



Living income benchmarking pilot study in Tigray Regional State of Ethiopia

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The document outlines a living income study in Tigray Region, Ethiopia, focusing on rural households in three *woredas*: Raya Azebo, Enderta, and Tseada Emba. Using the Living Income Methodology for East Africa, data was gathered through focus groups, interviews, and market surveys. The study found that food costs made up over half of the living income in Raya Azebo and Enderta, but less than 50% in Tseada Emba. Non-food non-housing expenses were highest in Tseada Emba at 38%, followed by Raya Azebo at 35%, and lowest in Enderta at 27.4%. Establishing a living income benchmark helps in comparing farming systems and identifying income gaps by contrasting actual earnings with the income needed for a decent living standard.

Key words: living income, income, gap, benchmarking, Tigray, Ethiopia

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Preface

Rural households have engaged in various livelihood activities to enhance both the quantity and quality of life. The main sources of income for farmers include crop production, livestock rearing, and off-farm or non-farm activities. However, there is limited information available about decent living standards for household members in rural areas. A decent standard of living encompasses not only food and housing but also non-food, non-housing (NFNH) expenses, which include education, healthcare, social responsibilities, transportation, and more.

This study aims to assess living income gaps by comparing households' actual incomes with the income necessary for a decent standard of living. It utilized household surveys and focus group discussions (FGDs) conducted in the Enderta, Raya Azebo and Tseada Emba *woredas* in the Tigray region of Ethiopia. To determine the living income gap, the study measured the difference between actual household income and an established living-income benchmark across the three *woredas*. Income data were collected through surveys to determine farmers' actual earnings. The living income benchmark was developed using insights from FGDs to estimate indicators of decent living standards. The study ultimately calculated the living income gap by subtracting actual income from the established benchmark, providing context-specific recommendations to improve the living standards of rural households.

The research received financial support from the Dutch Embassy in Ethiopia for the Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems (RAISE-FS) project. It is being hosted by Stichting Wageningen Research Ethiopia, based in Addis Ababa, to transform the Ethiopian food system across three food system typologies. The study would not have been possible without the collaboration of enumerators, *woreda* experts, development agents, and *kebele* administrators.

The study has a limited geographic scope. It focuses on three food system typologies and agro-ecologies, particularly within the already selected *woredas* for the RAISE-FS project, which considers commercial, food-insecure, and high-potential food system typologies. The findings will serve as valuable input for policymakers, researchers, scholars, and students in designing interventions, generating further information, improving living standards, and transforming food systems in rural areas.

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List of abbreviations and acronyms

AME	Adult Male Equivalent
ETB	Ethiopian <i>ETB</i>
CSA	Central Statistical Agency
FAO	Food and Agriculture Organization of the United Nations
FGD	Focused Group Discussion
Ha	Hectare
KII	Key Informant Interview
km	Kilo meter
M.a.s.l.	Meter above sea level
mm	milli meter
NGO	Non-Governmental Organization
PPP	Purchasing Power Parity
PPP/AME/day	Purchasing Power Parity per Adult Male Equivalent per Day
PPP/RH/day	Purchasing Power Parity per Rural Household per Day
RAISE-FS	Resilient Agriculture for Inclusive and Sustainable Ethiopian Food Systems
SPSS	Statistical Package for Social Sciences
SWRE	Stichting Wageningen Research Ethiopia
TLU	Topical Livestock Unit
WSER	Wageningen Social and Economic Research
WHO	World Health Organization
WUR	Wageningen University & Research

Summary

The extreme poverty line and the living wage methodology are frequently used as benchmarks for the poverty level and the salary that employees need earn to live decent lives, respectively. Living wage is applicable for employed workers while the poverty line is too broad to be applied at the local level. Living income benchmarking has lately come into prominence as a measure of the living standard for smallholder farmers who are self-employed. In order to determine the living income for rural households, we evaluated the earlier published Living Income Methodology for east Africa in three *woredas* (Enderta, Raya Azebo and Tseada Emba) of Tigray Regional State of Ethiopia. Data collection methods included focus group discussions, key informant interviews, and market surveys. The living income was expressed per adult equivalent per day (AE/day) and data collection is focused on rural households and their immediate surroundings.

The living income benchmark for Raya Azebo was 247.2 ETB (US\$ 11.15) PPP/AME/day while 225.6 ETB (US\$ 11.53) PPP/AME/day for Enderta *woreda* and 200.6 ETB (US\$ 9.05) for Tseada Emba *woreda*. The food cost accounted for more than half of the living income benchmark in Raya Azebo and Enderta while less than 50% for Tseada Emba. The variation in the cost required to buy food was also observed due to the differences in the type of commonly consumed food and their corresponding price. The proportion of non-food non-housing (NFNH) expenditures varied across the three *woredas*, comprising the largest share in Tseada Emba (38%), followed by Raya Azebo (35%), and the smallest share in Enderta (27.4%).

Applying a living income benchmark is therefore the most appropriate tool for comparing diverse farming systems and regions, as it inherently accounts for how farming practices influence food production and how market access affects local costs. Establishing this benchmark for a specific area is also the essential first step in identifying the living income gap, by facilitating a direct comparison between a household's actual earnings and the income needed for a decent standard of living.

Introduction

Two of the seventeen Sustainable Development Goals (SDGs) that are intended to be accomplished by 2030 are eradicating poverty and ending hunger (UN, 2015). The agriculture sector is directly tied to the SDGs since it plays a critical role in enhancing food security and while also generating employment opportunities (Otsuka, 2013). A potential strategy to end hunger is to better assure food supply by raising agricultural production and broadening the range of agricultural land use (Smyth et al., 2015). However, low-income developing nations will not be able to produce all the food needed due to the knowledge, technological, and resource endowment differences among smallholder farmers (Pawlak and Kołodziejczak, 2020). Ethiopia and other emerging nations made significant efforts to reduce poverty, but the percentage of people living below the poverty line remained at 24% in Ethiopia (World Bank, 2023). Furthermore, the disparity and equality among the smallholder farmers in yield gap remain high. The Purchasing Power Parity (PPP) 2.15 US dollars per capita per day was established as the international or extreme poverty limit for low-income countries in 2017 (World Bank, 2022). It was modified in 2017 to account for rising price levels based on the national poverty lines of the 15 poorest economies in the world as of 2017 (World Bank, 2022). The international poverty line has been used as an indicator to assess the progress of efforts to reduce poverty (Debebe and Zekarias, 2020). Although eradicating poverty and ending hunger was set to be achieved by 2030, there is no consensus on the local level indicators to measure poverty line. Indicators for determining the minimum income for rural areas are also utilized to determine the minimum wage rate (Anker, 2008), which is applied in the context of hired workers. However, because the poverty line indicator is utilized at the regional or national level, the use of the international poverty line as an indicator is too broad to quantify the varied rural farm households. Additionally, as the living wage indicator is frequently applied to commercialized tea plantation areas, employing the minimum wage rate may not be appropriate for non-commercial agriculture.

