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Transitory coping strategies of food-insecure smallholder farmer households: the case of Ilu Gelan District, West Shoa Zone, Oromia Regional State, Ethiopia

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Abstract

Background: Over 960 million people in the world are hungry and undernourished. The majority of these people are found in Asia and Africa. Approximately one-third of the people in sub-Saharan Africa are undernourished. The mechanisms pursued by households differ in several aspects within and between households. Coping strategies are short-term, location-specific actions and adjustments against hazard and activities that take place within existing structures. Before coming to the modernization time, every society around the world has attempted to overcome food shortages at household levels. They practice activities to escape them from food insecurity.

Methods: The study was aimed at coping strategies among food-insecure smallholder farmer households in Ilu Gelan District, West Shoa Zone, Oromia Regional State, Ethiopia. A cross-sectional study design and mixed data collection methods were employed. Multistage random sampling technique was employed to select 100 sample households for quantitative data and key informant interview, focused group discussion and observation for qualitative data. Data were analyzed using descriptive and inferential statistics.

Results: A coping strategy index at household level had been calculated, and inferential statistics was used to test the variability of the index by gender of the household head. The mean coping index was 88.54 and 119.14 for males and females, respectively. Using inferential statistics, equality of means was tested. The t value was -5.173 for 98° of freedom, and the mean difference was significant ($p < 0.001$). The study revealed that female-headed households were higher in coping measures and mean of coping strategy index than male-headed households.

Conclusions: In the study districts, smallholder farmer households rely on less preferred and less expensive food items. Coping strategy adopted by poor rural households is a shift to poor, and nutritionally lacking diet leads to health-related problems.

Keywords: Transitory, Coping strategies, Food insecurity, Smallholder farmer, Household

Background

Global estimates of food-insecure populations stand at 825 million [1] to 850 million [2]. Regional estimates of the food-insecure population include 263 million in South Asia, 268 million in China and Southeast Asia,

2012 million in sub-Saharan Africa (SSA), 60 million in South and Central America and the Caribbean, and 50 million in other regions of the world. Contrary to the United Nations' Millennium Development Goals of cutting hunger by half by 2015, the number of food-insecure populations in the world has been on the rise [3]. The stock of food grains in the world in 2007/2008, the lowest in decades, was only 75 million tons for milled rice and 105 million tons for corn in early 2008 [4]. An estimated 75% of the world's poor (those who live on less than $< \$2/$

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day income) live in rural areas and depend directly or indirectly on agriculture [5]. Food prices are rising [6], leading to riots in 30 countries around the globe [7, 8]. Share of family income spent on food is estimated at 10% in the USA, 20% in Brazil, 30% in China, 50% in Kenya and 65% in Bangladesh [8], and 9.7 million people food-insecure Ethiopians require relief assistance to meet basic food needs [9]. Thus, the world poor are under great stress, and an increase in food prices is a threat to global peace and stability [3].

The absence of food security associated with coping strategies increasingly being used. Human beings can struggle to sustain their life when food shortages happen, because food is one of our most basic needs than shelter and cloth. Before coming to the modernization time, every society around the world has attempted to overcome food shortages at household levels. They practice certain activities to escape them from food insecurity. Many years ago, when the world population was much lower than it is now, a man had little difficulty in ordinarily time in growing the food that was needed. At that time, human beings started to lead their life in ancient time by hunting wild animals and gathering fruity crops.

Farmers have developed coping and adaptation strategies to buffer against the adverse effects of climate change and variability [10, 11] by altering their economies and lifestyles with changing circumstances in their environments [12], and the concepts were raised beyond the climate literature [13]. Coping and adaptation to climate change and variability are closely related and interchangeably used in the context of disaster response except that they have different time spans. Coping strategies are autonomous, short-term, location-specific actions and adjustments targeted against a certain hazard and activities that take place within existing structures [14–16]. Coping strategies help to mitigate the negative effects of climate change and variability for the short term, but they are “risk spreading” in nature [11].

