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# Determinants of Pastoralists' Nutrition Security in Itang Special District, Gambella, Ethiopia

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**Abstract:** The malnutrition is widespread challenge in the Itang special district of Gambella. The main aim of this study was to examine the determinants of pastoralists' nutrition security in Itang special district. It collected the primary data through households' interview schedule, key informants interview and body mass index and; the secondary data were collected by document analysis. Then, the descriptive statistics mainly frequency, percentage, mean, standard deviation, and binary logit model were used to analyse the data by using SPSS version 20. The field result revealed that about 65% and 35% of the rural households were nutrition secured and unsecured respectively in the district. Similarly, the binary logit model result indicated that the livestock size, dietary diversity status, educational status and income were statistically significant at 1% while; the market access and awareness were statistical significant at 5%.

**Keywords:** Determinants; Pastoralists; Nutrition Security; Itang Special District

## Introduction

The Hunger and malnutrition are devastating problems, particularly for the poor and unprivileged countries. World Health Organization (WHO) estimates that by 2015, the prevalence of malnutrition worldwide will be 17.6% - with the vast majority living in developing countries in southern Asia and Sub-Saharan Africa (Haile et al, 2015).

Ethiopia is one of the countries in the Sub-Saharan Africa with the highest rates of malnutrition (Getahun et al, 2001). It is among the poorest and most food insecure countries of the world where 44% of its population live below the national poverty line (World Bank, 2005); and 46% of its population get below the minimum levels of dietary

energy consumption compared with other sub-Saharan and developing countries (World Bank, 2005). Likewise, 33.6% of the Ethiopian population are living below the food poverty line and cannot meet their daily minimum nutritional requirement of 2200 calories (MoFED, 2013).

In Gambella region, the condition of undernourishment is extremely predominance. The children are dying every day and the pregnant women and older people have malnourished. Across the region, about 39% of the households were reported with high prevalence of chronic energy deficiency (Girma and Genebo, 2002).

However, the studies on the rural households' nutrition security across the country in general, region or district in particular are minimal. A few studies were done on children (Girma and Genebo, 2002; Betebo et al, 2017 and Kuche et al, 2020; about mother nutrition (Girma and Genebo, 2002); concentration on girls (Wassie et al, 2015); regarding about women (Abdu et al, 2018); focused on pregnant women (Tsegaye et al, 2020) and another study was dealt with the impact of farming interventions and nutrition security (Wordofa et al, 2020). This showed that there is limited study conducted in Itang special district about the nutrition security of pastoralists. That can be proven from the erstwhile studies; which were conducted across many parts of Ethiopia.

As a result, the study about the pastoralists' nutrition security was undertaken to address the current gap. It was undertaken in Itang special district for three main reasons. In Itang special district, there are lack of study conducted previously, prevalence of nutrition insecurity, potential for livestock production and familiarity of study area to researcher. The result of this study can contribute to sufficient literature evidences, add knowledge to nutrition expertise, initiates institutional intervention to nutrition security of pastoralists, and provides a mean for decision making. Thus the objectives of this study were;

- ✓ To describe the status of pastoralists nutrition security in the study area
- ✓ To examine the factors contributing to pastoralists nutrition security in the area

## Literature Review

### *Status of Nutrition Security*

There is poor nutrition security in Ethiopia. The degree of its frequency varies depending on the findings of each scholar. Poor child feeding and mother hygiene behaviours were found as risk factors for under nutrition in one study (Girma et al., 2019). For instance, the overall result of one study found that 22.2 percent of children were stunted, with 21.8 per cent and 22.6 per cent in children of employed and jobless moms, respectively (Eshete et al., 2017). Stunting, wasting, and being underweight are all too common in children aged 24–59 months in Aykel Town. This study found that 56.6 per cent of children were stunted, 45.3 percent were underweight, and 34.6 per cent were wasting (Alemayehu et al., 2015). Stunting, underweight, and wasting, on the other hand, were seen in 31.6-33.7 per cent, 11.7-15.7 per cent, and 4.4-4.8 per cent of the population, respectively (Desalegn et al, 2019). Furthermore, the combined prevalence estimates of stunting, underweight, and

wasting from eighteen studies were 42.0 per cent, 33.0 per cent, and 15.0 per cent, respectively (Abdulahi et al, 2017). However, these findings do not reflect the nutritional state of pastoralists across the country.