A recent study developed the idea of living income to benchmark the living income of smallholder farmers in East Africa because there are few indicators that can be used to determine whether the income of farming households is enough to afford a decent living (van de Ven et al., 2021). A living income is defined as sufficient income to afford a decent standard of living for all household members and quantified by considering cost of nutritious diet, decent housing and other nonfood costs for health care, education, transport and cloth (Komives et al., 2015). Contrary to the poverty line, a living income benchmark can be applied for a specific sample location, better reflecting the region's actual cost of living. The benchmark serves to establish the income needed for a decent standard of living for a typical household in a specific area, thereby enabling a comparison with a total annual incomes of agricultural households (Cruickshank and Bammann, 2024). The living income benchmark would help to calculate the living income gap, and understand how much more farming households need to receive to achieve a living income (IDH, 2023; Oxfam International, 2021). A debate over the appropriateness of using living wages as a measure of self-employed households' income led to the creation of living income benchmarking for East Africa.

In alignment with this initiative, a Dutch Government-funded project, known as RAISE-FS, is focusing on the transformation of food systems. One of the project's objectives is to enhance the livelihoods of smallholder farmers across various food system typologies. To be able to monitor change, the project uses a living income approach. The first step was to benchmark the living income followed by assessing the living income gap across three food system typologies of southern Ethiopia. The project also wants to assess to what extent small scale food producers in the intervention area are closing the gap between their real annual income and a living income benchmark.

The three *woredas*, which were purposively selected for this study were Enderta, Tseada Emba, and Raya Azebo, and have been categorized into three different food system typologies. Enderta *woreda* represents the food insecure system, Tseada Emba *woreda* represents the high potential, and Raya Azebo *woreda* represents the commercial food system. The specific objectives of the study were:

- To obtain insights about benchmark(s) for living income
- To obtain insights on how benchmarks might vary across *woredas*
- To know how many different benchmarks are needed to meaningfully report on living income gaps
- To assess the living income gap by comparing with real income in the target food systems

Methodology

2.1 Description of the study areas

This study was conducted in Tigray Regional State of Ethiopia. Within Tigray regional state three *woredas* representing three different food system typologies were purposely selected due to the fact that they are among the RAISE-FS project implementation *woredas*. These *woredas* were categorized into different food system typologies. Enderta *woreda* represents food insecure food systems, Raya Azebo *woreda* represents commercial food system typology, and Tseada Emba *woreda* represents a high potential food systems typology. The living income benchmark was calculated at *woreda* level. Furthermore, the variation in living income benchmark between the three *woredas*/food systems were assessed. Within each *woreda*, the actual income data were collected from two *kebeles* using household survey, focus group discussion and key informant interview. The two *kebeles* considered from Enderta *woreda* were Tiabia Arato and Tiabia Mahbere genet while, Kara adishabo, Tsigia for Raya Azebo *woreda* and Tabia tsankanet and Tabia Hangoda for Tseada Emba *woreda*.

Table 1 Detailed description of the study areas

Variables		Raya Azebo	Tseada Emba	Enderta
Number of <i>kebeles</i>	Rural	10	12	24
	Urban	1	3	6
Distance from regional capital-Mekelle (KM)		125	76	13
Area(sq.Km)		2,132.83	51,552.20	141,052.00
Average annual rainfall (mm)		550	500	450
Average altitude (m.a.s.l)		1000-1660	2,200 to 2,800	1750 and 2780
Latitude		12.66° N	14°11'N	13°30'N
Longitude		39.75° E.	39°33'E	39°40'E
Population size	Male	76,987	85,131	116,660
	Female	74,925	40,686	114,815
	Total	151, 912	125,817	231,475
Agroecology (%)	Highland	0	2	38
	Midland	90	98	39
	Lowland	10	0	23
Cultivated land (ha)	Rainfall	26,723	10,481	31,570
	Irrigated	3,240	1,012	3,704
Major crop produced		sorghum, teff, maize and chickpea	Teff, maize, barley, finger millet, wheat, potatoes, faba beans, grass peas, and field peas	wheat, barley, teff, sorghum, and grass pea
Major livestock reared		Cattle, Shoats, Poultry, camel, bee.	Cattle, Shoats, Poultry, bee	Shoats, cattle, poultry, Donkeys, bee

