis also revealed a clear mismatch between household-level and individual-level indicators. While many households appeared food secure based on traditional metrics, such as high HDDS scores, women and children in these households often did not meet the minimum thresholds for acceptable dietary diversity. This suggests that even when a household has access to diverse foods, it does not necessarily mean that all members, especially women and children, are consuming diverse or adequate diets. The findings further show that household resilience, as captured by the RIMA RCI, does not always reflect individual dietary outcomes. While women in more resilient households were more likely to meet minimum dietary diversity thresholds, a notable share still had poor diets. Among children, dietary diversity remained low across all resilience levels, highlighting persistent vulnerabilities. This suggests that household resilience alone may not reflect adequate diets for all members. This insight underscores the importance of including individual-level dietary indicators, like MDD-W, within resilience measurement.

Overall, these findings have important implications. They highlight the need for food security and resilience efforts in Afghanistan and similar settings to go beyond household-level food availability and focus on diet quality and fair distribution of safe and nutritious food within households. Integrating individual-level dietary diversity indicators into regular monitoring and resilience assessments can help better identify and reach nutritionally vulnerable groups. Including measures like MDD-W and MDD-C in resilience frameworks can support more targeted and effective responses, helping bridge the gap between food access and actual dietary adequacy for the most vulnerable household members.

References

- Action Against Hunger.** 2024. Afghanistan: Funding gaps in nutrition response place thousands of lives at risk. [Cited 30 May 2025]. <https://www.actioncontrelafaim.org/en/publication/afghanistan-funding-gaps-in-nutrition-response-place-thousands-of-lives-at-risk/>
- Alinovi, L., Mane, E. & Romano, D.** 2010. Measuring household resilience to food insecurity: Application to Palestinian households. *Agricultural survey methods*, 341–368. <https://doi.org/10.1002/9780470665480.ch21>
- Alkire, S. & Foster, J.** 2011. Counting and multidimensional poverty measurement. *Journal of public economics*, 95(7–8): 476–487.
- Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A., Seymour, G. & Vaz, A.** 2013. The women’s empowerment in agriculture index. *World development*, 52: 71–91.
- Barrett, C.B. & Conostas, M.A.** 2014. Toward a theory of resilience for international development applications. *Proceedings of the National Academy of Sciences*, 111(40): 14625–14630. <https://doi.org/10.1073/pnas.1320880111>
- Béné, C., Headey, D., Haddad, L. & von Grebmer, K.** 2016. Is resilience a useful concept in the context of food security and nutrition programmes? Some conceptual and practical considerations. *Food security*, 8: 123–138. <https://doi.org/10.1007/s12571-015-0526-x>
- Benstead, L.J.** 2014. Effects of interviewer–respondent gender interaction on attitudes toward women and politics: Findings from Morocco. *International Journal of Public Opinion Research*, 26(3): 369–383.
- Birhanu, Z., Ambelu, A., Berhanu, N., Tesfaye, A. & Woldemichael, K.** 2017. Understanding resilience dimensions and adaptive strategies to the impact of recurrent droughts in Borana Zone, Oromia Region, Ethiopia: A grounded theory approach. *International Journal of Environmental Research and Public Health*, 14(2): 118. <https://doi.org/10.3390/ijerph14020118>
- Cissé, J.D. & Barrett, C.B.** 2018. Estimating development resilience: A conditional moments-based approach. *Journal of Development Economics*, 135: 272–284. <https://doi.org/10.1016/j.jdeveco.2018.04.002>
- Constas, M., Frankenberger, T. & Hoddinott, J.** 2014. Resilience measurement principles: Toward an agenda for measurement design. *Food Security Information Network, Resilience Measurement Technical Working Group, Technical Series*, 1.
- Constas, M., Frankenberger, T.R., Hoddinott, J., Mock, N., Romano, D., Bene, C. & Maxwell, D.** 2014. A common analytical model for resilience measurement: Causal framework and methodological options. *Resilience Measurement Technical Working Group, FSIN Technical Series Paper*, 2: 52.
- Di Maio, M. & Fiala, N.** 2020. Be wary of those who ask: a randomized experiment on the size and determinants of the enumerator effect. *The World Bank Economic Review*, 34(3): 654–669.
- Doss, C.** 2013. Intrahousehold bargaining and resource allocation in developing countries. *The World Bank Research Observer*, 28(1): 52–78.
- Duflo, E.** 2003. Grandmothers and granddaughters: old-age pensions and intrahousehold allocation in South Africa. *The World Bank Economic Review*, 17(1): 1–25.
- d’Errico, M. & Di Giuseppe, S.** 2018. Resilience mobility in Uganda: A dynamic analysis. *World Development*, 104: 78–96. <https://doi.org/10.1016/j.worlddev.2017.11.020>
- d’Errico, M., Grazioli, F. & Pietrelli, R.** 2018a. Cross-country evidence of the relationship between resilience and the subjective perception of well-being and social inclusion: Evidence from the regions of Matam (Senegal) and the Triangle of Hope (Mauritania). *Journal of International Development*, 30(8): 1339–1368.