### *Factors of Nutrition Security*

Ethiopian nutrition security is influenced by many factors. The age, sex, perceived birth weight, mother's educational status, BMI, maternal stature, region, wealth quintile, type of toilet facility, and type of cooking fuel all had significant relationships with stunting, according to the findings (Amare et al., 2019). Furthermore, being an educated mother, a child's age group of 24–59 months, and the households' fifth wealth quintile all influenced chronic malnutrition (stunting) (Eshete et al., 2017). Similarly, educating moms and caregivers on the benefits of proper child feeding and maintaining hygienic habits at important times will help improve children's nutritional status (Girma et al., 2019). Furthermore, the age of the children, the time of breastfeeding initiation, the child's sex, the source of water, the parents' educational status, the type of food used to begin complementary feeding, and the mothers' financial decision-making ability may all have an impact on the under nutrition of children in this age group (Alemayehu et al., 2015). Similarly, maternal fasting throughout the fasting season affects the nutritional condition and feeding practices of 6-23-month-old children (Desalegn et al., 2019). Furthermore, child age, gender, complementary foods, inadequate dietary diversity, diarrheal illnesses, maternal education, maternal height, residential region, and socioeconomic level were all significant risk factors for under nutrition (Abdulahi et al., 2017). Nonetheless, there is sufficient knowledge concerning the elements that influence pastoralists' nutrition security in Ethiopia.

## Methods

### *Study Area*

This research was carried out at the Itang special district, which is 45 kilometers from Gambella regional capital city. There are two key reasons why this district is unique. First, the district is not a part of any Gambella Region Zone, indicating that it is considered independent or autonomous. Second, with 23 kebele, the district is a combination of three ethnic groups, primarily Nuer, Anuak, and Oppo (1 urban kebele and 22 rural kebele). The Anuak Zone, on the south and southeast, the Nuer Zone, on the west, and the Oromia Region, on the north, are its adjacent zones or regions. Within the Gambella regional location, the district is located at 8015'N latitude and 34010'E longitude.

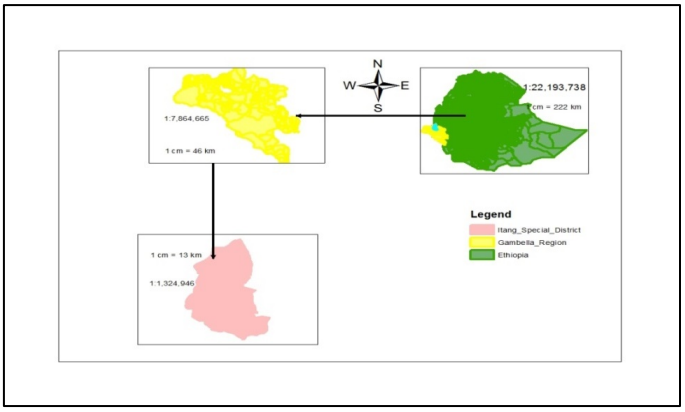


Figure 1. **Map of Study Area**

The district is sparsely populated area in the Gambella region. There are only 42,000 people in the Itang special district, with 21,411 men and 20,589 women (Alemseged et al, 2014). Likewise, a total of 8,744 households were counted in the district at the same time, resulting in an average of 4.8 people per household and 8213 dwelling units. These pastoral communities are not accessible to roads, electricity, telecommunication and social services mainly schools and health facilities in the district.

In this pastoral area, their local economy is varied across the district. Some of the households depend on the mixed production system, where there is production of crops and livestock together. Up till now, the livelihood option of the populous is mainly livestock related system. The fishing, animal husbandry, piggery, beekeeping and so on are majorly used in the pastoral areas. The production system of this community is traditional. The pastoralists use the free ranging production with their indigenous breeds. Thus, the people migrate between two locations (upland and river bank) in the Itang district. This movement depends on the circumstances, seasonal change and their own villages' options. As the rest of the districts in the Gambella National Regional State; majority of the rural pastoral have poor nutrition status.