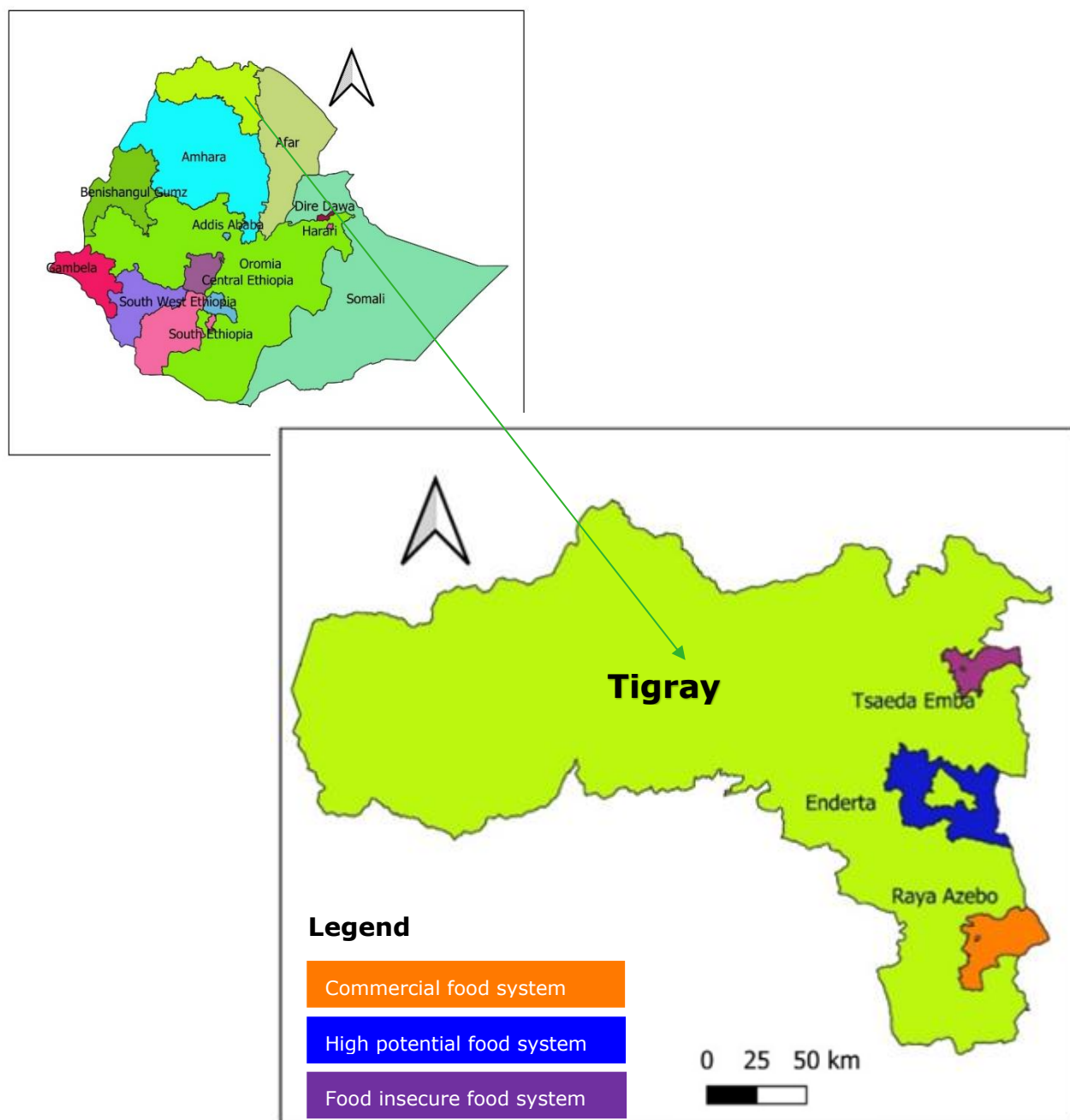


Figure 1 Map of the study area

2.2. Sampling design and study participants

An assessment of living income benchmark was conducted via a mixed-method strategy, including key informant interviews, focus group discussion and secondary data. The size and composition of reference households were obtained using household survey, a total 371 households (122 in Raya Azebo, 122 in Tseada Emba and 127 in Enderta woredas). Focus group discussion and key informant interview were conducted to assess the cost associated with housing, food, non-food and non-housing expenses (such as health care and education). Participants in these discussions were exclusively drawn from individuals who had participated in the baseline survey or who were involved in the RAISE-FS project interventions. Data related to costs of education, healthcare, and transportation were collected through KIIs and FGDs, and key stable food items were also identified using these data collection methods. The FGDs were conducted in three categories: one category comprised mixed groups of youth and adult/older males, as well as adult

and youth females; the second category comprised solely female participants from various age groups; and the third category comprised male participants spanning different age groups. In total 6 FGD were conducted with 10-12 members. Food price data were collected in July 2024 from multiple vendor locations across the three *woredas*. This included central open-air markets and small shops in the capital towns of each *woreda*: Qwiha town (Enderta *woreda*), Mekhoni town (Raya Azebo *woreda*), and Agula town (Tseada Emba *woreda*).

2.3. Data collection

Qualitative and quantitative data collection methods were employed to assess the living income benchmark. These included key informant interviews (KIIs), focus group discussions (FGDs), secondary data and reports, and participant household surveys. Data from these sources were triangulated to enhance the reliability and validity of the findings. The size and composition of the reference households were determined through a household survey. A total of 371 respondents were interviewed: 122 from Raya Azebo, 122 from Tseada Emba and 127 from Enderta.

Focus Groups Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted to assess costs associated with housing, food, and non-food non-housing expenses (such as healthcare and education). Participants in these discussions were exclusively drawn from individuals who had participated in the baseline survey or who were involved in the RAISE-FS project interventions. Data related to costs of education, healthcare, and transportation were collected through KIIs and FGDs, and key staple food items were also identified using these data collection methods. Food prices for each of the three *woredas* were collected across multiple vendor locations, including central open-air markets and small shops in *woreda* and regional town for Enderta *woreda*.

2.4 Data analysis

The living income benchmark was calculated by aggregating costs gathered through FGDs, KIIs, and a market survey. These costs encompassed four major expenditure groups, as defined by van de Ven et al. (2021): nutritious food, basic decent housing, other non-food non-housing (NFNH) items (such as education, healthcare, and transport), and provisions for social duties and unforeseen expenses (Table 2)

The total food cost is comprised of two components: the cost of a low-cost nutritious diet, plus an additional 16% to cover miscellaneous food expenses. This 16% allowance includes 10% for dietary variation, 2% for salt, spices, and condiments, and 4% for food waste (van de Ven et al., 2021). The housing costs cover the value of an owner-occupied house plus expenses for utilities, maintenance and taxes. The NFNH costs cover basic health care and education, plus a margin for other NFNH goods and services, such as clothing and footwear, household equipment, transportation and communication.

Table 2 Criteria and variables for living income benchmark

No	Criteria	Variables
1	Food cost	low nutritious diet cost and miscellaneous cost
2	Housing cost	value of owner occupied house, utilities, maintenances and tax cost
3	Non-food and non-housing cost	health care cost, education cost and other non-health and non-education cost
4	Social duty (<i>edir</i>)	Edir, festivals
5	unforeseen cost	costs uncured unexpectedly

2.5 Assessing the living income benchmark

A short list of guiding questions was used to assess living income benchmark (Table 3). These questions link to the Living Income Survey, which includes data collection guidelines, and the Living Income Diet Tool. Both are tools used to rapidly benchmark the living income in a rural area in a transparent and consistent way (van de Ven et al., 2021).