- d'Errico, M., Grazioli, F. & Pietrelli, R.** 2018b. Cross-country evidence of the relationship between resilience and the subjective perception of well-being and social inclusion: Evidence from the regions of Matam (Senegal) and the Triangle of Hope (Mauritania). *Journal of International Development*, 30(8): 1339–1368. <https://doi.org/10.1002/jid.3335>
- d'Errico, M. & Pietrelli, R.** 2017. Resilience and child malnutrition in Mali. *Food security*, 9(2): 355–370. <https://doi.org/10.1007/s12571-017-0652-8>
- d'Errico, M., Romano, D. & Pietrelli, R.** 2018. Household resilience to food insecurity: Evidence from Tanzania and Uganda. *Food Security*, 10(4): 1033–1054. <https://doi.org/10.1007/s12571-018-0820-5>
- FAO, IFAD, UNICEF, WFP & WHO.** 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets.* Rome, FAO. <https://doi.org/10.4060/ca9692en>
- FAO, IFAD, UNICEF, WFP & WHO.** 2022. *The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable.* Rome. <https://doi.org/10.4060/cc0639en>
- FAO, IFAD, WFP & WHO.** 2025. *The State of Food Security and Nutrition in the World 2025 – Addressing high food price inflation for food security and nutrition.* Rome. <https://doi.org/10.4060/cd6008en>
- FAO.** 2016. *RIMA II: Resilience Index Measurement and Analysis II.* First edition. Rome. <https://openknowledge.fao.org/handle/20.500.14283/i5665e>
- FAO.** 2020. *Comparison of FAO and TANGO measures of household resilience and resilience capacity.* Rome. https://www.fsinplatform.org/sites/default/files/paragraphs/documents/FAO_TANGO_Resilience_M easurement_Comparison_Paper.pdf
- FAO.** 2021. *Minimum dietary diversity for women.* Rome. <https://doi.org/10.4060/cb3434en>
- Harris, J.A. & van der Windt, P.** 2023. Empowering women or increasing response bias? Experimental evidence from Congo. *Journal of Development Economics*, 164: 103097.
- Headey, D., Hoddinott, J. & Park, S.** 2017. Accounting for nutritional changes in six success stories: a regression-decomposition approach. *Global Food Security*, 13: 12–20.
- Hoddinott, J. & Haddad, L.** 1995. Does female income share influence household expenditures? Evidence from Côte d'Ivoire. *oxford Bulletin of Economics and Statistics*, 57(1): 77–96.
- Hoddinott, J.F.** 2014. Looking at development through a resilience lens. In: *Resilience for food and nutrition security.* Fan, S., Pandya-Lorch, R., and Yose, S. edition, pp. 19–26. Washington, DC, IFPRI (International Food Policy Research Institute). <https://hdl.handle.net/10568/149770>
- IPC, I.F.S.P.C.** 2025. *Afghanistan: IPC Acute Food Insecurity Snapshot I March - October 2025.* https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_Afghanistan_Acute_Food_Insecurit y_Mar_Oct2025_Snapshot.pdf
- Jones, A.D., Ngure, F.M., Pelto, G. & Young, S.L.** 2013. What are we assessing when we measure food security? A compendium and review of current metrics. *Advances in nutrition*, 4(5): 481–505. <https://doi.org/10.3945/an.113.004119>
- Kadam, A., McCullough, E.B., McGavock, T.J. & Magnan, N.** 2025. Who is asking and how? Effects of survey mode and enumerator gender on measuring women's life experience. *World Development*, 195: 107078.
- Knippenberg, E., Jensen, N. & Conostas, M.** 2019. Quantifying household resilience with high frequency data: Temporal dynamics and methodological options. *World Development*, 121: 1–15. <https://doi.org/10.1016/j.worlddev.2019.04.010>
- Malapit, H., Quisumbing, A., Meinzen-Dick, R., Seymour, G., Martinez, E.M., Heckert, J., Rubin, D., Vaz, A. & Yount, K.** 2019. Development of the project-level Women's Empowerment in