On average, agriculture contributes 33% to national income, 70% to full-time employment and 40% to total export earnings in Africa [17]. Most of sub-Saharan Africa relies on agriculture for employment and food security for their economies. Even though agriculture is important for the national economy, it is highly dominated by smallholder farmers who produce under unfavorable conditions characterized by low and erratic rainfall and poor soils [18]. Agriculture in Ethiopia by large is subsistence [19]. Compared to other sectors, agriculture is highly vulnerable to climate change which manifests itself in terms of longer-term trends in the average conditions of rainfall and temperature, inter-annual variability and the occurrence of droughts, floods, frosts and other extreme events [20]. Ethiopia's economy

is dependent on agriculture which is characterized by a low-input, low-output and subsistence production system [21]. It is extremely vulnerable to climate change and variability, resulting in vulnerability of smallholder farmers [22, 23]. Droughts and floods occur frequently in most parts of Ethiopia, indicating how the country is suffering from climate variability and extreme events, and future climate change constitutes a major development challenge [24]. Drought followed by flood is the most common climate-related hazard in Ethiopia [25, 26].

Rainfall variability and associated droughts have been the major causes of food insecurity and poverty traps for many households during the past three decades [27, 28]. In addition, since the water resource of the country is governed by the amount and distribution of rainfall [29, 30], the spatiotemporal variability and declining trend of rainfall have negative impacts on the water resource sector. Climate change is likely to change rainfall patterns, resulting in shorter growing seasons in the future, particularly for subsistence farmers in Africa who rely on rain fed agriculture [31]. Extreme weather events such as droughts and floods are predicted to become more frequent, adding to the global burden of hunger caused by poverty, weak governance, conflict and poor market access [32, 33]. A recent vulnerability mapping in Africa cited Ethiopia as one of the most vulnerable countries to climate change, food insecurity and with the least adaptive capacity [34, 35]. Its geographical and climatic conditions, high dependence on agriculture and weak adaptive capacity were stated as the major reasons for its vulnerability [35, 36]. Sub-Saharan Africa remains the only region in the world where the number of hungry and malnourished populations will still be on the increase even by 2020 [37]. While other regions have improved per capita food availability since the 1970s, food production and availability have perpetually declined in sub-Saharan Africa. It is both a technological and a political/economic challenge and cannot be ignored any longer. Agrarian stagnation in sub-Saharan Africa has defined numerous attempts at transforming subsistence agriculture, even with due consideration to issues related to biophysical constraints and the human dimension challenges [38, 39]. Agriculture accounts about 41.6% of the GDP, employs about 83% of the labor force and contributes around 90% of the total export earnings of Ethiopia [19].

The sector is dominated by about 11.7 million smallholders cultivating about 95% of the national agricultural production, and large farms contributed to only 5% of the total production [40, 41]. This shows that the overall economy of the country depends on smallholder subsistence agriculture. Food production and population statistics in Ethiopia are notoriously unreliable, and all

estimates of national food availability and consumption requirements are “guesstimates” at best [42]. Given this limitation of statistics during the late 1980s, 52% of Ethiopia’s population consumed less than the recommended daily allowance of 2100 kcal, and Ethiopian agriculture appears to be locked into a downward spiral of low and declining productivity, caused by an adverse combination of agro-climatic, demographic, economic and institutional constraints, trends and shocks. Some observers argue that a “Malthusian crisis” is developing as rapid population growth (almost 3% per annum) is associated with steadily falling landholdings and per capita food production [42]. Between 1960 and 1990, the population doubled from 23 to 48 million, while per capita landholding shrunk from 0.28 to 0.10 hectare, and per capita food output collapsed by 41% from 240 to 142 kg [42].

In Africa, women smallholder farmers were one of powerful engines and would play key role in the development process to ensure food security at household level and they made greater contribution to household food security but women smallholders farmers households were the most neglected in the development policies and programs despite its contribution to food security at national levels.

The concept of coping strategies is not new. But, different researchers, scholars, authors and organizations have defined the term coping strategies in different ways. These indicate that there is no comprehensive definition [43]. Devereux defines as a response to adverse events or shocks. Broad definition of coping strategies, namely that “all the strategically selected acts that individuals and households in a poor socioeconomic position use to restrict their expense or earn some extra income to enable them to pay for the basic necessities (food, clothing, shelter) and not fall too far below their society’s level of welfare” [44]. Food insecurity is still widespread, especially among developing nations [45]. Over 960 million people in the world are hungry and undernourished [46]. The majority of these people are found in developing countries, most especially in Asia and Africa, and many die of hunger-related diseases (Standing Committee on Nutrition [47]). According to African Food Security Briefs [48], approximately one-third of the people in sub-Saharan Africa are undernourished [45].