Table 3 Guiding questions to estimate the living income benchmark in a particular time and place

No	Guiding questions
	Reference household size and composition
1	What is the average number of adult male, adult female and children (<18 years old) per household?
	Food costs
2	- What are the cheapest and most consumed foods per food group, available at vendor locations where reference households commonly shop for cheap foods? - For these foods: what is the current price (per kg or L)? - For foods with strongly fluctuating prices within a year (>25%), what is the most common price throughout the year (per kg or L)?
	Housing costs
3	- What are the local minimum standards for decent housing for a reference household, considering local standards in relation to the international housing standards? - What are the annual housing costs for a house that complies with these local minimum standards for decent housing?
	Health care costs
4	- What are the costs of basic health care insurance; which health care service types are (not) covered? - What are the costs of health care services not covered by the basic insurance?
	Education costs
5	- How many years of education are officially counted for completion of primary and lower secondary school? - What are the household out-of-pocket expenses per child for one year of public education at each these education levels?

2.6 Reference household size and composition

The local average household size and composition of male and female adults, and children (<18 years old) is referred to as the reference household. To assess the role of agriculture in rural development and food security in less developed countries, the living income per adult male equivalent (AME) was calculated for rural families based on households' energy needs. In the unit AME man, women and children are included, unlike assessing AME based on national statistics on labour participation (Anker and Anker, 2017). One AME requires 2500 kcal per person per day. Females are equivalent to 0.82 AME (2050 kcal/day) and children (0-18 years) to 0.75 AME (1875 kcal/day) (FAO/WHO/UNU, 2001a). This allows to easily calculate the living income related to food security for households of different size based on their composition, including extended families.

2.7 Method for living income benchmark calculation

2.7.1 Food costs

The household energy needs was calculated based on age, sex, body size and physical activity and a low cost diet from current to low cost, covering 20 foods and 11 food groups (Anker and Anker, 2017). For the food cost calculation the lowest cost nutritious diet was considered based on the Woman Dietary Diversity

Score (FAO, 2010), which ensures sufficient food options for a nutritious and micronutrient-sensitive diet. The nine food groups which were considered are: starchy staples, vegetables, fruits, meat, fish and seafood, eggs, milk and milk products, legumes nuts and seeds, and fats and oils.

First, a selection of cheap and commonly-consumed foods was identified within each food group from the available foods at multiple local vendors, such as open-air markets and small village shops. To ensure sufficient options for a low-cost nutritious diet, prices were collected for at least three foods of acceptable quality per food group. Two of them are the cheapest (per kilogram or liter) and one is the most commonly consumed food. For all selected foods, current prices (at moment of collection) were collected from 5-10 different vendor locations, depending on the price variability. In case of strong fluctuations throughout the year (>25%) the most common prices (throughout the year) were also collected from the same vendor locations and used in the calculations. Cost adjustment was done for Starchy staples, vegetables and fruits, due to their seasonal availability. For both the current and the most common price, the median price was used.

The Living Income Diet Tool was used to calculate the lowest-cost diet per AME meeting all dietary requirements for energy, carbohydrate, protein, fat, and a selection of micronutrients, based on the most common deficiencies in lower income countries (Beal et al., 2017). Dietary requirements are such that both females and males cover their minimum requirements, e.g. the threshold for iron is adequate for women and consequently slightly higher than strictly needed for males and the assumptions is that foods are distributed among household members according to their needs. Finally, the food cost was calculated based on the nutrient contents of each food and its price. Nutrient contents of foods was considered based on the nutrient composition of the raw purchased product, the average waste factor of its food group¹, and the average retention factor per nutrient after preparation (e.g. boiling, frying) specified for the food group based on (USDA, 2007).

Table 4 Nutritive requirements in the Living Income Diet Tool.

Dietary components	Required intake per AME	Unit	Source
Energy	2,500 (2,400 – 2,600) ²	kcal/day	(FAO/WHO/UNU, 2001b)
Carbohydrate	≥ 344	g/day	(WHO/FAO, 2003)
Protein	≥ 63	g/day	(WHO/FAO, 2003)
Total lipid (fat)	≥ 42	g/day	(WHO/FAO, 2003)
Calcium, Ca	≥ 833	mg/day	(WHO/FAO, 2004)
Iron, Fe	≥ 36	mg/day	(IOM 2001)
Zinc, Zn	≥ 15	mg/day	(IZiNCG, 2004)
Vitamin A	≥ 99	IU/day	(WHO/FAO, 2004)
Vitamin C, total ascorbic acid	≥ 43	mg/day	(WHO/FAO, 2004)
Folate, DFE	≥ 320	µg/day	(WHO/FAO, 2004)
Thiamine	≥ 1.0	mg/day	(WHO/FAO, 2004)
Riboflavin	≥ 1.1	mg/day	(WHO/FAO, 2004)
Vitamin B	≥ 2.0	µg/day	(WHO/FAO, 2004)

In addition to the calculated cost, 4% was added to cover food waste, an average for low income countries (FAO, 2010) and 2% to account for additions like salt, spices and condiments. Another 10% was added to the food costs to allow some variation in the diet.

2.7.2 Housing costs

The local minimum standard for basic healthy housing is based on international standards for healthy housing adjusted to conditions in Tigray, such as material availability, climate, and the reference household size and composition. The housing construction should be able to sustain about 50 years without major repairs – also called the ‘expected service life’ of the house (van de Ven et al., 2021).

¹ (<https://ndb.nal.usda.gov>; <http://www.fao.org/infoods/infoods/tables-and-databases/en/>),

The estimation of housing costs was done by: 1) defining a local standard for basic healthy housing for a reference household, and 2) estimating the annual costs of a house that meets these standards. To assess the housing conditions a combination of secondary reports, local observations, key informant interviews and/or focus group discussions was used. The expected service life of a house was checked and the lifetime of houses were reported by focus group discussants of each study area.

Estimating the cost of a standard house involved three focus group discussions per district: one mixed-gender group of all ages in one *Kebele*, and two single-gender groups (female and male) comprising both youth and adults in a second *Kebele*. FGD participants were asked about the criteria to be used for characterizing the best house based on the type of wall, roof and floor. Finally, FGD participants were asked to estimate: 1) total costs of constructing the house including all materials and labour and the expected service life, 2) annual utility costs, including water, electricity, cooking fuel, heat, and lighting, 3) annual costs for routine maintenance and repairs, and 4) annual costs for taxes, levies, fees and house insurance. Finally construction costs were divided over the expected service life.

