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

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Contents

Introduction 2

Methods 2

Results 3

Key messages 6

Tables and Figures

Table 1. Women’s socio-economic and demographic characteristics at baseline.....3

Figure 1. Proportion of women reporting any intake of fruit on the previous day, by GDQS fruit group categories.....4

Figure 2. Proportion of women reporting any intake of fruit on the previous day, by household wealth4

Figure 3. Proportion of women reporting any intake of fruit on the previous day, by household food security5

Figure 4. Proportion of women reporting any intake of fruit on the previous day, by educational attainment.....5

Figure 5. Proportion of women reporting any intake of fruit on the previous day, by age group6



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

Introduction

To ensure overall health and reduce risk of non-communicable disease (NCDs), a healthy diet low in fat, sugars and salt and high in fruit and vegetables (F&V) is recommended [1]. In most population groups, however, F&V intake is below the World Health Organization (WHO) recommendation of 400 g per person/day [2-4]. In Tanzania, a recent scoping review found that F&V intake was below recommended levels in all population groups examined [5]. Low F&V intake is due to a complex interplay of desirability, affordability, accessibility and availability [6, 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), is designing an end-to-end approach to be evaluated in Northern Tanzania, as previously described in the [Research Brief 1](#) [8]. A baseline survey was implemented, and dietary intake and nutrient adequacies among women of reproductive age (WRA, 15-49 years of age) participating in the baseline survey were summarized elsewhere [9, 10]. Here we provide a deep dive into fruit intake among these women.

Methods

The evaluation is being conducted in 33 villages in the Arusha and Kilimanjaro regions. WRA were eligible to participate if, at enrollment, they were 15-49 years of age, lived in one of the 33 study villages, had a biological child aged 10-14 years, and provided written informed consent. Ethical approval was granted by the Institutional Review Boards of the National Institute of Medical Research in Tanzania, the International Food Policy Research Institute, and the Wageningen University and Research. Details on village and household selection have previously been described [8]. The baseline survey was implemented from October 2023 to January 2024 with a two-week pause over the Christmas and New Year holidays. Dietary intake among WRA was assessed using a 24-hour dietary recall (24HR) with the OpenDRS approach. Women who consumed <500 kcal/day or >6000 kcal/day were excluded from the analyses due to suspected under-reporting or over-reporting, respectively [9].

Using a structured questionnaire, we collected data on women's socio-economic and demographic characteristics, and household food security using the FAO Food Insecurity Experience Scale [11]. Principal components analysis based on 12 assets and seven housing characteristics was used to calculate a household wealth index. All data were collected in Kiswahili using SurveyCTO on Android tablets.

Descriptive statistics were used to describe socio-economic and demographic characteristics. We used the first dietary recall to categorize individual fruits into three food groups: citrus fruits, deep orange fruits, and other fruits, as suggested in the Global Diet Quality Score (GDQS) toolkit [12]. Descriptive analyses were used to present fruit intake by fruit group and socio-economic status.

Results

The analyses included data from 2,547 women, who provided information on their individual fruit intake during the previous 24 hours in the first dietary recall. Women were on average 38.2 ± 6.0 years old (**Table 1**). Two-thirds of women had completed primary school (66.1%) and almost half reported moderate or severe food insecurity (48.7%). We previously reported that the mean usual F&V intake among women was 279 g/day (95% CI: 201, 365) of which fruit was 35 g/day (95% CI: 2, 118) and vegetables was 245 g/day (95% CI: 168, 328) [9].

Table 1. Women's socio-economic and demographic characteristics at baseline (N=2,547)

Socio-economic and demographic characteristics	Mean \pm SD or n (%)
Woman's age (years)	38.2 \pm 6.0
Age category	
20-29 years	197 (7.7%)
30-39 years	1223 (48.0%)
\geq 40 years	1127 (44.3%)
Educational status	
None/incomplete primary schooling	479 (18.8%)
Primary schooling complete	1683 (66.1%)
Secondary/higher schooling	385 (15.1%)
Household food security	
Food secure	936 (36.7%)
Mild food insecurity	370 (14.5%)
Moderate food insecurity	425 (16.7%)
Severe food insecurity	816 (32.0%)