The strategies pursued by households differ in several aspects, that is, within the household and between households [49]. Due to varying degrees of wealth among households, different coping behaviors are adopted by households at different poverty levels. However, some coping strategies are common to all households although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal [43]. Above all, the general tendency is that the lower

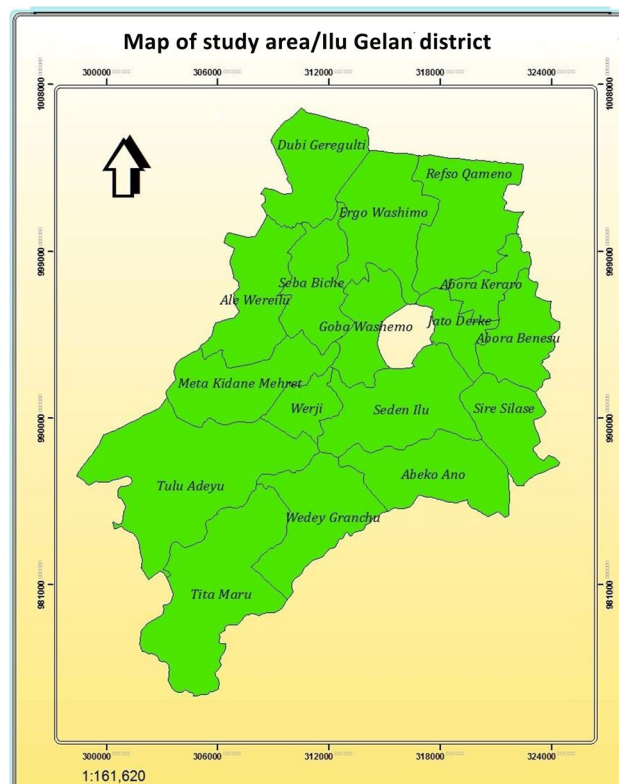
the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements [50].

Methods

Description of the study area

For the administrative purpose, the Ilu Gelan District is divided into 17 peasants associations and one town. The study area was located at water shed of Gibe River. The population has grown over the years. Ilu Gelan District is located at a 90 km from zonal capital (Ambo). The district capital, Ijaji, is located 215 km from regional capital (Finfine). The district was bounded by Chelia District in north and east, Dano District in the south and Bako District in west (Ilu Gelan Agricultural Offices, 2004 EC). The district is divided into three distinct climatic zones as high land, midland and low land respectively.

The average maximum and minimum temperatures of the district are 32 and 25 °C, respectively. There are four types of soil found in the district: fertile soil, sandy loam soil, clay soil and red soil. Out of the total area of the district Ilu Gelan is covered by red soil 70% and sandy loam soil 10% [51]. Population of the study was smallholder farmer households that live in the rural areas of the district. Currently there are 4073 households in the two selected kebeles in the study area [51].



Study design

Household-based cross-sectional survey research study was conducted in Ilu Gelan to identify transitory coping strategies of food-insecure smallholder farmer households. Sampling design was determined by type of universe to be studied, households in this study, sampling unit, sampling frame, size of sample and parameters of interest. Because of the nature of the study, multistage sampling technique was applied in order to increase the reliability and validity of the data.

Sample size determination and method of sampling

Sampling is a technique, which helps us in understanding the parameters or characteristics of the Universe or population by examining only a small part of it. Therefore, it is necessary that sampling technique be reliable [52]. Appropriate sample size depends on various factors relating to the subject under investigation such as the time, cost and degree of accuracy desired. [53]. Nevertheless, the sample size and the sample selection procedure should assure the representativeness of the population. Sample size determination has its own scientific approach.

To analyze coping strategies on food insecurity of the households, the researcher used multistage sampling technique to select sample food-insecure households in the study district.

First stage: The study district, Ilu Gelan, was selected purposively based on; repeated decreasing agricultural production, ever-increasing natural and man-made distresses and its threatening effect on high soil erosion and deforestation in the area, vulnerability to food insecurity to due to climate change and environment failures. Second stage: Two samples have been selected randomly out of 17 kebele. Third stage: The next step was selection of the sample of household head. Finally, 100 sample smallholder food-insecure households were selected by using random simple techniques. The sample size for collecting quantitative data for this research is determined by using Yemane Formula [54]. The study used the following formula to calculate sample size. The researcher has adopts [54] for determining sample size. $n = \frac{N}{1+N(e^2)}$.