- Agriculture Index (pro-WEAI). *World development*, 122: 675–692. <https://doi.org/10.1016/j.worlddev.2019.06.018>
- Murendo, C., Kairezi, G. & Mazvimavi, K.** 2020. Resilience capacities and household nutrition in the presence of shocks. Evidence from Malawi. *World Development Perspectives*, 20: 100241. <https://doi.org/10.1016/j.wdp.2020.100241>
- Novotny, I.P., Lefeuvre, N.B., Stoudmann, N., Dray, A., Garcia, C.A. & Waeber, P.O.** 2023. Looking beyond calories—when food quality and sourcing matters. *Journal of Cleaner Production*, 384: 135482. <https://doi.org/10.1016/j.jclepro.2022.135482>
- Sibrian, R., d’Errico, M., Palma de Fulladolsa, P. & Benedetti-Michelangeli, F.** 2021. Household resilience to food and nutrition insecurity in Central America and the Caribbean. *Sustainability*, 13(16): 9086. <https://doi.org/10.3390/su13169086>
- Simelane, K.S. & Worth, S.** 2020. Food and nutrition security theory. *Food and nutrition bulletin*, 41(3): 367–379. <https://doi.org/10.1177/0379572120925341>
- Smith, L.C. & Frankenberger, T.R.** 2018. Does resilience capacity reduce the negative impact of shocks on household food security? Evidence from the 2014 floods in Northern Bangladesh. *World Development*, 102: 358–376. <https://doi.org/10.1016/j.worlddev.2017.07.003>
- Stanford, R.J., Wiryawan, B., Bengen, D.G., Febriamansyah, R. & Haluan, J.** 2017. The fisheries livelihoods resilience check (FLIRES check): A tool for evaluating resilience in fisher communities. *Fish and fisheries*, 18(6): 1011–1025. <https://doi.org/10.1111/faf.12220>
- Tabe-Ojong, M.P.J.** 2024. Context matters: Oil palm production and women’s dietary diversity in the tropical forest of Cameroon. *Journal of Agricultural Economics*, 75(1): 323–340. <https://doi.org/10.1111/1477-9552.12559>
- UNICEF.** 2023. *Afghanistan Multiple Indicator Cluster Survey 2022-2023, Summary Findings Report*. <https://www.unicef.org/afghanistan/reports/afghanistan-multiple-indicator-cluster-survey-mics-2022-2023>
- Upton, J.B., Cissé, J.D. & Barrett, C.B.** 2016. Food security as resilience: reconciling definition and measurement. *Agricultural Economics*, 47(S1): 135–147. <https://doi.org/10.1111/agec.12305>
- Vesco, P., Baliki, G., Brück, T., Döring, S., Eriksson, A., Fjelde, H., Guha-Sapir, D., Hall, J., Knutsen, C.H., Leis, M.R., Mueller, H., Rauh, C., Rudolfsen, I., Swain, A., Timlick, A., Vassiliou, P.T.B., von Schreeb, J., von Uexkull, N. & Hegre, H.** 2025. The impacts of armed conflict on human development: A review of the literature. *World Development*, 187: 106806. <https://doi.org/10.1016/j.worlddev.2024.106806>
- Vollenweider, X.** 2015. Measuring climate resilience and vulnerability: A case study from Ethiopia. *Final Report prepared for the Famine Early Warning Systems Network (FEWS NET) Technical Support Contract (TSC), Kimetrica LLC*.
- WHO & UNICEF.** 2021. *Indicators for assessing infant and young child feeding practices: definitions and measurement methods*. Geneva. <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>
- World Bank.** 2024. *Afghanistan development update*. Washington, D.C. <http://documents.worldbank.org/curated/en/099100824080039148>
- Zaharia, S., Masters, W.A., Ghosh, S., Shively, G.E., Gurung, S., Manohar, S., Thorne-Lyman, A.L., West, K.P., Appel, K.H., Liang, L., Shrestha, R., Bashaasha, B., Kabunga, N. & Webb, P.** 2021. Recovery without resilience? A novel way to measure nutritional resilience in Nepal, Bangladesh, and Uganda. *Global Food Security*, 31: 100573. <https://doi.org/10.1016/j.gfs.2021.100573>

Annex

Table A1. Minimum Dietary Diversity for Women (MDD-W) (aged 15–49 years old) module

Now I would like to ask you about foods and drinks that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else. I am interested in whether you have the food items I will mention even if they are combined with other foods. For example, if you had a soup made with carrots, potatoes and meat, you should reply “yes” for each of these ingredients when I read you the list. However, if you consumed only the broth of a soup, but not the meat or vegetable, do not say “yes” for the meat or vegetable.

As I ask you about food and drinks, please think of foods and drinks you had like snacks or small meals as well as during any main meals. Please also remember foods you may have eaten while preparing meals or preparing food for others. Please do not include any food used in a small amount for seasoning or condiments (like chilies, spices, herbs or fish powder). I will ask you about those foods separately.

