



CGIAR

BETTER DIETS
AND NUTRITION

Energy and Macronutrient Intake among Women of Reproductive Age: Baseline Findings from the FRESH End-to-End Evaluation

Tanzania Evaluation | Research Brief 4

December 2025

Bliznashka, L., Azupogo, F., Arnold, C. D., Djuazon, N., Jeremiah, K., Malindisa, E., Kinabo, J., Cunningham, K., Hess, S., & Olney, D.



Contents

<i>Introduction</i>	2
<i>Methodology</i>	2
<i>Results</i>	3
Socio-economic and demographic characteristics	3
Energy and macronutrient intake	4
<i>Key messages</i>	6

Tables

Table 1. Women's socio-economic and demographic characteristics (N=2,594)	3
Table 2. Women's usual energy and macronutrient intake (N=2,594)	4

Figures

Figure 1. Women's mean usual macronutrient intake by education status (N=2,594)	5
Figure 2. Women's mean usual macronutrient intake by household food security status (N=2,594)	5
Figure 3. Women's mean usual macronutrient intake by household wealth quintile (N=2,594)	6

Energy and Macronutrient Intake among Women of Reproductive Age in Northern Tanzania: Baseline Findings from the FRESH End-to-End Evaluation

Introduction

In Tanzania, unhealthy diets are a major contributor to non-communicable diseases such as obesity, hypertension, and diabetes [1]. Tanzanian diets are generally cereal-based and low in fruit and vegetables (F&V) and animal sourced foods [2,3]. With rising incomes, consumption of energy-dense processed and ultra-processed foods has increased, reaching 694 kg/year per adult in 2019 [4]. Among women of reproductive age (WRA), daily energy intake is also increasing. Although nationally representative data are lacking, individual studies indicate an increase over time from 1,347 kcal/day in 2014 to 1,631 kcal/day in 2015/16 and 2,174 kcal/day in 2022 [5–7].

[The CGIAR Research Initiative on Fruit and Vegetables for Sustainable Healthy Diets \(FRESH\)](#), now under the [CGIAR Science Program on Better Diets and Nutrition \(BDN\)](#), uses an end-to-end approach, described in more detail in [Research Brief 1](#), that combines demand, food environment, and supply interventions to increase desirability, affordability, accessibility, and availability of F&V [8].

In Tanzania, an ongoing impact evaluation is testing the effectiveness of this end-to-end approach in improving F&V intake and vegetable production across 33 villages in the Arusha and Kilimanjaro regions [8]. In this research brief, we describe baseline findings on the energy and macronutrient intake among WRA in the study area.

Methodology

Baseline data were collected between October 2023 and January 2024 from 2,604 WRA (15–49 years of age), with a brief two-week pause over the Christmas and New Year holidays. Randomly sampled WRA were eligible for the survey if they lived in one of the 33 study villages, had a biological child aged 10–14 years, and provided informed consent. [Research Brief 1](#) provides additional details on how villages and households were selected for the study [8].

In the analyses presented here, we used data from 2,594 WRA for whom we had dietary intake data. These data were collected using a quantitative multi-pass 24-hour dietary recall. Twenty percent of women were interviewed a second time (repeated recall) on a non-consecutive day to account for day-to-day variation in dietary intake. Quantities consumed were converted to energy and macronutrient intake using the Tanzanian food composition table, supplemented with other sources as necessary. Women who consumed <500 kcal/day or >6000 kcal/day were excluded from the analyses due to suspected under-reporting or over-reporting, respectively. Usual energy and macronutrient intake were estimated using the National Cancer Institute methodology, using data from both the first and second recalls [9]. Detailed descriptions of the diet data collection procedures, data processing, and data analyses are available [elsewhere](#) [3].

Using a structured questionnaire, we collected data on women's socio-economic and demographic characteristics. We assessed household food security using the FAO Food Insecurity Experience Scale [10]. Household wealth quintile was derived from a household wealth index calculated using principal components analysis based on 12 assets and seven

housing characteristics. All data were collected in Kiswahili using SurveyCTO on Android tablets.