2.7.3 Non-food non-housing costs

Non-food non-housing costs (NFNH) cover costs for education, health and other basic needs, such as clothing and footwear, transport, communication. The NFNH costs were collected using focus group discussions. The sections below provide a detailed analysis of NFNH costs specifically associated with healthcare and education.

2.7.4 Health care costs

Costs of health care include all annual household out-of-pocket expenses to cover basic health care based on the locally available services. Health care costs were collected a combination of secondary reports (local health care facility patient records, etc.) and key informant interviews (e.g. staff in local clinics, health care extension officers) and FGD as source of information. During FGDs, the most common diseases in the area were identified followed by estimating the average number of health care visit for identified disease and incurred costs per visit. Finally, health care extension officers of each *Kebele* were asked about the validity of information collected during FGD and average visit of a given household per year were obtained from health facility records.

2.7.5 Education costs

Education costs include all annual household-out-of-pocket expenses to cover decent public primary and lower secondary education for all children in the reference household. In most countries education is compulsory starting at the age of 5 to 7 until the age of 11 to 18 years, roughly covering primary and lower secondary school (UNESCO, 2000). The recent Ethiopia education system includes eight years of primary education (ages 7-14) and 4 years of secondary education (ages 14-18). For this study only local schools were considered with the assumption that the majority of rural households send their children to a local school as this is expected to provide education of sufficient quality.

Information on education related expenditures was generated through key informant interviews and focus group discussions with stakeholders, including local education experts and parents/caretakers of school children. Household out-of-pocket expenses cover only parental responsibilities for essential needs for a child to go to school (school fees, clothing/uniform, and materials such as books). Total education costs per child were calculated and then divided over 18 years to determine the average annual education cost per child

2.7.6 Social duty costs

Social duty costs include costs like *Edir*, *Mahiber* and other costs which would be incurred for social cohesion, were assessed using focus group discussions.

2.7.7 Total budget for living income benchmark

The total living income benchmark includes the sum of estimated costs for food, housing, NFNH and social duty per reference household, plus a margin for Unforeseen Events (10% is added to the calculated living income budget).

2.7.8 Data analysis

The data were analysed using the Statistical Package for Social Sciences (SPSS version 20) software and Microsoft-Excel 2013. Descriptive statistics, such as means and percentages, were computed, and the results were summarized and presented using tables and graphs.

3. Result

3.1 Reference household size and composition

Reference household (RH) sizes in Tigray Regional State of Ethiopia were, 4.7 AME in Raya Azebo and 5.1 AME in Tseada Emba and 4.8 AME in Enderta (Table 5).

Table 5 Reference household (RH) composition for Enderta, Raya Azebo, and Tseada Emba; AME: Adult male equivalent.

Age & gender group	Individuals/RH			AME/individual	AME/age & gender group		
	Raya Azebo	Tseada Emba	Enderta		Raya Azebo	Tseada Emba	Enderta
Adults, male	1.3	1.4	1.2	1.0	1.3	1.5	1.3
Adults, female	1.4	1.5	1.3	0.82	1.4	1.3	1.2
Children(<18)	2.7	3.0	3.1	0.75	2.1	2.3	2.3
AME (Adult male equivalent) per reference household					4.7	5.1	4.8

3.2 Costs per item of the living income benchmark

3.2.1 Diet composition and food costs

According to the Living Income Diet Tool, the minimum cost of a nutritious diet varied across the three *woredas* (Table 6). Across the three *woredas*, the primary starchy foods were wheat, barley, and sorghum, while chickpeas were the most commonly consumed legume (Table 6). In Enderta, the cost was 143.9 *ETB* (US\$ 6.49) PPP per Adult Male Equivalent (AME) per day, equivalent to 226,497.1 *ETB* (US\$ 10,216.4) PPP per reference household per year. For Raya Azebo, the figures were 133.2 *ETB* (USD 6.01) PPP/AME/day and 218,781 *ETB* (US\$ 9,868.3) PPP per household annually. Tseada Emba recorded the lowest costs at 91.8 *ETB* (US\$ 4.14) PPP/AME/day and 164,184.3 *ETB* (US\$ 7,405.7) PPP per household per year (Table 6). The most common prices throughout the year were used for maize, tomato, onion, watermelon and Swiss chard, because their current price differed >25% (ranging from -25% to +166%) from the most common price throughout the year.

Table 6 Composition and costs for a low-cost nutritious diet calculated with the Living Income Diet Tool for the three *woredas* of the study area based on local market prices in AME

Food (sub)group	Food	Market price, June '24 ETB/kg	Calculated amount purchased g/AME/day	Calculated food costs 2024 ETB/US\$ PPP/AME/day
Raya Azebo				
Starchy staple	Sorghum	67.5	415	27.3 (1.23)
	Barley	76	135	10.0 (0.45)
Legumes nuts and seeds	Chick beans	80.0	65	5.1 (0.23)
Dark green leafy vegetable	Swiss chard	50.0	75	3.8 (0.17)
Vitamin A rich vegetables	Tomato	15.0	75	1.1 (0.05)
Other vegetable	Onion	55.0	120	6.4 (0.29)
Vitamin A fruits	Papaya	47.5	45	2.0 (0.09)
Other fruits	Cactus pear	5.0	100	0.4 (0.02)
Eggs	Chicken eggs	290	100	28.4 (1.28)
Milk	Cow milk	70.0	400	27.3 (1.23)
Oils and nuts	Palm oil	207.5	15	3.1 (0.14)
Low-cost nutritious diet costs				115.1 (5.19)
Miscellaneous food costs (16% of low-cost nutritious diet costs)				18.4 (0.83)
Total food costs (US\$ PPP/AME/day)				133.2 (6.01)
Tseada Emba				
Starchy staple	Wheat	45	435	19.1 (0.86)
Legumes nuts and seeds	Chickpea	90	220	19.3 (0.87)
Dark green leafy vegetable	Swiss d	37.5	75	2.7 (0.12)
Vitamin A rich vegetables	Tomato	47.5	55	2.7 (0.12)
Other vegetables	Onion	37.5	100	3.8 (0.17)
Vitamin A fruits	Guava	60	45	2.7 (0.12)
Other fruits	Cactus s	4.5	75	0.4 (0.02)
Other meat	Chickpea	400	67	26.7 (1.18)
Oils and nuts	Palm oil	175	15	2.7 (0.12)
Low-cost nutritious diet costs				79.1 (3.57)
Miscellaneous food costs (16% of low-cost nutritious diet costs)				12.6 (0.57)
Total food costs (US\$ PPP/AME/day)				91.8 (4.14)
Enderta				
Starchy staple	Wheat	70	437	29.9 (1.35)
	Barley	60	165	9.8 (0.44)
Legumes nuts and seeds	Chick beans	100	65	6.4 (0.29)
Dark green leafy vegetable	Swiss chard	35	25	0.9 (0.04)
Vitamin A rich vegetables	Tomato	17.5	75	1.3 (0.06)
Other vegetables	Onion	30.0	120	3.5 (0.16)
Vitamin A fruits	Water melon	25	35	0.9 (0.04)
Other fruits	Cactus pear	5.0	25	0.1 (0.006)
Red meat	Chicken meat	400	125	48.8 (2.20)
Milk	Cow milk	70.0	260	17.7 (0.8)
Oils and nuts	Palm oil	200	25	4.9 (0.22)
Low-cost nutritious diet costs				123.9 (5.59)
Miscellaneous food costs (16% of low-cost nutritious diet costs)				19.7 (0.89)
Total food costs (US\$ PPP/AME/day)				143.9 (6.49)