Please describe the foods (meals and snacks) that ate or drank at home yesterday (in the last *24 hours of yesterday*: breakfast, lunch, dinner and snacks).

n.	Food item	Yes/No
1	Grains, roots, and tubers (sorghum/millet/corn/wheat/rice/spaghetti/bread/ or white sweet potato/potato/yam or other tubers)	
2	Pulses (beans/chickpea, horse grain/lentil/pea, sweet pea/soyabean)	
3	Nuts and seeds (almond/nut/cashew/pecan/sesame seed/sunflower seed)	
4	Dairy (milk/ cheese or yogurt)	
5	Meat, poultry, and fish (beef/lamb/goat/rabbit/wild game/chicken/duck or other birds/liver/kidney meats/fresh or dried fish/other seafood)	
6	Eggs	
7	Dark leafy greens and vegetables (broccoli/spinach/pumpkins/mustard greens/fenugreek greens/turnip greens/lamb's quarters/lettuce)	
8	Other Vitamin A-rich fruits and vegetables (carrots/pumpkin/sweet potato/apricot/mango/melon)	
9	Other vegetables (tomato, cucumber, eggplant, cauliflower, radish, pepper, yard long bean, cabbage, mushroom, wax gourd bottle gourd, luffa gourd, wing bean, bitter melon, green pepper, winter melon)	
10	Other fruits (oranges, tangerines, bananas, coconut flesh, melon, jackfruit, fruit, rambutan, tamarind, jujube, green mango, apple, watermelon, avocado)	

Source: Author's own elaboration based on FAO. 2021. *Minimum dietary diversity for women*. Rome. <https://doi.org/10.4060/cb3434en>

Table A2. Minimum Dietary Diversity for Children (MDD-C) (6–23 months old) module

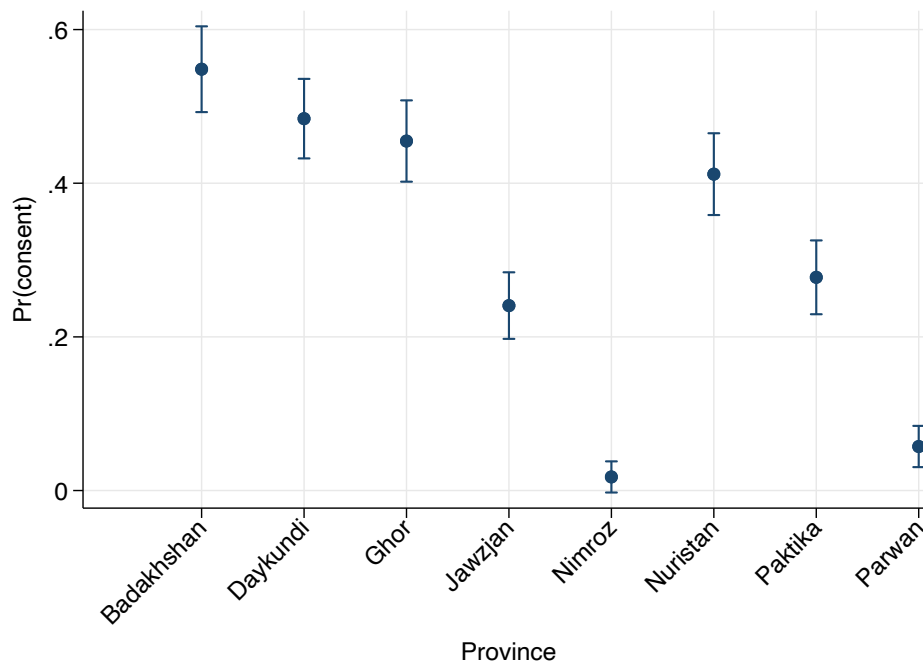
Now I would like to ask you about foods that your child had yesterday during the day or at night. I am interested in foods your child eats whether at home or somewhere else. Please think about snacks and small meals as well as main meals. I will ask you about different types of foods, and I would like to know whether your child ate the food even if it was combined with other foods in a mixed dish like [list common local examples of mixed dishes] Please do not answer “yes” for any food or ingredient used in a small amount to add flavour to a dish.