We first present women’s socio-economic and demographic characteristics. We then present women’s usual intake of energy and macronutrients (carbohydrates, fat, protein, and dietary fiber) overall and by woman’s age, education, household food security status, and household wealth quintile. We tested for differences across groups using *t*-tests, considered significant at $p < 0.05$. Differences were reported as nutritionally meaningful if they were statistically significant and were larger than the following cut-offs: (1) 100 kcal/day in energy intake, corresponding to ~5–7% of average energy intake, (2) 25 g/day in carbohydrate intake, equivalent to 100 kcal/day of energy intake, (3) 5 g/day in protein intake, corresponding to ~20 kcal/day of protein, (4) 10 g/day in fat intake, corresponding to ~90 kcal/day, and (5) 5 g/day in dietary fiber intake, representing ~20% of the WHO-recommended daily intake of ≥ 25 g/day.

Results

Socio-economic and demographic characteristics

Women in our sample were, on average, 38 years old; nearly one-half were between 30 and 39 years old (**Table 1**). Two-thirds of women had completed primary education, and 15% had completed at least some secondary or higher education. One-fifth of women were lactating, and 4% were pregnant at the time of the interview. Approximately one-third of households were food secure, and another one-third were severely food insecure.

Table 1. Women’s socio-economic and demographic characteristics (N=2,594)

Socio-economic and demographic characteristics	Mean \pm SD or %
Woman’s age (years)	38.3 \pm 6.2
Woman’s age group	
20-29 years	8%
30-39 years	48%
40-49 years	44%
Woman’s education	
None/incomplete primary	19%
Primary complete	66%
Any secondary/higher	15%
Physiological status	
Non-pregnant/non-lactating	76%
Pregnant	4%
Lactating	19%
Household food security	
Food secure	37%
Mild food insecurity	15%
Moderate food insecurity	17%
Severe food insecurity	32%
Household wealth	
Wealth index	0.0 \pm 2.4
Lowest wealth quintile	20%

Energy and macronutrient intake

Women consumed 2,415 kcal/day on average (**Table 2**), with no meaningful variation by age group. Daily energy intake also did not vary between non-pregnant/non-lactating women (2,371 kcal/day) and pregnant women (2,283 kcal/day). However, lactating women consumed 250 more kcal/day than non-pregnant/non-lactating women ($p<0.01$), with a mean usual energy intake of 2,621 kcal/day. Women with any secondary or higher education consumed 156 more kcal/day on average ($p=0.04$) than women with no or incomplete primary education. Women in food secure households consumed 335 more kcal/day on average ($p<0.01$) than women in severely food insecure households. Further, women in wealthier households consumed more calories than women in less wealthy households, with a difference of 276 kcal/day between the lowest and highest wealth quintiles ($p<0.01$). Overall, the mean usual energy intake increased across household wealth quintiles, ranging from 2,250 kcal/day in the lowest quintile to 2,526 kcal/day in the highest quintile ($p<0.01$). The mean energy intake also increased as household food security improved, ranging from 2,265 kcal/day among women in severely food insecure households to 2,601 kcal/day among women in food secure households ($p<0.01$). Carbohydrates and fat were the primary sources of energy, contributing 62% and 25% of energy intake, respectively (**Table 2**).

Table 2. Women's usual energy and macronutrient intake (N=2,594)

Macronutrient	Mean \pm SE	Percentage of energy intake
Energy (kcal/day)	2415 \pm 29	
Carbohydrates (g/day)	397 \pm 5	62%
Fat (g/day)	72 \pm 2	25%
Protein (g/day)	65 \pm 1	10%
Dietary fiber (g/day)	43 \pm 1	3%

Women consumed an average of 397 g/day of carbohydrates, 72 g/day of fat, 65 g/day of protein, and 43 g/day of dietary fiber (**Table 2**). We found no differences in usual intake of macronutrients by women's age. Usual macronutrient intake did not differ between pregnant and non-pregnant/non-lactating women. Lactating women had significantly higher intake of all macronutrients compared to non-pregnant/non-lactating women, consistent with their higher energy intake.

Carbohydrate intake was lower among women with any secondary or higher education compared to women with no or incomplete primary education ($p<0.04$) (**Figure 1**). Dietary fiber intake also decreased with increasing education ($p<0.01$), whereas fat intake was higher among more educated women ($p<0.01$). Protein intake did not vary by women's education level (**Figure 1**).