## *Study Design*

The cross-sectional study was applied to gather related and obligatory information during the period of January, 1 to February, 2021 G.C. This study had used a mixed of quantitative and qualitative approach to assess the nutrition security of the households. It collected primary and secondary data through documents analysis, stadiometer and interview schedule methods. The data was analysed by using SPPSS version 20.

## *Sampling Techniques and Sample Size*

The study was undertaken in Itang special district with the emphasis on the pastoral households. The district was selected purposively due to lack of study conducted previously, livestock potential, and familiarity of researcher and prevalence of nutrition insecurity. In the district's 23 lowest administrative units (kebele); Achua and Pulkod kebele were selected by using simple random sampling technique. This technique was used to reduce the bias of selection. In that method, the equal chance was given to every lowest

administrative unit to be selected. In the same way, the pastoral households were selected using simple randomly technique across the Achua and Pulkod. And then, the sample size of the pastoralists was calculated based on the (Arsham, 2007) n= 0.25/ $(SE)^2$, Where n is the sample size and SE is the Standard error (4%). N= 156 pastoral household from the two kebele (lowest administrative unit in Ethiopia) were selected. This method of sample size determination is used when the response variable is binary in nature or dummy variable.

### *Data Collection Methods*

The assessment was collected the primary data about the pastoralists' nutrition security. The interview schedule was carried out in order to gather the data about the factors contributing to nutrition security among the pastoralists across the district. In the same token, the body mass indexes of the pastoralists' data were collected using Stadiometer to assess the nutrition security. These data were substantiated through key informants' interview. Furthermore, the secondary data were collected, evaluated and criticized to substantiate the first hand information.

### *Methods of Data Analysis*

The collected quantitative data were coded, edited and analysed using SPSS software version 20. At that instant, the descriptive statistics such as frequency, percentage, mean, standard deviation, chi-square and t-value were used to organize and describe the collected data during the field in the study area. And then, the Binary logit model was employed to examine the association between nutrition security and explanatory variables. Moreover, the qualitative data of this paper was analysed narratively. These data were analysed based on the objectives.

### *Variables Hypothesis*

The dependent variable of this study is the pastoral households' nutritional security in the study areas. This variable was empirically estimated with the reference to the status of the pastoralists' nutrition security in the study areas. At this moment, the nutrition security is the dummy variable (that are nutrition secure and nutrition insecure) in which; the nutrition secured= 1 and nutrition insecure= 2 respectively. The nutrition secure was the pastoralists with normal nutrition status whereas; the nutrition insecure pastoralists were those with malnutrition in the study area. Thus, the pastoralists' who were underweight, overweight and obese were considered as malnourished and normal nutrition status is regarded as secured. The study noted that the < 18.5 represents underweight, 18.5-24.9 represents normal health, 25-29.9 represents overweight and ≥30 represents obesity male household-heads. In context of the explanatory variables; their associations with dependent variable were hypothesized as shown in table provided below.

Table 1. **Explanatory Variables Hypothesis**

| Variables | Description and Measurement | Nature | Sign |
|---|---|---|---|
| Sex | SE (1=Male & 0=Female | Dummy | +/- |
| Marital status | MAS (1=Single, 2=Married, 3=divorce and 4= widow ) | Dummy | +/- |
| Remittance | REM (1=Yes & 0=No) | Dummy | + |
| Income | ICO (measure in Ethiopian Birr) | Continuous | + |
| Awareness | AWN (1=Yes and 0=no) | Dummy | + |
| Cultivated land size | LSI (Measure in Number) | Continuous | + |
| Livestock size | LSI (TLU) | Continuous | + |
| Preference | PRE (1=Yes & 0=No) | Dummy | + |
| Educational status | EDS(1=yes and 0=no) | Dummy | + |
| Age | AG (Year) | Continuous | + |
| Market access | MA (1=yes & 0=No) | Dummy | + |
| Credit access | CA (1=yes and 0=no) | Dummy | + |
| Aid | Ai (1=yes and 0=no) | Dummy | - |
| Skill training | SKT (1=yes and 0=no) | Dummy | + |
| Employment status | EMS (1=yes and 0=no) | Dummy | + |
| Dietary diversity | DIDI (1=diversified and 0=not diversified) | Dummy | + |

## Findings

### *Pastoralists Characteristics*

**Demographic Characteristics**

There are some of the demographics' characteristics that contribute to nutrition security among the pastoralists in Itang special district. The survey result indicated that about 48.6% and 63.6% male pastoral households were nutrition secure and unsecure respectively in the study area (Table 2). This showed that the male pastoralists are nutrition insecure in the study area. Likewise, about 51.4% and 36.4% of the female pastoral households were nutrition secure and unsecure respectively in the study area (Table 2). This denotes that many of the females' respondents are nutrition secure in the study area.