Yesterday during the day or at night, did you eat:

n.	Food item	Yes/No
1	Breast milk	
2	Grains, white/pale starchy roots, tubers and plantains (sorghum/millet/corn/wheat/rice/spaghetti/bread/ or white sweet potato/potato/yam or other tubers)	
3	Beans, peas, lentils, nuts and seeds	
4	Dairy products (milk, infant formula, yogurt, cheese)	
5	Flesh foods (meat, fish, poultry, organ meats)	
6	Eggs	
7	Vitamin A-rich fruits and vegetables (carrots/ pumpkin/sweet potato/apricot/mango/melon)	
8	Other fruits and vegetables (tomato, cucumber, eggplant, cauliflower, radish, pepper, yard long bean, cabbage, mushroom, wax gourd bottle gourd, luffa gourd, wing bean, bitter gourd, green pepper, winter melon oranges, tangerines, bananas, coconut flesh, melon, jackfruit, fruit, rambutan, tamarind, jujube, green mango, apple, watermelon, avocado)	

Source: Author’s own elaboration based on WHO & UNICEF. 2021. *Indicators for assessing infant and young child feeding practices: definitions and measurement methods*. Geneva. <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>

Figure A1. Adjusted probability of consent for an adult female interview, by province (predictive margins)



Notes: Predicted probabilities from a probit model of household consent for an adult female interview, controlling for household composition, literacy, wealth/assets, agricultural activity, income diversification, land and livestock holdings, shocks, and province indicators. Points show province-specific predictive margins; bars are 95 percent CIs (delta method) with robust standard errors. Overall consent rate in the sample is 32.5 percent. Low probabilities (e.g. Parwan/Nimroz) reflect smaller effective samples/low consent.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Table A3. Summary statistics of households with and without dietary data in the pilot provinces

Variable	Sample with dietary data	Sample without dietary data	Pairwise t-test
	Mean	Mean	Mean difference
Access to improved water source (1=yes)	0.895 (0.008)	0.890 (0.007)	0.006
Accesses to improved toilet (1=yes)	0.974 (0.004)	0.879 (0.007)	0.095***
Access to electricity (1=yes)	0.926 (0.007)	0.848 (0.008)	0.078***
Distance to water source (minutes)	10.608 (0.254)	11.883 (0.266)	-1.276***
Distance to primary school (minutes)	27.690 (0.487)	25.434 (0.404)	2.256***
Distance to road (minutes)	33.304 (1.436)	27.332 (0.758)	5.972***
Distance to livestock market (minutes)	80.722 (1.845)	70.916 (1.676)	9.807***
Distance to agricultural market (minutes)	80.802 (1.868)	62.613 (1.392)	18.188***
Distance to public transport (minutes)	50.348 (1.617)	41.509 (1.109)	8.839***
Distance to health centre (minutes)	71.517 (1.756)	59.725 (1.382)	11.792***
Distance to government office (minutes)	102.954 (2.198)	87.744 (1.838)	15.210***
Household size	8.068 (0.079)	8.867 (0.088)	-0.799***
Number of male adults	1.539 (0.023)	1.838 (0.025)	-0.299***
Number of female adults	1.604 (0.022)	1.735 (0.023)	-0.132***
Number of children five and under five	1.762 (0.030)	1.983 (0.033)	-0.221***
Number of children (aged 6–17 years old)	2.941 (0.044)	3.054 (0.044)	-0.113*
Households with children (aged 0–24 months)	0.456 (0.013)	0.257 (0.010)	0.200***
Walth index	-0.256 (0.036)	-0.457 (0.031)	0.201***
Input index	0.088 (0.027)	0.024 (0.027)	0.064*
Agricultural wealth index	-0.473 (0.038)	-0.402 (0.030)	-0.071

Variable	Sample with dietary data	Sample without dietary data	Pairwise t-test
	Mean	Mean	Mean difference
Tropical Livestock Unit (TLU)	1.082	0.916	0.166***
	(0.035)	(0.042)	
Land size (ha)	0.650	0.668	-0.018
	(0.018)	(0.014)	
Household head literacy	0.411	0.250	0.161***
	(0.012)	(0.010)	
Household head years of education	12.980	14.136	-1.155***
	(0.115)	(0.087)	
Household member highest years of education	7.194	5.051	2.143***
	(0.138)	(0.120)	
Average years of education	4.834	4.241	0.593***
	(0.106)	(0.102)	
Number of crops	1.315	1.275	0.040
	(0.026)	(0.020)	
Number of income sources	1.290	1.164	0.126***
	(0.014)	(0.012)	
Food consumption score (FCS)	0.390	0.382	0.008
	(0.004)	(0.003)	
Household dietary diversity score (HDDS)	5.341	5.475	-0.133*
	(0.053)	(0.049)	
Coping strategy index (CSI)	0.103	0.116	-0.013**
	(0.004)	(0.005)	
Loan (amount in local currency)	26 535	24 521	2 014.475
	(1164)	(93)	
Formal transfer (amount in local currency)	43 241	42 978	263.609
	(394)	(360)	
Informal transfer (amount in local currency)	418	460	-42.310
	(81)	(71)	
Number of associations household participating	0.675	0.596	0.079*
	(0.032)	(0.027)	
Number of relatives household rely on in case of need	1.732	1.645	0.088**
	(0.028)	(0.024)	
FAO beneficiaries	0.735	0.643	0.092***
	(0.011)	(0.011)	
Number of observations	1 585	2 041	