US\$ 1 PPP = 22.17 ETB in 2024 (Databank World Bank, 2023)

<https://data.worldbank.org/indicator/PA.NUS.PPP/> Values in parentheses indicate US\$

3.2.2 Housing costs

Across all locations, FGDs revealed that the minimum living space considered adequate for a reference family is 42 m². This locally-defined standard, which includes one living room and at least two bedrooms, exceeds the international benchmark of 30 m². It was also noted that toilet, bathroom, and kitchen facilities may be located outside the main housing unit.

For the reference family in Enderta , the estimated annual housing cost was 49,734 *ETB* (US\$ 2,243.3) PPP, which includes construction costs of 43,333.5 *ETB* (US\$ 1,954.6) PPP, plus routine maintenance and repairs costs and utility costs (Table 7). The lifespan of the house with maintenance and repair was reported to be over 65 years instead of the international benchmark of 50 years. The extended lifespan is attributed to the specific construction materials (stone) and soil condition in Enderta, which contributed to greater housing durability.

For Raya Azebo the estimated annual housing costs for a reference household was 39,500.3 *ETB* (US\$ 1,781.7) PPP, which include construction costs 30,000.4 *ETB* (US\$ 1,353.2) PPP plus routine maintenance and repairs costs and utility costs (Table 7). The life span of houses in Raya Azebo was reported to be over 100 years with routine maintenance and repairs. The longer predicted service lives of homes in Raya Azebo were attributed to the superior soil features and comparatively moderately cold temperatures. Furthermore, the house is constructed with very durable wood called *Olea Africana*, which is not susceptible to termites.

In Tseada Amba , the estimated annual housing costs for a reference household was 27,608.3 *ETB* (US\$ 1,245.2) PPP, which include construction costs 25,358.0 *ETB* (US\$ 1,143.8) PPP plus routine maintenance, repairs and utility costs (Table 7). The lifespan of houses in Tseada Amba was reported to be over 65 years with routine maintenance and repairs, which is longer than the international standard of 50 years. The longer lifespan was attributed to the type of construction materials and unique features of soil characteristics. House insurance costs were not common in all the three study sites.

Table 7 Overview of estimated housing costs for a house complying with local minimum standards for decent housing for a reference household in rural areas of Enderta, Raya Azebo, and Tseada Emba *woredas*

Cost item	Raya Azebo	Tseada Emba	Enderta
	<i>ETB/US\$ PPP/RH/year</i>		
Construction costs	30,000.4 (1,353.2)	25,358.0 (1,143.8)	43,333.5 (1,954.6)
Routine maintenance and repairs	5,999.2 (270.6)	2,250.3 (101.5)	3,999.5 (180.4)
Taxes, levies, fees and house insurance	0	0	0
Utilities (water, electricity, cooking fuel)	3,500.6 (157.9)	0.0	2,401.0 (108.3)
Total housing costs	39, 500.3 (1,781.7)	27,608.3 (1,245.2)	49,734 (2,243.3)
	<i>ETB (US\$) PPP/AME/day</i>		
Total housing costs	23.9 (1.08)	14.9 (0.67)	29.7 (1.34)
Service year	100	65	65

Values in parentheses indicate US\$

3.3 Non-food non-housing costs (NFNH) costs

3.3.1 Health care

The health care system in all the three *woredas* of the study area includes public facilities (dispensaries) in all villages (Table 8). KIIs were held with six health care workers from dispensaries of each *kebele* to cross check and validate information from FGDs. Basic health care insurance is available for all villagers through the government. The membership covers all public health care costs for all household members, including doctor consultation and complete treatment with medicine and laboratory tests for all common diseases.

The interviewees reported that this does not cover all household expenses on health care, as regularly medicines are out of stock and have to be purchased privately. The annual total health care costs per household for Enderta, Raya Azebo and Tseada Emba were 1,048.9 *ETB* (US\$ 466.8) PPP, 19,400.9 *ETB* (US\$ 875.1) and 67,002.2 *ETB* (US\$ 3,022.2), respectively.

Tseada Emba had the highest medical costs followed by Raya Azebo while the lowest annual total health cost was recorded for Enderta. The Tseada Emba greater medical costs were attributed to the high presence of common flue and malaria diseases and community's dependency on private pharmacy to buy medicine as these medicines are commonly out of the stock in government pharmacies in the area. In all three *woredas* basic insurance services were not accessible due to the destruction and discontinuation in repose to the war in Tigray

Table 8 Estimated health care costs per person in *ETB* and US\$ (PPP) and per reference household (RH) per year for rural areas of Enderta, Raya Azebo and Tseada Emba *woredas*.