Similarly, the survey result showed that about 20% (Single), 48.6% (Married), 20% (Divorce) and 11.4% (Widow) were nutrition secure pastoral households in the study area (Table 2). This implies that the married households are more nutrition secures among the others respondents. Moreover, about 19% (Single), 61.2% (Married), 11.2% (Divorce) and 8.2% (Widow) were nutrition unsecure pastoral households in the study area (Table 2). The married households are also nutrition insecure aross the district.

Table 2. **Sex and Marital Status Distribution**

| Characteristics | | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| Sex | Male | 17 | 48.6 | 77 | 63.6 |
| | Female | 18 | 51.4 | 44 | 36.4 |
| Marital Status | Single | 7 | 20 | 23 | 19 |
| | Married | 17 | 48.6 | 74 | 61.2 |
| | Divorce | 7 | 20 | 14 | 11.6 |
| | Widow | 4 | 11.4 | 10 | 8.2 |

(Source: own survey, 2021)

On the other hand, about 54.3% and 53.7% were reported to be nutrition secure and unsecure pastoralists who have good preference to nutrition pastoral households in the study area (Table 3). Besides, nearly 45.7% (nutrition secure) and 46.3% (nutrition unsecure) were pastoralists with limited preference toward nutrition respectively in the study area (Table 3). Further, about 25.7% (nutrition secure) and 64.5% (nutrition unsecure) households were illiterate; whereas 74.3% (nutrition secure) and 35.5% (nutrition unsecure) households were literate in the study area (Table 3). In the same token, around 57.1% (nutrition secure) and 17.4% (nutrition unsecure) pastoral households have good awareness to nutrition in the study area (Table 3). The result also showed that about 42.9% (nutrition secure) and 82.6% (nutrition unsecure) households have negative awareness toward nutrition in the study area (Table 3).

Table 3. **Preference and Educational Status Distribution**

| Characteristics | | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| Preference | Yes | 19 | 54.3 | 65 | 53.7 |
| | No | 16 | 45.7 | 56 | 46.3 |
| Educational status | Illiterate | 9 | 25.7 | 78 | 64.5 |
| | Literate | 26 | 74.3 | 43 | 35.5 |
| Awareness | Yes | 20 | 57.1 | 21 | 17.4 |
| | No | 15 | 42.9 | 100 | 82.6 |

(Source: own survey, 2021)

Besides, the average age of nutrition secure and unsecure pastoral households were 45.6 and 27.5 respectively in the study area (Table 4). As estimated, the standard deviations of the nutrition secure and unsecure pastoral households were 12.3 and 10.7 respectively in study area (Table 4).

Table 4. **Households Age Distribution**

| Characteristics | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|
| | Mean | Standard Dev. | Mean | Standard Dev. |
| Age | 45.6 | 12.3 | 27.5 | 10.7 |

(Source: Own Survey, 2021)

**Institutional Characteristics**

Some of the institutional characteristics oblige description among pastoral households in the study area. The survey result showed that about 45.7% (nutrition secure) and 51.2% (nutrition unsecure) pastoral households have received aids while, 54.3% (nutrition secure) and 48.8% (nutrition unsecure) of pastoral households have not received aids in the study area (Table 5). Moreover, about 74.3% (nutrition secure) and 54.5% (nutrition unsecure) pastoral households have access to market; whereas about 25.7% (nutrition secure) and 45.5% (nutrition unsecure) pastoral households have no access to market in the study area (Table 5). In addition, the field result indicated that about 65.7% (nutrition secure) and 59.5% (nutrition unsecure) pastoral households have credit access whereas; 34.3% (nutrition secure) and 40.5% (nutrition unsecure) pastoral households have no access to credit in the study area (Table 5).