Notes: FAO – Food and Agriculture Organization of the United Nations. N – total number of observations. This table compares household and community characteristics between the sample with dietary data (n=1 585), the sample without dietary data (n=2 041), and the full pilot sample (n=3 626). Values are means with standard errors in parentheses. The final column reports mean differences between households with and without dietary data. Stars indicate statistical significance of mean differences from two-sample t-tests ($p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Robust standard errors in parentheses.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Table A4. Balance of household characteristics by consent status, male primary respondents

Variable	Non consented	Consented	Pairwise t-test
	Mean	Mean	Mean difference
Access to improved water source (1=yes)	0.890 (0.007)	0.908 (0.009)	-0.018
Accesses to improved toilet (1=yes)	0.878 (0.007)	0.989 (0.003)	-0.110***
Access to electricity (1=yes)	0.845 (0.008)	0.986 (0.004)	-0.141***
Distance to water source (minutes)	11.899 (0.270)	11.353 (0.340)	0.547
Distance to primary school (minutes)	25.504 (0.411)	28.438 (0.679)	-2.934***
Distance to road (minutes)	27.158 (0.765)	39.388 (2.240)	-12.230***
Distance to livestock market (minutes)	70.897 (1.699)	87.985 (2.618)	-17.088***
Distance to agricultural market (minutes)	62.369 (1.404)	87.062 (2.626)	-24.694***
Distance to public transport (minutes)	41.706 (1.127)	54.609 (2.368)	-12.903***
Distance to health centre (minutes)	60.071 (1.406)	82.935 (2.536)	-22.865***
Distance to government office (minutes)	88.016 (1.865)	111.972 (3.016)	-23.956***
Household size	8.893 (0.089)	8.071 (0.102)	0.823***
Number of male adults	1.843 (0.025)	1.591 (0.030)	0.252***
Number of female adults	1.740 (0.023)	1.590 (0.029)	0.150***
Number of children five and under five	1.989 (0.034)	1.866 (0.035)	0.124**
Number of children (aged 6–17 years old)	3.061 (0.044)	2.816 (0.057)	0.245***
Households with children (aged 0–24 months)	0.257 (0.010)	0.542 (0.016)	-0.285***
Walth index	-0.456 (0.031)	-0.180 (0.048)	-0.276***
Input index	0.033 (0.027)	0.094 (0.037)	-0.062
Agricultural wealth index	-0.391 (0.031)	-0.280 (0.051)	-0.111*

Variable	Non consented	Consented	Pairwise t-test
	Mean	Mean	Mean difference
Tropical Livestock Unit (TLU)	0.922	1.283	-0.361***
	(0.043)	(0.049)	
Land size (ha)	0.672	0.607	0.065***
	(0.014)	(0.018)	
Household head literacy	0.249	0.428	-0.179***
	(0.010)	(0.016)	
Household head years of education	14.130	12.637	1.493***
	(0.088)	(0.156)	
Household member highest years of education	5.065	6.985	-1.920***
	(0.121)	(0.176)	
Average years of education	4.246	5.019	-0.773***
	(0.103)	(0.138)	
Number of crops	1.280	1.293	-0.014
	(0.020)	(0.033)	
Number of income sources	1.166	1.292	-0.127***
	(0.012)	(0.018)	
Food consumption score (FCS)	0.382	0.372	0.010*
	(0.003)	(0.005)	
Household dietary diversity score (HDDS)	5.477	5.243	0.233***
	(0.050)	(0.070)	
Coping strategy index (CSI)	0.117	0.085	0.032***
	(0.005)	(0.003)	
Loan (amount in local currency)	24 541.876	29 074.354	-4 532.478**
	(946.196)	(1673.567)	
Formal transfer (amount in local currency)	43 092.804	44 346.183	-1 253.379**
	(361.874)	(466.037)	
Informal transfer (amount in local currency)	445.634	237.099	208.535*
	(68.540)	(76.461)	
Number of associations household participating	0.605	0.427	0.178***
	(0.027)	(0.026)	
Number of relatives household rely on in case of need	1.644	1.785	-0.140***
	(0.024)	(0.034)	
FAO beneficiaries	0.640	0.703	-0.064***
	(0.011)	(0.015)	
Number of observations	1 999	961	