Cost item	Raya Azebo	Tseada Emba	Enderta
US\$ PPP/RH/year			
Basic health care insurance	0.0	0.0	0.0
Doctor consultation, public	0.0	0.0	0.0
Medicine from pharmacy	19,400.9 (875.1)	67,002.2 (3,022.2)	1,048.9 (466.8)
Laboratory (self-)test	-	-	-
Total health care costs	19,400.9 (875.1)	67,002.2 (3,022.2)	1,048.9 (466.8)
ETB (US\$) PPP/AME/day			
Total health care cost	11.8 (0.53)	37.5 (1.69)	6.2 (0.28)

3.3.2 Education

The total education costs were 6,837.2 *ETB* (US\$ 308.4) PPP per child or 21,196.7 *ETB* (US\$ 956.1) PPP/RH/year for Enderta while 2,250.3 *ETB* (US\$ 101.5) PPP per child or 6,076.8 *ETB* (US\$ 274.1) PPP/RH/year for the Raya Azebo and 4,660.1 *ETB* (US\$ 210.2) PPP per child or 13,980.4 *ETB* (US\$ 630.6) PPP/RH/year for Tseada Embo (Table 9).

Table 9 The estimated education costs (*ETB* (US\$) PPP) for a reference household (RH) per year, in rural areas of three *woredas*.

Cost item	Raya Azebo	Tseada Emba	Enderta	Unit
Lower Primary education	Clothing	0.0	0.0	0.0(0.0) <i>ETB</i> /US\$ PPP/child/year
	Materials	1,150.6 (51.9)	1,110.7 (50.1)	2,381.1 (107.4) <i>ETB</i> /US\$ PPP/child/year
	Fees	0.0	99.8 (4.5)	115.3 (5.2) <i>ETB</i> /US\$ PPP/child/year
	Transportation	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	House rent	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	Duration	6	6	6 Years
Middle lower education	Clothing	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	Materials	776.0 (35.0)	1,019.8 (46.0)	1,489.8 (67.2) <i>ETB</i> /US\$ PPP/child/year
	Fees	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	Transportation	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	House rent	0.0	0.0	0.0 <i>ETB</i> /US\$ PPP/child/year
	Duration	2	2	2 Years

Cost item	Raya Azebo	Tseada Emba	Enderta	Unit
Clothing	299.3 (13.5)	749.3 (33.8)	999.9 (45.1)	ETB/US\$ PPP/child/year
Materials	549.8 (24.8)	1,700.4 (76.7)	1,589.6 (71.7)	ETB/US\$ PPP/child/year
Secondary education	51.0(2.3)	0.0	0.0	ETB/US\$ PPP/child/year
Transportation	3250.1(146.6)	9,300.3 (419.5)	6,999.1 (315.7)	ETB/US\$ PPP/child/year
House rent	0.0	0.0	0.0	ETB/US\$ PPP/child/year
Duration	4	4	4	Year
Full costs per child	2,250.3 (101.5)	4,660.1 (210.2)	6837.2 (308.4)	6837.2(308.4)
Average costs per child per year ¹	124.2 (5.6)	259.4 (11.7)	379.1 (17.1)	379.1(17.1)
Children per RH	59.9 (2.7)	66.5 (3.0)	68.7 (3.1)	Children/RH
Total education costs	6,076.8 (274.1)	13,980.4 (630.6)	21,196.7 (956.1)	ETB/US\$ PPP/RH/year
Total education costs	3.8 (0.17)	7.8 (0.35)	12.6 (0.57)	ETB/US\$ PPP/AME/day

Full costs per child for 12 years of education, divided by 18 years of parental financial responsibility.
Values in parentheses indicate US\$

The highest education cost was recorded in Enderta followed by Tseada Embo with the lowest in Raya Azebo .The higher cost in Enderta was reported to be due to high prices of uniforms and materials.

3.4 Other Non-food non-housing (other NFNH)

Non-food non-housing costs included household expenses for transportation, communication, water, energy, clothing, and social duties. The total other NFNH costs were 66922 *ETB* (US\$ 3018.6) PPP/RH/year for Enderta and 61506 *ETB* (US\$2774.3) PPP/RH/year and 54768 *ETB* (US\$ 2470.4) PPP/RH/year for Raya Azebo and Tseada Emba respectively (Table 10). Annual transportation costs per reference household varied across the three *woredas*. Raya Azebo recorded the highest at 13,590 *ETB* (US\$ 613.0) PPP, followed by Enderta with 6,440 *ETB* (US\$ 290.5) PPP while Tseada Emba had the lowest costs at 3,839 *ETB* (US\$ 173.2) PPP. Similarly, the communities in Raya Azebo expend higher cost for communication, water than the other two *woredas* while communities in Enderta expend higher cost for energy and family cloths.

Table 10 Overview of the estimated NHNE costs (US\$ PPP) for a reference household (RH) per year, in rural areas of the three *woredas*

Cost item	Raya	Tseada Emba	Enderta
	ETB/US\$ PPP/RH/year		
Transportation of the HHs	13,590.2 (613.0)	3,839.8 (173.2)	6,440.4 (290.5)
Communication	6,360.6 (286.9)	2,338.9 (105.5)	1,620.6 (73.1)
Water	600.8 (27.1)	113.1 (5.1)	239.4 (10.8)
Energy	6,899.3 (311.2)	1,800.2 (81.2)	13,499.3 (608.9)
Family cloth	32,900.3 (1,484.0)	32,519.0 (1466.8)	35,999.6 (1,623.8)
Social duty (payment for Edir, festivals etc)	1,155.1 (52.1)	14,117.8 (638.6)	9,123.0 (411.5)
Total other NFNH costs	61,506.2 (2774.3)	54,768.8 (2470.4)	66,922.4 (3,018.6)
	ETB (US\$) PPP/AME/day		
Other NFNH costs	37.5(1.69)	30.6(1.38)	39.9(1.80)

3.5 Living income benchmark

The total living income benchmark is calculated by summing the estimated costs for food, housing, non-food non-housing (NFNH) expenses, and social obligations for a reference household. An additional 10% margin is then added to this total to cover unforeseen events. Based on previously presented data, the estimated living income benchmark expressed in ETB (US\$) PPP per adult male equivalent per day is estimated at 225.6 ETB (US\$ 11.53) in rural Enderta , ETB 247.2 (US\$ 11.15) in Raya Azebo and ETB 200.6 (US\$ 9.05) at Tseada Embo (Table 11). The benchmark for Tseada Embo was slightly lower than for Enderta and Raya Azebo . The food cost accounted for more than 50% in Enderta and Raya Azebo while less than 50% in Tseada Embo .