Table 5. **Aid, Market and Credit Access Distribution**

| Characteristics | | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| Aid | Yes | 16 | 45.7 | 62 | 51.2 |
| | No | 19 | 54.3 | 59 | 48.8 |
| Market Access | Yes | 26 | 74.3 | 66 | 54.5 |
| | No | 9 | 25.7 | 55 | 45.5 |
| Credit Access | Yes | 23 | 65.7 | 72 | 59.5 |
| | No | 12 | 34.3 | 49 | 40.5 |

(Source: Own survey, 2021)

Also, about 71.4% (nutrition secure) and 41.3% (nutrition unsecure) pastoral households have obtained skill training; whereas 28.6% (nutrition secure) and 58.7% (nutrition unsecure) pastoral households have not gained training in the study area (Table 6). Likewise, about 42.9% (nutrition secure) and 24% (nutrition unsecure) pastoral households have obtained remittance; whereas 57.1% (nutrition secure) and 76% (nutrition unsecure) pastoral households did not get remittance in the study area (Table 6).

Table 6. **Skill Training and Remittance Distribution**

| Characteristics | | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| Skill Training | Yes | 25 | 71.4 | 50 | 41.3 |
| | No | 10 | 28.6 | 71 | 58.7 |
| Remittance | Yes | 15 | 42.9 | 29 | 24 |
| | No | 20 | 57.1 | 92 | 76 |

(Source: Own Survey, 2021)

**Economics Characteristics**

This study has explored and described the economics characteristics of pastoral households in the study area. The estimate showed that the mean income of nutrition secure and unsecure pastoral households were 452 and 237 respectively in the study area (Table 7). In the same token, the average cultivated land size of nutrition secure and unsecure pastoral households were 0.53 and 0.2 respectively in the study area (Table 7). Likewise, the average livestock size of nutrition secure and unsecure pastoral households were 15.3 and 11 respectively in study area (Table 7).

Table 7. **Income, Land and Livestock Size Distribution**

| Characteristics | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|
| | Mean | Standard Dev. | Mean | Standard Dev. |
| Income | 452 | 54 | 237 | 32 |
| Cultivated Land size | 0.53 | 0.3 | 0.2 | 0.1 |
| Livestock size | 15.3 | 7.5 | 11 | 7 |

(Source: Own Survey, 2021)

Besides, about 60% (nutrition secure) and 28.1% (nutrition unsecure) pastoral households were employed; whereas 40% (nutrition secure) and 71.9% (nutrition unsecure) pastoral households were not employed in the study area (Table 8). Similarly, about 68.4% (nutrition secure) and 33.9% (nutrition unsecure) pastoral households have dietary diversity; whereas 31.4% (nutrition secure) and 66.1% pastoral households have inadequate dietary diversity in study area (Table 8).

Table 8. **Employment and Dietary Diversity Status Distribution**

| Characteristics | | Nutrition secure | | Nutrition unsecure | |
|---|---|---|---|---|---|
| | | F | % | F | % |
| Employment status | Yes | 21 | 60 | 34 | 28.1 |
| | No | 14 | 40 | 87 | 71.9 |
| Dietary Diversity | Yes | 24 | 68.6 | 41 | 33.9 |
| | No | 11 | 31.4 | 80 | 66.1 |

(Source: Survey result, 2021)

## *Pastoralists Nutrition Status*

**The State of Nutrition in the District**

The nutrition condition is life-threatening among the pastoral households across the Itang special district. A lot of the pastoral households have poor nutrition status across the Itang special district. A survey result indicated that around 77.6% (121) and 22.4% (35) of the pastoralists were nutrition unsecured and nutrition secured pastoral households respectively in the district (Figure 2). In the same regard, the field result showed that about 42%, 22%, 19% & 17% of the pastoral households were underweight, normal, obese & overweight respectively in the district (Figure 2). This implies that the malnutrition is extremely prevalence in the Itang special district. Thus, the main motive behind this problem is lack of consuming various diets in the study area. Across the district, most of the people who are residing in that area do not eat various dietary sources of food items. Some of them use their products for marketing whereas; the other remains idle of not

producing different products. Getahun et al (2001) showed that the prevalence of underweight in 1998 survey was 42%. Under this circumstance, the recent finding is higher than the previous result. This showed that the nutrition insecurity is very worse.