Notes: FAO – Food and Agriculture Organization of the United Nations. N – total number of observations. This table compares characteristics of households where the male primary respondent consented to the dietary module (n=961) and those where consent was not given (n=1 999). The final column reports mean differences between consenters and non-consenters. Statistical significance is based on two-sample t-tests ($p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Robust standard errors in parentheses. These statistics are restricted to households with a male primary respondent, consistent with the consent-adjustment model.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Table A5. Correlates of Minimum Dietary Diversity for Women (MDD-W)

	MDD-W
FAO beneficiary	0.0823***
	(-0.0248)
Number of male adults	0.00135
	(-0.015)
Number of female adults	-0.0324**
	(-0.0147)
Number of children aged five and under five	-0.00534
	(-0.00939)
Number of children (aged 6–17 years old)	0.0284***
	(-0.00622)
Household head literacy	0.0708***
	(-0.0223)
Wealth index	-0.01
	(-0.00859)
Agricultural wealth index	-0.0609***
	(-0.00955)
Market participation	0.141***
	(-0.0229)
Access to electricity	-0.0820*
	(-0.0421)
Number of income sources	-0.0393**
	(-0.0191)
Land size (ha)	0.0549***
	(-0.0164)
Tropical Livestock Unit (TLU)	0.0207*
	(-0.0108)
Food consumption score (FCS)	0.373***
	(-0.0998)
Household dietary diversity score (HDDS)	0.942***
	(-0.0833)
Number of observations	1 584

Notes: The dependent variable is an indicator equal to 1 if a woman of reproductive age (15–49) consumed foods from ≥5 of 10 MDD-W food groups in the previous 24 hours. Coefficients are marginal effects (percentage-point changes). Robust standard errors are in parentheses. These statistics are restricted to households with MDD-W data.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

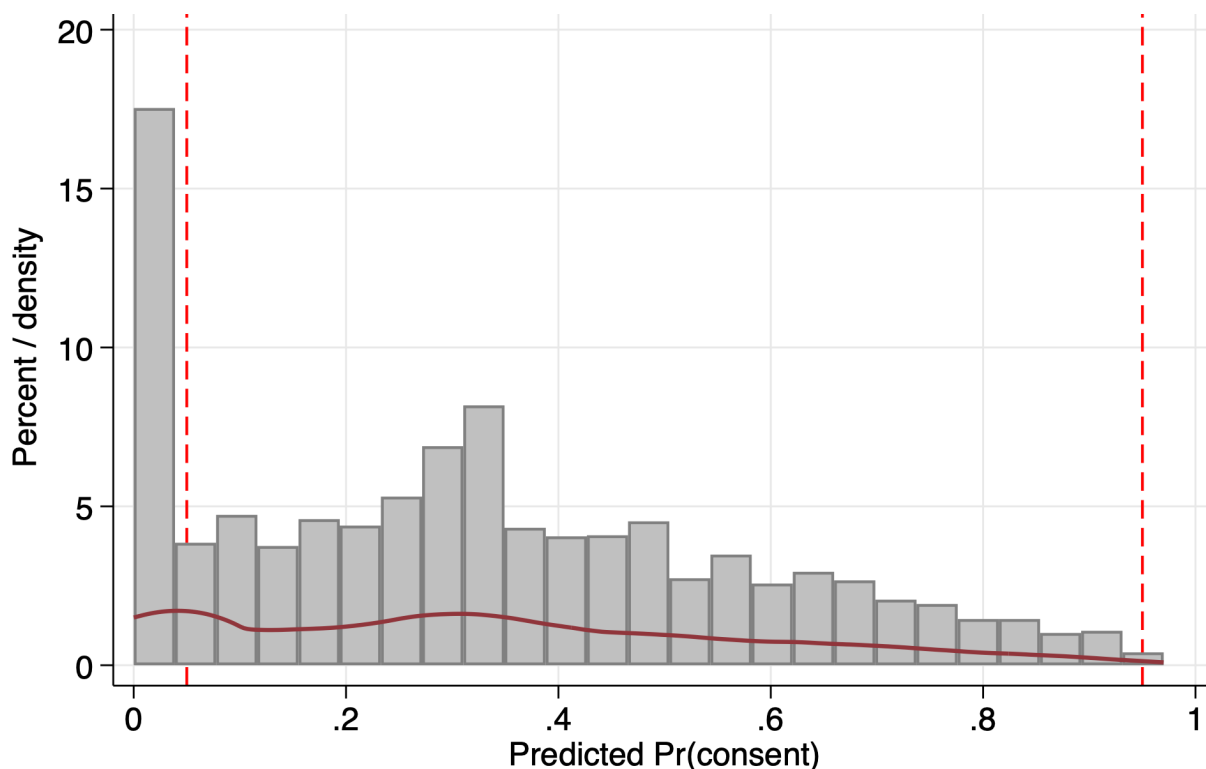
Table A6. Observed and predicted average Minimum Dietary Diversity for Women (MDD-W) by province