The following steps were used to determine sample size derived from the above formula to collect quantitative data using semi-structured interview schedule. Here, n designates the sample size the research uses; N designates total number of households heads; e designates maximum variability or margin of error 8%; 1 designates the probability of the event occurring.

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

$$n = \frac{4073}{1 + 4073(0.08)^2} = 100$$

Therefore, total sample size was 100 household head farmers, out of which 50 were selected from Seba Biche and the remaining 50 were from Meta Kidane Mehreta. Selection was made proportionally from total household living in both kebeles. The total sample drawn was 100.

Methods of data collection

This study based on a micro-level, and it is derived from a cross-sectional primary data. The structured household questionnaire was used to collect the data from 100 farm households. The data were collected through household survey. Moreover, focused group discussions and key informants interviews were conducted in the village communities. Data analysis procedures consist of descriptive statistics and coping strategies index (CSI). The CSI is developed by [55] to measure the food security situation. The basic idea of CSI is to combine the frequency and severity of coping strategies. The frequency of coping strategies requires the means of scoring of relative frequency which measures how many days per week a household had to rely on the various coping strategies ranking from “never” to “every day.” The severity of coping strategies is measured using focused group discussion via asking the individuals to classify their coping strategies based on their opinion (1=less severe, 2=moderate, 3=severe and 4=very severe). The means of scoring reflect the severity weight of each coping strategy that household has adopted. Thus, the CSI score is calculated by combining of both “frequency” and “severity” of coping strategies. The result of the CSI score denotes that a household with a higher value is more food insecure compared with a household with a lower value.

The survey gathered data pertaining to the demographic and economic aspects of the households. I also included items related to the causes of food insecurity in the district, as well as access to the market, receipt of food aid and the distance of the village away from the main road. The situation of the stock status was measured through the availability of sufficient sustainability daily rations for household members, the number of meals taken per day and the number of days per week meat or fish eaten in the household. The odds of reporting that one often experienced food shock were also included in the analysis.

Method of data analysis

The data analysis process was carried out after collection of the required information from primary sources.

The data were analyzed by Statistical Package for Social Sciences (SPSS) version 20. SPSS was used to analyze different variables through descriptive statistics such as, frequencies, mean, standard deviation and percentage.

Results

Measuring household food insecurity

In this study, sample households were classified into food secure and food insecure on the basis of the 2100 kilocalorie threshold. Households with daily calorie consumption greater than or equal to 2100 kcal per day were categorized as food secure and those households whose calorie intake fell below this food security threshold grouped as “food-insecure” based on Ethiopian Health and Nutrition Research Institute (EHNRI) recommendation [56].

Coping strategies

To increase longevity and starting some things that makes life, the indicators of coping mechanisms are listed in Table 1. But it is different for male- and female-headed households. In addition to that, the study considered some food security proxy indicators. These are the food consumption score which combines information on meal frequency and dietary diversity and the coping strategy index which has proven to be a good indicator of food security level.

Coping strategies and weighing

According to the information gathered from focused group discussion and key informant interview in the study districts, the use of these coping strategies depends on the most frequently used coping strategies they used. Table 2 shows average severity weight for various coping strategies among selected localities smallholder farmer households in Ilu Gelan, in 2017/2018G.C. The coping strategy index was adopted and modified in the present study [55]. During FGD and key informant interview, the major coping mechanisms in the area were listed and finalized. The revised CARE/WFP list is given in Table 2. There were 19 coping strategies listed. As explained in “Methods” section, weighing of the strategies is very important to ensure the cultural sensitivity of the population. This exercise is done during the FGD and KII. The average weight of each strategy during two FGDs was finalized after the consensus ranking with key informants. For consensus ranking, the individual strategies listed have been ranked into four categories, where 1 and 4 indicate the least and most severe category, respectively, and 2 and 3 indicate intermediate. The weight assigned to each strategy is also shown in Table 2. There was no complete consensus about the ranking except some respondents employing their children to wealthy households for keeping cattle, and selling fire wood and charcoal. However, a quick look will indicate that there was good consensus on withdrawing children from