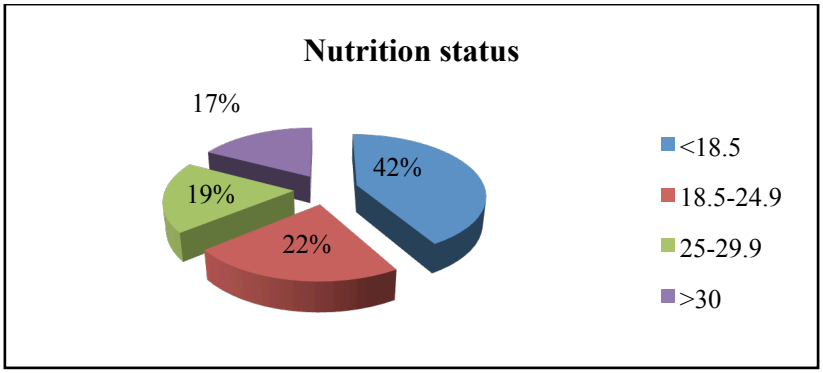


Figure 2. **Pastoralists Nutrition Status in the District**

**The State of Nutrition in the Study Kebele**

The statuses of nutrition security among the pastoral households vary between Achua and Pulkod kebele. A survey result indicated that about 36.3% and 46.8% of the pastoral households were underweight in Achua and Pulkod kebele (Figure 3). The result of key informants' interview described that the poor sanitary practice and lack of consuming diverse diet were the major reasons for malnutrition variation in the study area. Moreover, nearly 22.1% and 24.1% pastoral households have normal health status from the Achua and Pulkod kebele respectively (Figure 3). Hence, the key informal interview result showed that the main difference was the status of organizational employment and accessibility to the market products. In addition, around 22.1% and 15.2% of households have become obese whereas; 19.5% and 13.9% of the households were overweight in Achua and Pulkod kebele respectively (Figure 3). These are the people with better economic status in the kebele. The weight, the height, and the BMI of nutritionally insecure women are 44 kg, 1.45 m, and 15.8 kg/m2 (Teshome et al, 2022). This showed that the body mass index of the previous study is higher than the current result.

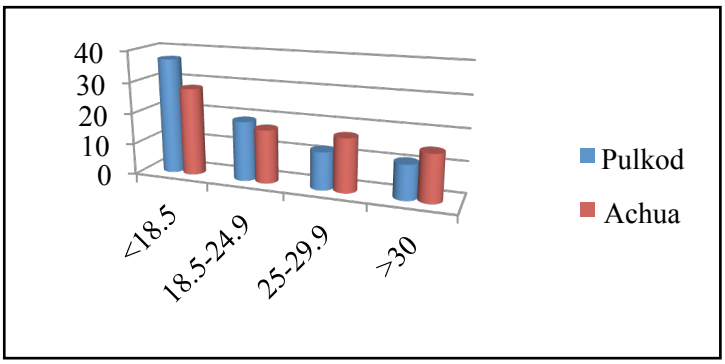


Figure 3. **Variation of Nutrition Security**

**Determinants of Pastoral Nutrition Security**

The multicollinearity among the hypothesized dummy independent variables was checked during analysis of this study. The study result showed that there was no collinearity problem among the discrete variables at the time of analysis. The results of the discrete independent showed that the contingency coefficient were below 1 (Table 9). As a rule of thumb, when the CC value was less than 1, it indicated that there was no collinearity problem. Thus, the overall coefficients of contingency results among the discrete variables are less than one.