	Number of observations	Observed MDD-W	Predicted MDD-W	95% confidence interval	
Badakhshan	441	0.52	0.46	0.40	0.52
			(0.03)		
Daykundi	471	0.07	0.11	0.07	0.14
			(0.02)		
Ghor	459	0.78	0.66	0.61	0.71
			(0.03)		
Jawzjan	447	0.12	0.29	0.25	0.34
			(0.02)		
Nimroz	469	0.63	0.55	0.46	0.65
			(0.05)		
Nuristan	479	0.20	0.17	0.12	0.22
			(0.03)		
Paktika	439	0.69	0.59	0.50	0.68
			(0.05)		
Parwan	429	0.87	0.66	0.60	0.71
			(0.03)		
Total	3 634		0.43	0.405	0.458
			(0.02)		

Notes: Estimates are based on the pilot Minimum Dietary Diversity for Women (MDD-W) module administered in eight provinces. Predicted Minimum Dietary Diversity for Women (MDD-W) values for non-respondent households were obtained from a probit regression model including household. 95% confidence intervals are derived from a nonparametric bootstrap with 100 replications. Bootstrap standard errors are shown in parentheses below each province estimate. The sample includes the full Pilot sample.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Figure A2. Distribution of predicted probabilities of consent



Note: These statistics are restricted to households with a male primary respondent, consistent with the consent-adjustment model. Red dashed vertical lines mark the predicted probability at 0.05 and 0.95. These predictions are restricted to households with a male primary respondent (2 960 household).

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

Table A7. Model fitness: original vs enhanced resilience capacity index (RCI)

	Original RCI (FCS; HDDS)		Enhanced RCI (FCS; MDD-W)		Enhanced RCI (FCS; MDD-C)	
	Value	Evaluate	Value	Evaluate	Value	Evaluate
Root Mean Square Error of Approximation (RMSEA)	0.068	Acceptable	0.04	Good fit	0.00	Good fit
Comparative Fit Index (CFI)	0.985	Good fit	0.99	Good fit	1.00	Good fit
Tucker-Lewis Index (TLI)	0.955	Good fit	0.97	Good fit	1.013	Good fit

Notes: FCS – food consumption score; HDDS – household dietary diversity score; MDD-W – Minimum Dietary Diversity for Women; MDD-C – Minimum Dietary Diversity for Childre. Each column reports fit statistics for a SEM where a latent resilience factor is identified by the four RIMA pillars (ABS, AST, AC, SSN) and linked to the stated outcome block. Indices shown: RMSEA (lower is better), CFI and TLI (higher is better). Evaluation labels follow common thresholds: RMSEA ≤ 0.05 = “Good fit”, 0.05–0.08 = “Acceptable”; CFI/TLI ≥ 0.95 = “Good fit”.

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024. FAO. 2025. e-RIMA: Household Resilience Tool. [Accessed on 27 June 2025]. https://foodandagricultureorganization.shinyapps.io/ShinyRIMA_HHresilience

Table A8. Minimum Dietary Diversity for Children (MDD-C) and resilience capacity

Minimum Dietary Diversity for Children (MDD-C)	Resilience level original (%)			
	Least	Borderline	Most	Total
Poor	81.6	87.8	78.6	82.2
Acceptable	18.5	12.2	21.4	17.8
Number of observations	299	188	234	721

Source: Authors' own elaboration based on results of the RIMA Afghanistan Household Survey conducted on August 2024.

FAO AGRICULTURAL DEVELOPMENT ECONOMICS WORKING PAPERS

This series is produced by the Food and Agriculture Organization of the United Nations (FAO) since 2001 to share findings from research produced by FAO and elicit feedback for the authors.

It covers different thematic areas, such as food security and nutrition global trends and governance; food security and resilience; sustainable markets, agribusinesses and rural transformations; and climate-smart agriculture.



The complete series is available at:

www.fao.org/agrifood-economics/publications/working-papers

The Agrifood Economics and Policy Division (ESA) is the focal point for FAO's research and policy analysis on agricultural and economic development. The Division produces evidence-based policy analysis and strengthens the capacity of Member Nations to improve decision-making on food security and nutrition, resilience, climate-smart agriculture, sustainable markets, agribusinesses and rural transformations.

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of FAO and can in no way be taken to reflect the views of the European Union.

CONTACTS

Agrifood Economics and Policy Division – Economic and Social Development
ESA-Director@fao.org
www.fao.org/agrifood-economics

Food and Agriculture Organization of the United Nations
Rome, Italy

ISBN 978-92-5-140416-4 ISSN 2664-5785



9 789251 404164
CD8081EN/1/01.26