Among all women, only 16.5% reported consumption of any fruit on the previous day (**Figure 1**). Among these 421 women, over half reported to have eaten citrus fruits, of which lemon consumption was most frequently reported. However, among the women (n=172) who reported consuming lemon, the mean intake of lemon was only 2 g/day (95% CI: 0.3, 6), suggesting it was only a squeeze of lemon juice in tea or over meals. Only 3.3% of all women (n=80) reported eating oranges on the previous day but among those women, their mean intake was 143 (95% CI: 27, 269) g/day. Consumption of any fruits belonging to the deep orange fruits category was reported by 4.3% of all women, of which mango was most frequently consumed (2.9%) with an average intake of 400 (95% CI: 131, 902) g/day, followed by papaya (1.8%) with an average intake of 275 g/day (95% CI: 2, 771) among the women who consumed each fruit. Fruit intake from the other fruit category was reported by 6.3% of women. Banana was the most frequently consumed of the other fruits category, with 83 women (3.3% of all women) reporting a mean intake of 107 g/day (95% CI: 6, 192). Other fruits consumed by women included avocado (2.0%), watermelon (1.0%), and pineapple (1.0%). Average amounts for these fruits ranged from 96 g/day for avocado to 343 g/day for watermelon among the women who reported consuming these fruits.

The analyses by socio-economic status revealed that the proportion of women consuming any fruit was lower among those with lower socio-economic status. Specifically, 6.0% of women in the lowest household wealth quintile reported fruit intake compared to 31.2% in the highest wealth quintile (**Figure 2**). Similarly, the lowest proportion of women reporting any fruit intake was among women living in severely food insecure households (**Figure 3**), and among those who had no or incomplete primary education (**Figure 4**). Fruit consumption was reported slightly less frequently by women 20-29 years of age compared to women 40–49-years of age (12.7% vs 17.9%; **Figure 5**).

Figure 1. Proportion of women reporting any intake of fruit on the previous day, by GDQS fruit group categories

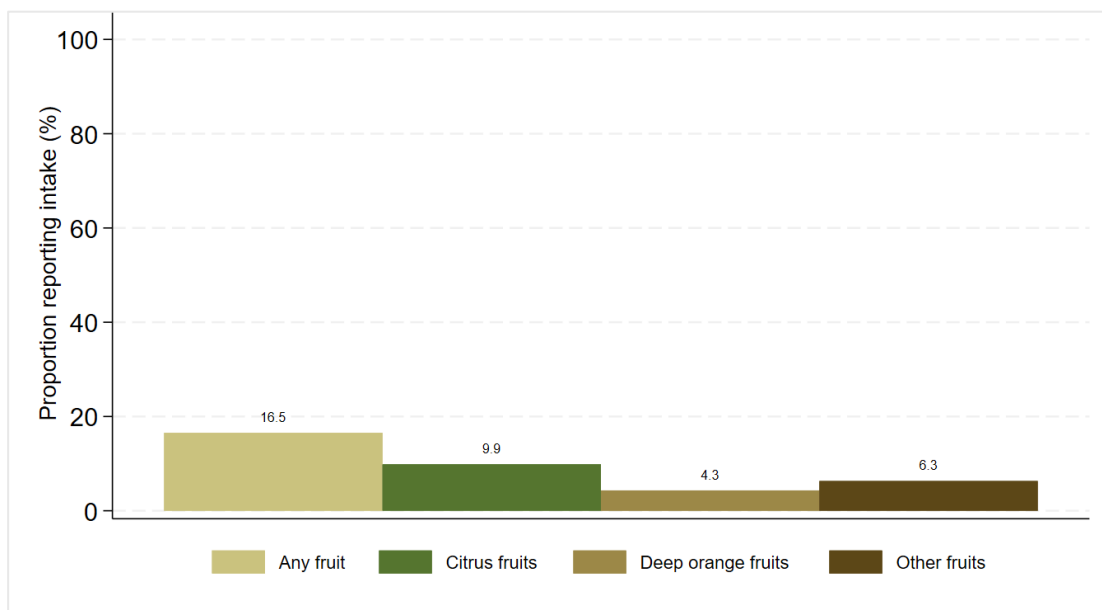


Figure 2. Proportion of women reporting any intake of fruit on the previous day, by household wealth