Table 1 Coping mechanisms by sex of household head. Source: Field survey, 2018

| Coping mechanisms | Male | Female | Significance |
|---|------|--------|--------------|
| Cuttin down consumption of more nutritious food items (meat, egg, etc.) | 2.33 | 3.65 | 0.00 |
| Selling of asset and others materials | 0.7 | 1.01 | 0.227 |
| Selling charcoal and fire wood | 0.51 | 3.0 | 0.006 |
| Consumption of wild food | 2 | 5 | 3.50 |
| Engage in petty retailing of items | 0.66 | 3.86 | 0.00 |
| Seasonal migration/mobility for labor | 0.93 | 0.82 | 0.71 |
| Selling fire wood and charcoal | 1.5 | 2.49 | 0.01 |
| Sending out children to work on others' farm | 0.82 | 1.22 | 0.347 |
| Relying on less preferred and less expensive food | 2.29 | 4.49 | 0.00 |
| Dropping of children from school | 1.10 | 2.44 | 0.015 |
| Reduction in non-food expenditures | 1.93 | 3.87 | 0.000 |
| Daily labor in both rural and urban areas | 1.47 | 0.50 | 0.001 |
| Purchase of food by credit/relying on borrowing | 1.61 | 1.23 | 0.026 |
| Skip entire day without food | 1.61 | 0.91 | 0.015 |
| Reducing number of meals per day | 2.57 | 4.32 | 0.000 |
| Sending family members to abroad for remittance | 0.23 | 0.18 | 0.045 |
| Selling liquor ('Arake' and 'Tela') ^a | 1.85 | 0.68 | 0.001 |
| Sale of timber | 0.69 | 0.22 | 0.025 |
| Begging | 0.31 | 0.13 | 0.180 |

^a 'Arake' and 'Tela' are locally made alcoholic drinks

Table 2 Coping strategies grouped and ranked by FGDs and KII. Source: Field survey, 2018

| Coping mechanisms | | Focused group discussion and key informative ranking for each individual behavior | | | |
|-------------------|---|---|-----------|--------------|-----------------------------|
| | | META FG-1 | SIBA FG-2 | Average mean | Consensus ranking after KII |
| 1 | Cutting down meat consumption | 5 | 3 | 4.0 | 4 |
| 2 | Sending children to urban | 5 | 4 | 4.5 | 4 |
| 3 | Selling of asset and others materials | 4.5 | 3.5 | 4.0 | 4 |
| 4 | Engage in petty retailing of items | 3 | 3 | 3.0 | 3 |
| 5 | Seasonal migration/mobility for labor | 3.5 | 4 | 3.75 | 4 |
| 6 | Borrowing money | 4 | 4 | 4.0 | 4 |
| 7 | Selling fire wood and charcoal | 3 | 3 | 3.0 | 3 |
| 8 | Employing their children for others person | 5 | 4 | 4.5 | 4 |
| 9 | Relying on less preferred and less expensive foods | 4 | 4 | 4.0 | 4 |
| 10 | Dropping of children from school | 3 | 2 | 2.5 | 2 |
| 11 | Reduction in consumption expenditures | 4 | 2 | 3.0 | 3 |
| 12 | Moving from agriculture and becoming daily laborer | 3 | 3 | 3.0 | 2 |
| 13 | Purchase of food by credit | 3 | 5 | 4.0 | 4 |
| 14 | Skip entire day without food | 4 | 3 | 3.5 | 4 |
| 15 | Reducing meals | 5 | 3 | 4.0 | 4 |
| 16 | Migrating (particularly to Middle East and may include vulnerable jobs) | 2 | 1 | 1.5 | 1 |
| 17 | Consuming alcohols | 2 | 5 | 3.5 | 4 |
| 18 | Timbering | 3 | 2 | 2.5 | 2 |
| 19 | Begging | 4 | 5 | 4.5 | 4 |

Table 3 Mean coping strategies index. Source: Field survey, 2018

| | Mean coping index | Std. deviation | Std. error |
|---------------------|-------------------|----------------|------------|
| Male ($n = 61$) | 88.54 | 30.33 | 3.88 |
| Female ($n = 39$) | 119.14 | 26.35 | 4.22 |
| Total ($n = 100$) | 100.47 | 32.39 | 3.24 |

school as the most commonly implemented indicator of coping strategy. In general, the consensus ranking should be a whole number that is the most frequent response. Both men and women small holders farmer households use all the coping strategies in the listed above at least part of them, in order to fulfill their food discrepancy. All the relative frequency of using different coping strategies was ranked from “never” to “every day” in a 1–7 scale.