Table 9. **Multicollinearity Diagnosis of The Discrete Independent Variables**

| **Variable** | SE | PRE | MAC | AWN | CA | REM | DIDI | Ai | EMS | EDS | SKT | **MAS** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SE | 1 | | | | | | | | | | | |
| PRE | 0.22 | 1 | | | | | | | | | | |
| MAC | 0.1 | 0.45 | 1 | | | | | | | | | |
| AWN | 0.2 | 0.20 | 0.31 | 1 | | | | | | | | |
| CA | 0.2 | 0.02 | 0.01 | 0.11 | 1 | | | | | | | |
| REM | 0.1 | 0.13 | 0.31 | 0.26 | 0.3 | 1 | | | | | | |
| DIDI | 0.0 | 0.01 | 0.16 | 0.162 | 0.3 | 0.24 | 1 | | | | | |
| Ai | 0.1 | 0.02 | 0.31 | 0.25 | 0.0 | 0.42 | 0.013 | 1 | | | | |
| EMS | 0.0 | 0.31 | 0.32 | 0.355 | 0.0 | 0.42 | 0.07 | 0.2 | 1 | | | |
| EDS | 0.2 | 0.31 | 0.31 | 0.22 | 0.1 | 0.48 | 0.19 | 0.1 | 0.03 | 1 | | |
| SKTT | 0.0 | 0.39 | 0.32 | 0.245 | 0.1 | 0.13 | 0.237 | 0.10 | 0.28 | 0.40 | 1 | |
| MAS | 0.21 | 0.14 | 0.25 | 0.310 | 0.2 | 0.12 | 0.121 | 0.1 | 0.21 | 0.18 | .31 | 1 |

(Source: SPSS Output, 2021)

In the same way, the multicollinearity of the continuous explanatory variables was verified. The result showed that there were no multicollinearity problems experienced from the continuous independent variables of the study. The VIF results showed that the all values of the variables were below 10 (Table 10). Thus, the results of multicollinearity diagnosis were briefly shown in the tables 3 provided for clarification.

Table 10. **Variance Inflation Factor for Continuous Independent Variables**

| **Variables** | **$R^2$** | **VIF** |
|---|---|---|
| AG | 0.615 | 2.59 |
| LSI | 0.225 | 1.29 |
| INC | 0.406 | 1.68 |
| CLSI | 0.253 | 1.34 |

(Source: SPSS Output, 2021)

Similarly, the goodness of fit test was used with Hosmer-Lemshew prior to the binary logit model execution. The test showed that the p-value (=0.371) of the Homer-Lemshew goodness of fit test is greater than the all significant levels (1%, 5% and 10% respectively). This displayed that the binary logit model fit with the study variables; or it was executed for the analysis of the factors of nutrition security. Therefore, the binary logit model was applicable for data analysis in this study.

Then, the sixteen explanatory variables were hypothesized to influence the decision of pastoralists' nutrition security in Itang Special District. And then, six of them were statistically significant with nutrition security of the pastoralists. At this respect, the binary logit model showed that livestock size, dietary diversity status, educational status and income were statistically significant at 1% (Table 11). Moreover, market access and awareness were statistical significant at 5% (Table 11).

Table 11. **The Results of The Binary Logit Model**

| Variables | B | S.E | Wald | Sig. | Exp(B) |
|---|---|---|---|---|---|
| AG | 0.022 | .025 | .731 | .748 | .022 |
| LSI | .055 | .060 | 4.837*** | .007 | .57 |
| INC | .000 | .000 | .761*** | .004 | .32 |
| SE | .012 | .007 | 2.944 | .816 | .012 |
| MAC | .027 | .026 | 1.086** | .021 | .27 |
| EDS | 1.444 | .763 | 3.576*** | .005 | .236 |
| AWN | .446 | 1.004 | 1.197** | .022 | .40 |
| MAS | .149 | .072 | 2.577 | .990 | .031 |
| CLASI | -.029 | .686 | .002 | .922 | .971 |
| REM | .299 | .877 | .116 | .522 | .349 |
| AC | .474 | .071 | .320 | .276 | .79 |
| DIDI | .028 | .606 | 3.002*** | .001 | .972 |
| PRE | .989 | .633 | 2.445 | .280 | .689 |
| Ai | -.638 | .693 | .848 | 110 | .529 |
| SKT | -.1.208 | 1.087 | 1.234 | .432 | .299 |
| EMS | 2.939 | 1.140 | .647 | .872 | .902 |
| Constant | -45.160 | .608 | .000 | .999 | .000 |
| LR $Chi^2$ (16) =112,3 p-value=0.002 | | | | | |
| Hosmer Lemshow $Chi^2$ (8)=5.116, p=0.371 | | | | | |
| Number of Observation=156 | | | | | |

(Source: The binary logit model output)

Note: ** and *** represent the variables that are statistically significant at 5% and 1%.

At this instant, it is a time for six statistically significant explanatory variables rationalization in relation with nutrition security. The relationships between these significant explanatory variables with nutrition security among the pastoral households were briefly discussed below.