Table 11 Estimated Living Income per Adult Male Equivalent (ETB and US\$ PPP per Day) for a Reference Household in the three *woredas* of the study area (Reference year 2024).

Cost item	Raya Azebo	Tseada Embo	Enderta
	ETB/US\$ PPP/AME/day		
Food	133.2 (6.01) (54%)	91.8 (4.14) (46%)	143.9 (6.49) (56%)
Housing	23.9 (1.08) (10%)	14.9 (0.67) (7%)	29.7 (1.34) (12%)
Health care	26.4 (1.19) (11%)	37.5 (1.69) (19%)	6.2 (0.28) (2%)
Education	3.8 (0.17) (2%)	7.8 (0.35) (4%)	0.57 (12.6) (5%)
Other NFNH	37.5 (1.69) (15%)	30.6 (1.38) (15%)	12.6 (1.80) (17%)
NFNH	67.6 (3.05) (27%)	75.8 (3.42) (38%)	58.8 (2.65) (23%)
Unforeseen	24.6 (1.11) (10%)	20.2 (0.91) (10%)	25.5 (1.15) (10%)
Total living income benchmark	247.2 (11.15) (100%)	200.6(9.05) (100%)	225.6 (11.53) (100%)

The food cost accounts for 56% of the total living income in Enderta followed by Raya Azebo (54%) and Tseada Embo (46%) while the NFNH accounted for 23% in Enderta while 27% in Raya Azebo and about 38% in Tseada Embo (Figure 2). The cost for housing accounted for 12% in Enderta followed by Raya Azebo (10%) and Tseada Endeta (7%).

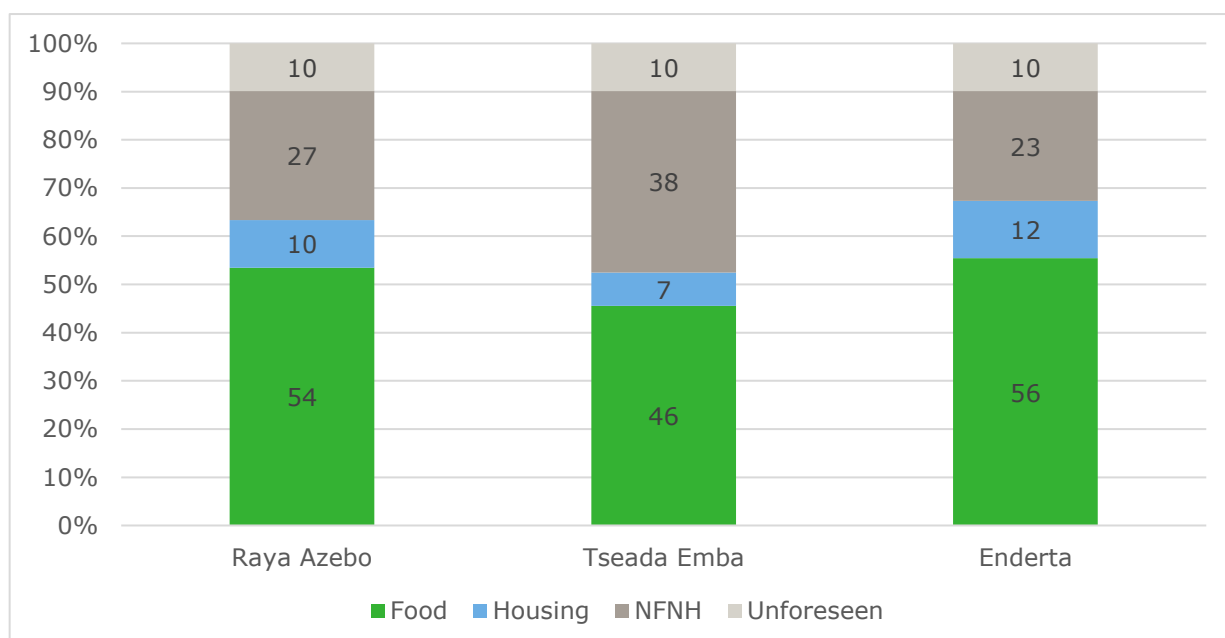


Figure 2 Share of food, housing NFNH and unforeseen costs to the total living income

4. Discussion

The findings highlight that food costs represent the largest share of the living income benchmark across all *woredas*, accounting for 56.3% of the total living income in Enderta followed by Raya Azebo (53.9%) and Tseada Emba (45.7%) (Figure 2). Similarly to a previous study of living income benchmarking, food cost accounted for 41% in Tanzania, 37% in Uganda and 44% in Ethiopia (van de Ven et al., 2021). The variation in the type of commonly consumed food and its corresponding price was attributed for the variation in the share of food cost among the three *woredas* (Table 5).

The housing costs across various regions, it was observed that Enderta had the highest expenditure, accounting for 11.5% of the total costs. This was followed by Raya Azebo at 9.7% and Tseada Endeta at 7.4%. The higher housing costs in Enderta can be attributed to the increased prices of construction materials, which are notably higher than those in the other two *woredas*. This disparity is likely a reflection of the generally higher cost of living in Enderta compared to other regions, as detailed (Table 10).

The Non-food Non-housing (NFNH) costs include health care, education, transportation, communication, water, electricity, family clothing, and social responsibility costs. In Tseada Emba, the NFNH costs account for 37.8 0% of the benchmark for total living income, followed by Raya Azebo (27.4%) and Enderta (23%) (Figure 2). The higher NFNH costs in Tseada Emba were attributable to higher costs for transportation and communication (Table 7 and Table 9). The three *woredas*' varying levels of market access were the cause of the disparity in housing and NFNH costs between them.

5. Conclusion

The findings demonstrate that the living income benchmark offers a more contextually relevant metric than traditional poverty lines, facilitating more precise and targeted interventions for rural households. Based on this, it is recommended that future development programming in Ethiopia integrate the living income approach to better support smallholder farmers in attaining a decent standard of living. From this study it can be recommend to adopt living income benchmarks in development planning as conventional poverty measures should be complemented or where appropriate, replaced by the more context-specific living income benchmark. This will enable programs to be more accurately tailored to the needs of rural household and support smallholder farmers to achieve a decent living standard. Thus development interventions in Ethiopia should explicitly aim to close living income gaps, ensuring that agricultural households can earn enough to afford a decent and dignified standard of living.

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