In the study area, different coping mechanisms were employed by both male- and female-headed households. As indicated in Table 1, female-headed households were significantly different and more engaged in coping mechanism of selling fire wood and charcoal and engage in petty retailing of items. The analysis also showed that

consumption-based coping mechanism of female-headed household like cutting down meat consumption, relying on less preferred and less expensive food, reduction in consumption expenditure and reducing meals was significantly different and more affiliated when compared with male-headed households and dropping of children from school was more seen in female-headed households. Table 1 indicates that male-headed households were significantly different in coping mechanisms and more affiliated to the coping mechanisms of daily laborer, timbering, skip entire day without food, and alcohol consumption.

Coping strategies index

The coping index was calculated for food-insecure households ($n = 100$) using the methodology suggested in “Methods” section. The mean coping index was 88.54 and 119.14 for males and females, respectively. Using inferential statistics equality of means was tested. The t value was -5.173 for 98 degrees of freedom, and the mean difference was significant ($p < 0.001$). It implies that coping mechanisms of female-headed households were significantly different from male-headed households (Table 3).

Discussion

Human beings can struggle to sustain their life when food shortages happen, because food is one of our most basic needs rather than shelters and cloth. Before coming to the modernization time, every society around the world has attempted to overcome food shortages at household levels. They practice certain activities to escape them from food insecurity. In the past, when the world population was much lower than it is now, a man had little difficulty in ordinary time in growing the food that was needed. At that time, human beings started to lead their life in ancient time by hunting wild animal and gathering fruity crops. But it is different from male and female households. In addition to that, the study considered some food security proxy indicators. These are the food consumption score which combines information on meal frequency and dietary diversity and the coping strategy index which has proven to be a good indicator of food security level.

According to information obtained from group discussion and key informant interview, food-insecure households used strategies such as migration, dropping children out of school, cutting down trees and child labor as coping mechanisms. Even though many rural girls move to towns for daily labor, the income they earn does not cover their food and clothing. In the absence of gainful daily labor, some of them are often forced to involve in undesirable things to lead their life (prostitution and robbery). Studies conducted in Ethiopia have indicated that children migrating to urban areas, especially in Addis Ababa, are exposed to high child labor abuse in urban areas and are mostly deprived of their basic rights to education [57]. Another coping strategy adopted by poor rural households is a shift to poor and nutritionally lacking diet which sometimes leads to health-related problems including mental disorder. The downside of the effects of the coping strategies aforementioned has also implications for social norms. For instance, sending children to the streets earn money by begging is a shameful act according to Oromo¹ culture. However, today abject poverty and HIV/AIDS pandemic have forced many children to street begging even among the Oromo. The primary victims of this problem are girls.

As regards the effect of early marriage, parents betroth their daughters at early ages hoping that the latter would provide the former with income they could earn after marriage. This is often the case when the husband is believed to have sufficient income to support his wife's family. Ironically, however, early marriages can end up leading women to engage in less profitable activities like brewing and selling local liquor (e.g., "Areke" and "Tela" which are locally made liquors). Brewing such liquors is not only less profitable, but it has debilitating effect

on their health. Early marriage is also one of the factors accounting for high dropout rates of girls at both elementary and high schools. Dropping out of school is not limited to girls; boys are also forced to quit school and sent out to work on others' farms and earn income for their family. Even worse is that the income that boys earn in this way is too little to even cover their own cost of clothing let alone helping their family buy sufficient food. So, these results were confirmed with the study revealed that in Table 1 those reported by households surveyed. As the Table 1 displays that the dropping of children from school was one of the coping mechanisms practiced in the study district and significant differences were found between household food insecurity and coping mechanism (at t value 0.015). This was similar to the values reported in Tanzania by Ballard [58], and another option by the same finding was the withdrawal of children, especially girls from school in order to utilize their labor and save money, which, among other things, had ramifications for future literacy levels and the child's participation in the modern economy. Again dropping of children from school was much higher among food-insecure households observed in the surveyed areas (Table 1). So, these values were in agreement with those reported by Brock and Coulibay [59] who pointed out that globally, withdrawing children from school is a short-term strategy that has permanent effects that could make it difficult to reduce food security in the long term. The data show in Table 1 that in the study districts smallholder farmer households strongly rely on less preferred and less expensive food items and statistically strongly significant differences at (at t value 0.000) were observed in the surveyed district (Table 1). These indicated that households have significant differences noted between food insecure and coping mechanisms in Table 1. These values were in line with those values obtained by Ahmed Mohammed Abdulla. This result conforms to findings of a study by [60] conducted among the pastoralists in the Oromia (Yabelo) region of Ethiopia. One-sample t test reveals that there is a statistically significant difference between male-headed and female-headed households in terms of their coping strategies indices.