There were no meaningful differences in intake of carbohydrates or dietary fiber by household food security level (**Figure 2**). Daily fat and protein intake decreased with increasing food insecurity. Women in food secure households consumed 10 additional grams of protein per day compared to women in severely food insecure households ($p<0.01$). We also found a 24 g/day difference in fat intake between women in food secure households (84 g/day) and women in severely food insecure households (60 g/day) ($p<0.01$).

In addition, women's intake of carbohydrates did not vary by household wealth, but protein, fat, and dietary fiber intake did (**Figure 3**). Protein intake increased with wealth quintile, ranging from 61 g/day among women in the lowest wealth quintile to 68 g/day among women in the highest wealth quintile ($p<0.01$). Fat ranged from 58 g/day to 89 g/day among women in the

lowest and highest wealth quintiles respectively ($p < 0.01$). Dietary fiber intake decreased with wealth, ranging between 45 g/day among women in the lowest wealth quintile and 39 g/day among women in the highest wealth quintile ($p < 0.01$).

Figure 1. Women’s mean usual macronutrient intake by education status (N=2,594)

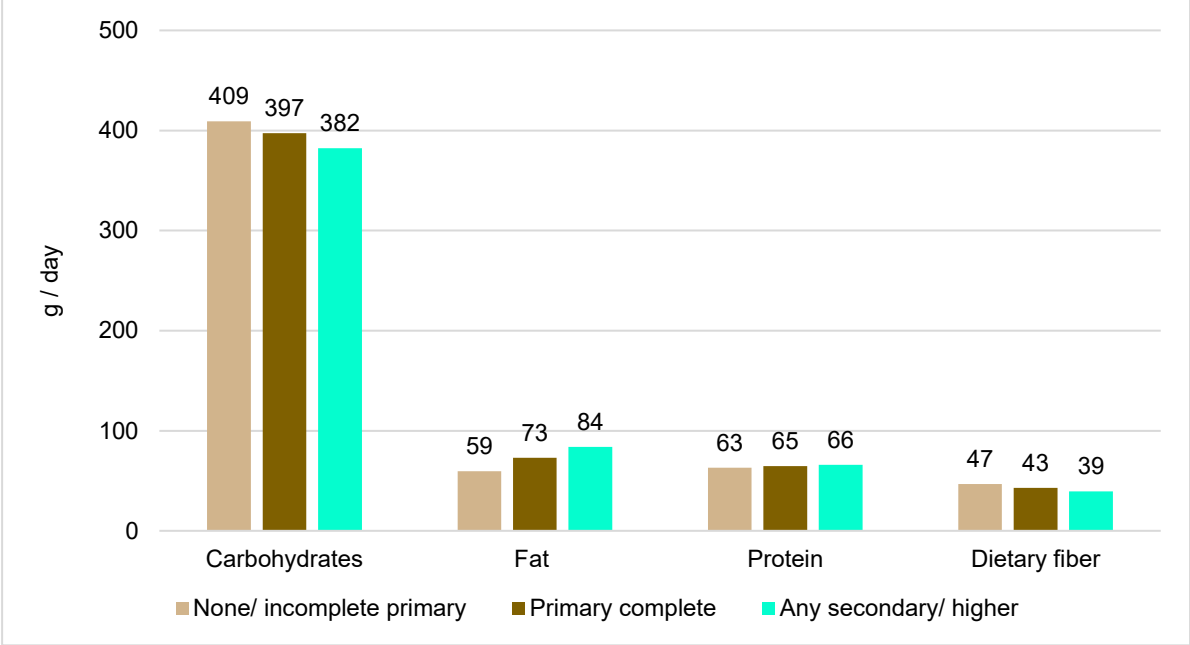


Figure 2. Women’s mean usual macronutrient intake by household food security status (N=2,594)