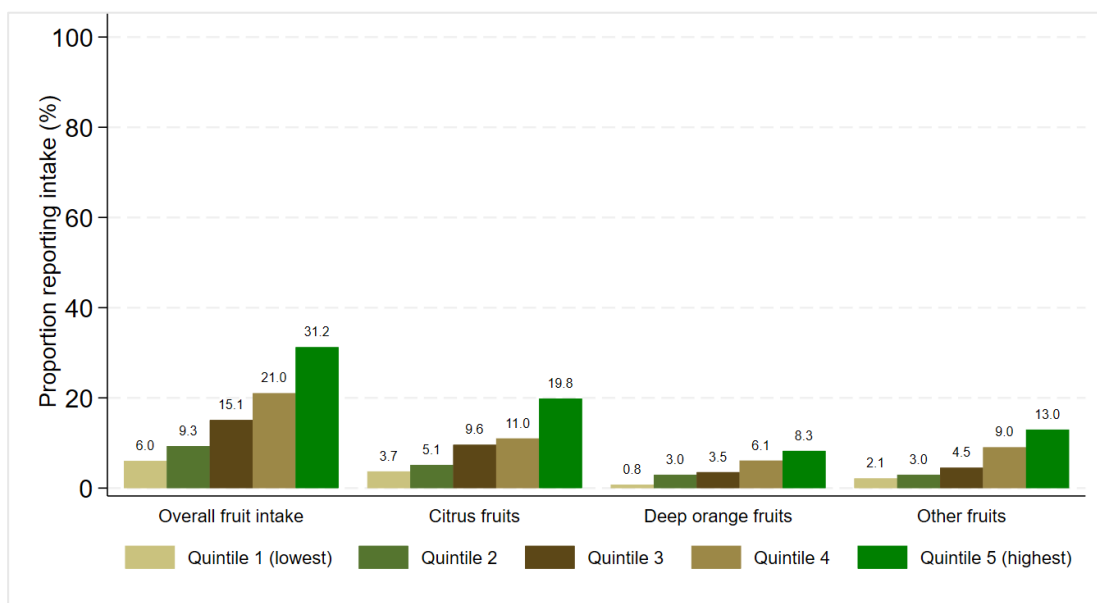


Figure 3. Proportion of women reporting any intake of fruit on the previous day, by household food security

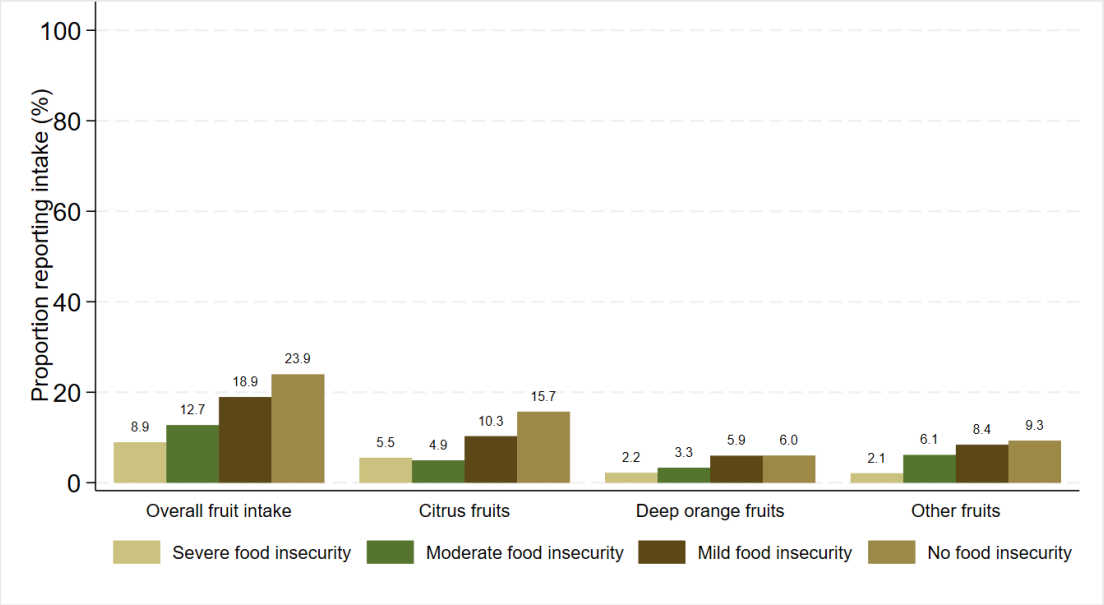


Figure 4. Proportion of women reporting any intake of fruit on the previous day, by educational attainment