As given in Table 1, sending family members to abroad, to the Middle East countries in particular, in expectation of future remittance is another coping mechanism practiced by the sample households in the study district and significant values were obtained (t value: 0.045). This study was also consistent with the finding of Abdulla [60]. The study also indicates that the coping strategies practiced by most of the households were reduction in non-food expenditures and daily labor in both rural and

¹ Oromo is the ethnic group residing in the study area.

urban areas as well as purchase of food by borrowing. However, borrowing involves high interest rate in the form of usury. This is particularly true in the case of borrowing from individuals as opposed to formal and micro-finance institutions. Due to the high interest rate, very few households borrow from individuals lending money through usury. [61] also found a similar result in the study they conducted in the Southern Nations, Nationalities and Peoples Region of Ethiopia. The study also shows that sale of timber, begging, reducing daily meals and selling productive assets and other materials are coping strategies predominantly pursued by households who had a higher likelihood of being food insecure. So, the results were also in line with those of Bryant [62].

This [62] idea is that distress sale of assets is a major coping strategy adopted by households at times of acute food shortage. In addition, the result is consistent with the study of that of Ekesa in 2008 [36]. According to information obtained from focused group discussion and key informant interview, farm households in the study area often have too little to eat. Lack of enough food was mainly because of insufficient crop harvest and lack of purchasing power. The latter is ascribed to lack of sufficient income, both farm and non-farm/off-farm. Limited purchasing power robs the households of their entitlement to food whenever it is available in the market. Generally, the source of food insecurity among the study participants arises from both problems of availability and access. The FGD and key informant interview show that the major food crops consumed in the study area include cereals, legumes, roots and tubers, bananas, vegetables, fruits, meat and milk products. Cereals crop like sorghum and maize and legumes like beans and soya bean were under produced due to natural and man-made factors. Roots and tubers such as cassava, potatoes and sweet potatoes were consumed as most important food security crops during food shortage, but now they are produced by fewer numbers of households because of environmental factors.

To cope up with the fall in incomes, households sold off assets, one such asset is land. Bryant [63] found a similar finding. In Cambodia, a study conducted revealed that about one in five children whose households were affected by male labor migration had to start working in order to help their mothers [64]. Food is one of the basic needs which are crucial for human beings. We can do nothing without food. However, [65] indicated large amount of food production in the world does not ensure any country's food security. Time to time there are many factors to worsen the food security problem in many parts of the developing world. CARE/WFP [55] identified education level of household head, income source, market and food prices and supply of food commodities as some of the factors underlying food insecurity. In order to cope with food shortages,

most households are often compelled to ration the meager food at their disposal, i.e., cutting the amount and number of meals, favoring certain household members over others and skipping whole days without eating [49]. Households can take measures to overcome food insecurity problem. Poor households are the hardest hit by food insecurity when compared with the relatively better-off ones. The most food-secure households are those who achieve adequate access to food while using only a small proportion of available resources, whereas the most food-insecure households are those most at risk who fail to achieve adequate access even by devoting a large proportion of available resources to food [66].

Daily labor in both rural and urban areas, purchase of food by borrowing and petty trade, seasonal migration/mobility for labor and selling fire wood and charcoal were identified as widely practiced coping mechanisms. Withdrawing children from school and sending them out to work on others' farm, relying on less preferred and less expensive food and reducing non-food expenditures and skipping meals were other common coping mechanisms pursued by the households in the study area.