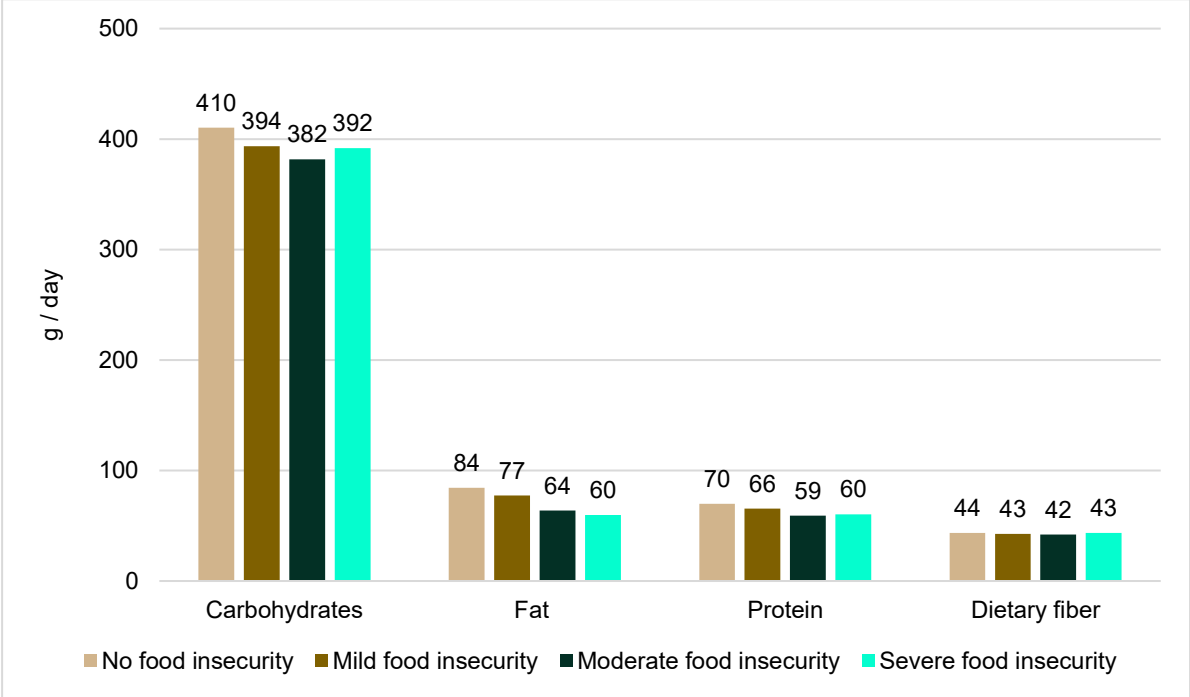
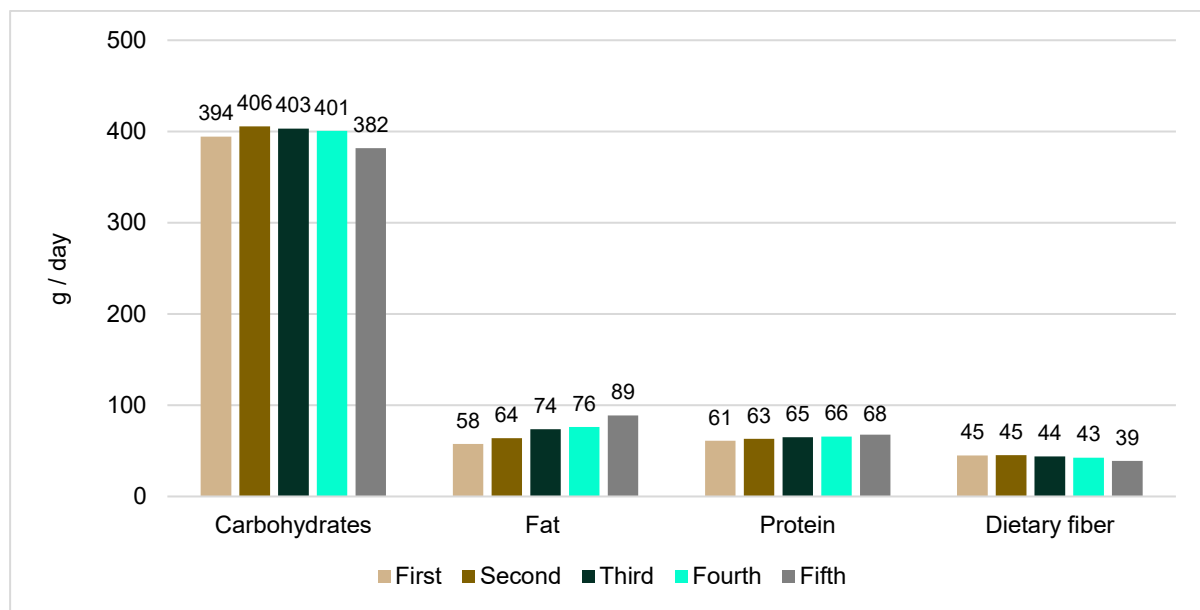