**LSI (Livestock size):** Livestock holding size was estimated as the determinants of nutrition security among the pastoral households in Itang Special District. As expected, the model result showed a positive significant association between livestock size and pastoralists nutrition security at 1% (p-value=0.007). This showed that the increase of livestock size would increase the pastoralists' nutrition security. The estimate directed that increasing the number of livestock, would increase the probability of the pastoralists' nutrition security by 57%. This suggests that the pastoralists with the large number of livestock have better nutrition security. Girma and Genebo (2002) finding specified that the livestock size determines the status of nutrition positively.

**INCO (Income):** The income of the pastoralists was hypothesized as the determinants of nutrition security in the study areas. The income of the pastoralists positively determines the nutrition security at 1% (p-value=0.004). This indicated that the increases of income increase the nutrition security among the pastoral communities. While keeping the other variables constant, the increases of income by one birr would increases the probability of nutrition security among the pastoral households by 32%. This exhibited that the pastoral households with more income are able to afford the products and consume diverse diets. Tsegaye et al (2020) showed that the wealth status influences the nutrition security.

**DIDI (Dietary diversity):** The status of dietary diversity was postulated as the determinants of pastoralists' nutrition security in Itang special district. As expected, the status of dietary diversity influenced the pastoralists' nutrition security positively at 1% (p-value=0.001). This revealed that the increase of status of dietary diversity, increase the nutrition security of the pastoralists in the study area. It was shown that as the status of dietary diversity increase, the probability of nutritional security would be increased by 97.2%. This entailed that the pastoralists with high dietary diversity status involve in consuming various food items. Kuche et al (2020) showed that consuming more food items determines the nutrition security.

**MAC (Market Access):** The market access was estimated to be the determinants of pastoralists' nutrition security in the study area. The result indicated that there was positive and statistically significant relationship between market access and nutrition security at 5% (p-value=0.021). This certified that the increases of the access to market, increases the pastoralists' nutrition security. The estimate showed that the increase of access to market would increase the probability of the pastoralists' nutrition security by 27%. This showed that the pastoral access the demanding products in the study area. Kuche et al (2020) result showed that the main livestock market centres are usually nearby to where the pastoralists are migrating.

**EDS (Educational Status):** The educational status of the pastoralists was hypothesized to influence the nutrition security in the study area. The educational status of the pastoralists was positively associated and statistically significant at 1% (p-value=0.005). This marked that being an educated increase the nutrition security of the pastoralists in the study area. Thus, the estimate revealed that the increases of pastoralists' education status would increases the probability of nutrition security by 23.6%. This is in connection with the fact that the educated pastoralists are often able to know the essential of nutritional values. Girma and Genebo (2002) revealed that educational status influences the nutrition security.

**AWN (Awareness):** The awareness to nutrition was postulated as the determinant of nutrition security among the pastoralists in the study area. As expected, the awareness was found to be positively and statistically significant at 5% (p-value=0.022). This showed that as the knowledge of pastoralists to nutrition values increases; the nutrition security increases. The estimate indicated that the increase of the awareness to nutrition would increases the probability of nutrition security by 40%. This suggested that the pastoralists who have good awareness can engage in different nutritional sources of food. Tsegaye et al (2020) showed that the knowledge to nutrition determines the nutrition security.

## Conclusion

The malnutrition is one of serious health challenges which exist recurrently across the rural settings in Gambella region. It disturbs the livelihood of many indigenous households across the Itang Special District. The malnutrition leads to the death of the people, makes people crazy and waste the resources, disrupt the productive skills of the young generation across the district. It also limited the capacity of rural households and institutional services.

Meanwhile, it was just found that, there is extremely prevalence of malnutrition among the pastoral households in the study area. In the same way, the numerous factors determine the nutritional security of the pastoral households in the study area. Therefore, improving the nutrition security demand the participation of whole communities, civil society organizations, Governmental organizations and NGOs. These actions are promoting diversification of livelihood activities, creating awareness, increasing capacity building and infrastructural services support. In conclusion, the further studies about the nutrition security among the marginalized groups are needed.

### Limitations

This study is not free from limitations. It has limited sample size. The study location is also minimal. It similarly focused on pastoral households alone.

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