Smallholder farming households in Ilu Gelan pursued a host of short-term coping strategies to overcome the problem of food shortages. The irony, however, is that these coping strategies employed by the households were not effective in reducing household food insecurity in the study area. Thus, even though the coping strategies could ease problem food shortage over a very short period, they were not able to provide long-term solution to the food security problem poor household face. While agriculture plays a major role in the reduction in household food insecurity, the food insecurity problem cannot be solved by promoting agriculture alone. Hence, policies aimed at reducing food insecurity should look beyond agriculture if long-term solution is sought.

Conclusions

The main objective of the study was to identify the coping mechanisms food-insecure households in Ilu Gelan districts adopted in order to grapple with food shortages they face. The data show in the study districts smallholder farmer households rely on less preferred and less expensive food items. Coping strategy adopted by poor rural households is a shift to poor and nutritionally lacking diet leads to health-related problems. A one-sample *t* test reveals that there is a statistically significant difference between male-headed and female-headed households in terms of their coping strategies indices. The downside of the effects of the coping strategies aforementioned has also implications for health and social norms.

Begging is also one of the coping mechanisms that practiced in the study district, but insignificant differences

(at t value 0.180) were observed between food-insecure households and coping mechanisms in the surveyed district (Table 1). These values were disagreement with those result obtained. However, today abject poverty and HIV/AIDS pandemic have forced many children to street begging. The primary victims of this problem are girls. Smallholder farming households in Ilu Gelan pursued a host of short-term coping strategies to overcome the problem of food shortages. The irony, however, is that these coping strategies employed by the households were not effective in reducing household food insecurity in the study area. Thus, even though the coping strategies could ease food shortage problem, over a very short period they were not able to provide long-term solution to the food security problem poor household face. While agriculture plays a major role in the reduction in household food insecurity, the food insecurity problem cannot be solved by promoting agriculture alone. Hence, policies aimed at reducing food insecurity should look beyond agriculture if long-term solution is sought.

Household in Ilu Gelan was engaged in traditional and hand tool agriculture with simple drafting animal. Data obtained from FGD and key informant interview show that the production of crop did not provide sufficient food for household family consumption to impact on household food security status. Low production due to erratic rainfall reduced the availability of crops for household consumption and opportunities for income generation.

Households did not produce sufficient quantities of crops throughout the year due to natural and man-made factors. However, the households to cope with food insecurity relied on reduction in non-food expenditures. Daily labor in both rural and urban areas, purchase of food by credit/relying on borrowing and sending family members to abroad for remittance and obtained from their own production and also food received as gifts from relatives and from non-farm activities were more practiced among food-insecure household.

Recommendations

In view of the findings of the study and the above concluding remarks, the following recommendations are made in order to promote sustainable food security at smallholder farmer's household level in the study district. Gender monitoring and evaluation of the ongoing programs should be carried out to ensure benefits to all and particularly to the vulnerable, female-headed households. Withdrawing children from school was also a common for food-insecure households coping strategy in the study districts. To reduce school withdrawal, the

government in collaboration with the World Food Program served school children with feeding program.

In addition to this, implementing disaster and risks management programs to support rural poor and smallholder farmers during natural calamities and other shocks is desperately needed to give prescription for the households. Moreover, encouraging a wise use of natural resources as well as improved technologies, increasing animal and crop diversification and increasing local social net work systems among the community during shocks and stress would be important. Pay attention to policy and strategies of access to use water resources uses both surface water and ground water like modern irrigation technologies and unemployment issues is the big problem. So, households should be focusing on home gardens activities.

Abbreviations

GDP: growth domestic product; WEP: World Food Program; FGD: focused group discussion; HIV: human immune virus; KI: key informants; EHNRI: Ethiopian Health and Nutrition Research Institute; CSI: coping strategies index.

Authors' contributions

This research has been designed and led by BD who structured the concepts, reviewed all of the studies and analyzed both quantitative and qualitative data. He further developed the manuscript, identified and developed important concepts, validated and designed the arguments, conceived and conducted quantitative study and edited the final research. The author read and approved the final manuscript.

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Competing interests

The author declares that there are no competing interests.

Availability of supporting data

The author wants to declare that he can submit the data at whatever time based on your request. The datasets used and/or analyzed during the current study will be available from the author on reasonable request.

Consent for publication

Not applicable.

Ethical approval and consent to participate

Participants of the research including survey households, case studies, enumerators, the supervisors and key informants were fully informed about the objectives of the study. They all were approached friendly and fraternal.

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