Figure 3. Women's mean usual macronutrient intake by household wealth quintile (N=2,594)



Key messages

- The usual energy intake of 2,370 kcal/day among non-pregnant, non-lactating WRA was in line with the Tanzanian Food Based Dietary Guidelines (FBDG), which recommend daily energy intake of 2,300 for this group [11]. Pregnant women's usual energy intake of 2,283 kcal/day was ~400 kcal/day (or ~15%) less than the national recommendation of 2,624 kcal/day for pregnant women. Likewise, lactating women's usual energy intake of 2,621 kcal/day was ~200 kcal/day (or ~7%) less than the national recommendation of 2,822 kcal/day for this group.
- Usual protein intake among WRA was generally higher than recommended in the Tanzanian FBDG: 65 g/day in our sample versus 41 g/day recommended for non-pregnant, non-lactating WRA [11]. In addition, we found that usual protein intake was above the 41 g/day recommendation for all subgroups we examined.
- The usual fat intake of 72 g/day we documented was substantially higher than the 55 g/day recommended in the Tanzanian FBDG for the general population [11]. The highest intake was observed among women in wealthier and food secure households, and among the most educated women. The highest fat intake of 89 g/day (or 62% above the FBDG recommendation) was observed among women in the wealthiest households.
- Women's usual dietary fiber intake was in line with recommendations: 43 g/day in our sample versus 39 g/day recommended for the general population [11]. Usual dietary fiber intake decreased with household wealth, but did not vary meaningfully by any of the other socio-economic characteristics we examined.
- The higher usual energy, protein, and fat intakes among the most educated women and among those living in wealthier and more food secure households suggest that women with more resources consume more.
- Overall, we found no meaningful differences in women's usual energy and macronutrient intake by women's age.

REFERENCES

1. Afshin A, Sur PJ, Fay KA, Cornaby L, Ferrara G, Salama JS, et al. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2019;393: 1958–1972. doi:10.1016/S0140-6736(19)30041-8
2. Bricas N, Tchamda C. Sub-Saharan Africa's significant changes in food consumption patterns. UNESCO; 2017. Available: [https://agritrop.cirad.fr/591511/7/So What 2 - SSA%27s significant changes.pdf](https://agritrop.cirad.fr/591511/7/So%20What%202%20-%20SSA%27s%20significant%20changes.pdf)
3. Azupogo F, Arnold CD, Bliznashka L, Makori N, Njau CN, Malindisa E, et al. Dietary Intake and Nutrient Adequacies among Women of Reproductive Age in Northern Tanzania: A Cross-Sectional Study. *J Nutr*. 2025. doi:10.1016/j.tjnut.2025.11.008
4. Ignowski L, Belton B, Tran N, Ameye H. Dietary inadequacy in Tanzania is linked to the rising cost of nutritious foods and consumption of food-away-from-home. *Glob Food Sec*. 2023;37: 100679. doi:10.1016/j.gfs.2023.100679
5. Mamiro P, Kinabo J, Dawkins N, Bundala N, Mwanri A, Majili Z, et al. Food intake and dietary diversity of farming households in Morogoro region, Tanzania. *African J Food, Agric Nutr Dev*. 2016;16: 11295–11309. doi:10.18697/ajfand.76.16045
6. Eleraky L, Stuetz W, Rybak C, Frank J, Biesalski HK, Mbwana H, et al. Potentials and limitations of a food group-based algorithm to assess dietary nutrient intake of women in rural areas in Tanzania. *Int J Food Sci Nutr*. 2024;75: 436–444. doi:10.1080/09637486.2024.2335523
7. Ngassa NJ, Masumo RM, Hancy A, Kabula EJ, Killel E, Nusurupia J, et al. Food and nutrient intake among non-pregnant, non-lactating women of reproductive age of Mbeya in Tanzania: A repeated 24-hour dietary recall. Robinson J, editor. *PLOS Glob Public Heal*. 2024;4: e0004010. doi:10.1371/journal.pgph.0004010
8. Bliznashka L, Kumar N, Kinabo J, Mwombeki W, Hess S, Marshall Q, et al. Improving fruit and vegetable intake and production in Tanzania: An evaluation of the FRESH end-to-end approach. Washington, DC; 2023. Available: <https://hdl.handle.net/10568/138874>
9. NCI. User's Guide for Analysis of Usual Intakes v2.1. For use with versions 2.1 of the MIXTRAN, DISTRIB, and INDIVINT SAS macros. Available: http://appliedresearch.cancer.gov/diet/usualintakes/macros_single.html
10. Ballard TJ, Kepple AW, Cafiero C. The Food Insecurity Experience Scale: Development of a Global Standard for Monitoring Hunger Worldwide. Technical Paper. Rome, Italy: FAO; 2013.
11. United Republic of Tanzania Ministry of Health. Food-Based Dietary Guidelines for a Healthy Population. 2023. Available: <https://www.moh.go.tz/storage/app/uploads/public/658/295/d4b/658295d4bbcba467264195.pdf>