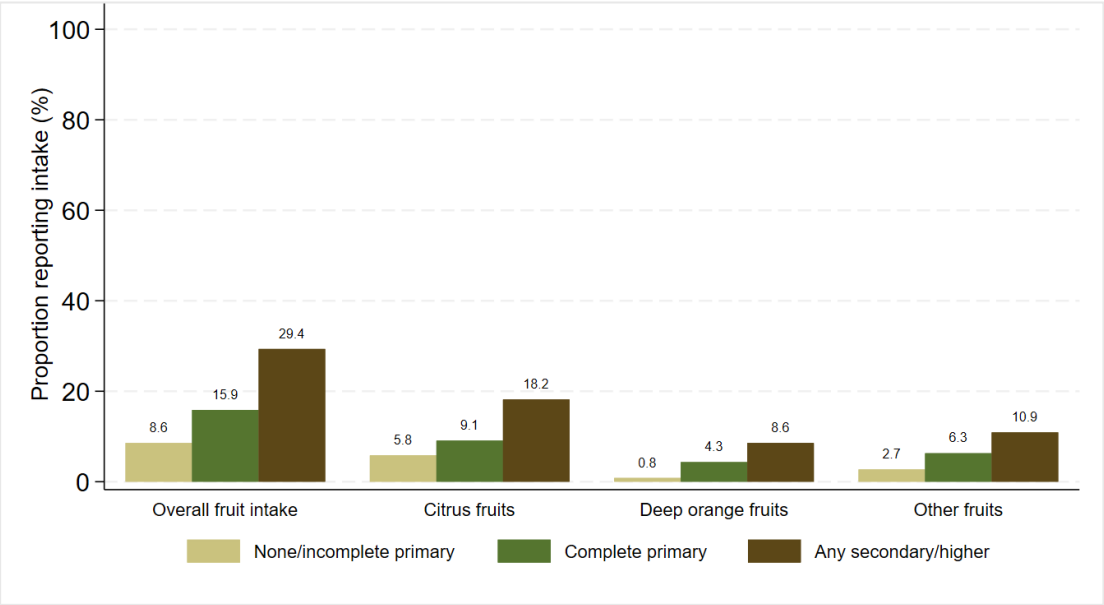
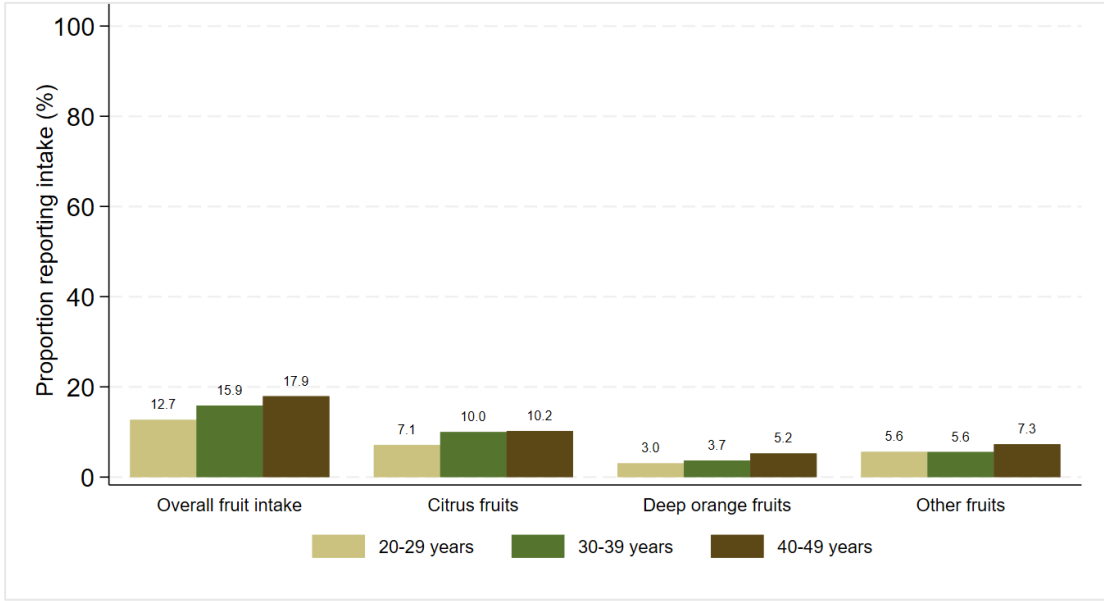


Figure 5. Proportion of women reporting any intake of fruit on the previous day, by age group



Key messages

- Few women (16.5%) reported consuming any fruit on the day prior to the survey.
- Reported fruit intake was lower among women in poorer households and those living in food insecure households suggesting that affordability of fruit is likely a critical barrier to increasing intake.
- The fruit that was reportedly consumed most frequently by women (7%) was lemon, which was consumed in very small amounts.
- Other fruits that women reported eating in larger quantities were banana, orange, mango, avocado, papaya, watermelon, and pineapple. However, these were reported by only 1.0 – 3.3% of women.

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Cover photo: Fruit for sale at a market in Moshi, Tanzania; IFPRI/S. Honeycutt.



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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/>.

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