AUTHORS

Lilia Bliznashka (l.bliznashka@cgiar.org) is a Research Fellow at the International Food Policy Research Institute based in Washington, DC, USA

Fusta Azupogo (fazupoko@uds.edu.gh) is a Lecturer at the University for Development Studies based in Tamale, Ghana

Charles D Arnold (cdarnold@ucdavis.edu) is a Statistician at the Institute of Global Nutrition at the University of California, Davis based in Davis, CA, USA

Nelly Djuazon (n.djuazon@cgiar.org) is a Research Analyst at the International Food Policy Research Institute based in Dakar, Senegal

Kidola Jeremiah (jkidola@gmail.com) is a Principal Research Scientist at the National Institute of Medical Research Mwanza based in Mwanza, Tanzania

Evangelista Malindisa (maryvianey12@gmail.com) is a Lecturer at the Catholic University of Health and Allied Sciences, and Research Scientist at the National Institute of Medical Research Mwanza based in Mwanza, Tanzania

Joyce Kinabo (jkinabo@sua.ac.tz) is a Professor of Human Nutrition at Sokoine University of Agriculture based in Morogoro, Tanzania

Kenda Cunningham (K.Cunningham@cgiar.org) is a Senior Research Fellow at the International Food Policy Research Institute based in London, UK

Sonja Hess (syhess@ucdavis.edu) is a Research Nutritionist at the Institute of Global Nutrition at the University of California, Davis based in Davis, CA, USA

Deanna Olney (D.Olney@cgiar.org) is the Director of the Nutrition, Diets, and Health Unit at the International Food Policy Research Institute based in Washington, DC, USA

ACKNOWLEDGEMENT

We gratefully acknowledge all respondents for their time and willingness to participate in this study, as well as the field team for their efforts in data collection. We also acknowledge Neha Kumar for her role in the study design. We are grateful to Gayathri Ramani, Rock Zagre, Malick Dione, and Nishmeet Singh for their support in fieldwork preparation, and data management, cleaning, and analysis. We would like to thank all funders who support this research through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders.

Copyright © IFPRI 2025

This work is licensed under a [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).

Cover photo: [Woman preparing ugali from cassava flour in Tanzania; Holly Holmes/RTB.](#)



About BDN

The CGIAR Science Program on Better Diets and Nutrition (BDN) identifies, co-designs and tests consumer-oriented solutions to ensure sustainable healthy diets for all while enhancing livelihoods, social equity, and environmental sustainability. Through evidence-based research and collaboration, BDN supports country-led food system transformation in low- and middle-income countries. To learn more about BDN, please visit <https://www.cgiar.org/cgiar-research-portfolio-2025-2030/better-diets-and-nutrition/>.

Disclaimer

This publication has been prepared as an output of BDN and has not been independently peer reviewed. Any opinion(s) expressed here belong to the author(s) and are not necessarily representative of or endorsed by CGIAR.

We would like to thank all funders who support this research through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders.