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# Socioeconomic Feature on Child Feeding, As A Determinant Factor of Nutritional Status of Children: The Case of Rural Community at Dilla-Zuria District of Gede'o Zone, Southern Ethiopia

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**Abstract**

*Good nutrition is necessary for a healthy and active life, and it has a direct impact on intellectual capacity, which has a positive impact on social and economic development. As it has a significant impact on physical, mental, social, and cognitive development. A variety of factors influence children's nutritional needs, including access to nutritious foods and feeding practices. To better understand the factors contributing to malnutrition in children under the age of five, a study was conducted in the Dilla-Zuria district of Gede'o Zone, Southern Ethiopia. This study used a cross-sectional design with a mix of qualitative and quantitative approaches. SPSS version 20.0 software was employed for analysis. Descriptive statistics, leaner regression, bivariate correlations, and qualitative inference were employed for analysis. Household socioeconomic features, child feeding practices, access to subsistence and food, and the mother's autonomy to use the household's wealth were used as independent variables, with anthropometric data from children under the age of five used as a dependent variable for determination of nutritional status. The findings of this study revealed that the caregivers' child feeding practices are heavily influenced by the socioeconomic features of the family when determining the nutritional condition of children under the age of five. To address the nutritional problem of children under the age of five, an integrated holistic approach involving several sectors and sub-sectors with clearly defined mainstreaming duties has been commended.*

**Keywords:** Socioeconomic Feature, Rural Community, Under-Five Child, Nutritional Health Status, Child Feeding Practice

## 1. Background

Children's nutritional status is affected by a number of variables, including the accessibility and use of health services, the level of child care provided, household access to food and how that food is distributed within the household, and a host of other elements. Numerous studies have been conducted on the interventions needed to increase a household's ability to address the root causes of malnutrition. Interventions may place an emphasis on boosting a household's resources as well as helping them use those resources more effectively in order to improve the nutritional status of their children [12]. Many studies asserted that less breast milk increases children's susceptibility to malnutrition before the age of five and affects their growth and development. However, if the children become accustomed to complementary feeding that can meet the minimum dietary diversity requirement of, they can start receiving adequate nutrition after stopping breastfeeding.

One of the key elements needed to encourage child growth and development is complementary feeding. Consistently it has shown that the timing, frequency, quality, or type of complementary feeding is so crucial that studies consistently show that children under the age of five have the greatest influence on the nutritional health outcomes [10,11]. Even infants who receive optimal breastfeeding are at risk of malnutrition if they do not receive adequate quantities and quality of complementary feeding after six months of age because of limited gastric capacity and a higher body demand for nutrition.

Age is positively correlated with a composite measure of growth retardation in children called height-for-age. The children in the different age groups (6-11, 12-23, and 24-36 months) who had items from four or more food groups the day before is the minimum dietary diversity [18]. From about the age of six months, a child needs complementary feeding, or additional food in addition to breast milk, to meet their nutritional and

energy needs. A number of factors, such as insufficient quantity and micronutrient deficiencies caused by low dietary diversity, consumption of low levels of animal-derived foods, and inadequate nutrition, play major roles in defining the quality of complementary feeding [5-10]. In most populations, a child would have a high likelihood of consuming at least one food from an animal source and at least one fruit or vegetable that day, in addition to a staple food like a grain, root, or tuber, if they had consumed foods from at least four different food groups the day before.

For non-breastfed children aged 6-23 months, the World Health Organization has recommended a minimum meal frequency of four times per day [13]. Therefore, it has been determined that enhancing infant and young child feeding practices is a key strategy for addressing children under-five's suboptimal nutritional status, particularly in areas with limited resources. Therefore, as multiple studies have clearly indicated, the quality of complementary feeding in various countries is far from adequate, and children living in poverty are most vulnerable. The price of nutritious food is a decisive factor in this context, as nutrient-dense foods cost significantly more than less nutritious staples. Hence, an economic feature is a preliminary determinant for children's feeding capability, and this study was motivated to understand and explore the situation from a socioeconomic development perspective.

## 2. Study Methods

### 2.1. Study Design and Period

In this study, both qualitative and quantitative cross-sectional study design was used. It was conducted from 1st of September 2018 to 25th of October 2019.

### 2.2. Study Setting

The study was conducted on institutional-based health care follow-up of children under the age of five years at health posts in the Dilla-Zuria district of Gede'o Zone, SNNPR Ethiopia. The Gede'o Zone is located in the South Nation, Nationalities and Peoples' Regional State of Ethiopia, 359 km southeast of Addis Ababa. The Dilla-Zuria district is the nearest administrative district of the Gede'o Zone, located at a distance of 6 km from the Zonal town of Dilla.

## 3. Sample Size Determination and Sampling Procedure

Since this study was part of the study on "Socioeconomic Determinants of under-five year Child Malnutrition in Gede'o Zone, Southern Ethiopia," the sample size determination was directly adopted for this study too. The sample size calculated for the study was based on the following assumptions: a 95% confidence level, a 5% margin of error, and a 10% non-response rate. The study participants were chosen using a systematic sampling technique. They were proportionally allocated to each cluster of rural communities within the nutritional health status follow-up registration list of the district.

## 4. Study Participants

Because malnutrition has a negative social image that might produce vulnerability in potential participants in this study, the most prudent precaution to safeguard the rights and well-being of participants was considered. In doing so, the guidelines set by the American Anthropological Association (1998) were applied. The anonymity of respondents was guaranteed by protecting and coding their names and identities in all notes and records. For standardization of the dependent variable, children's nutritional status, the World Health Organization guideline (2013) was applied16.

The study population for this study was children under the age of five years, with households of those children previously screened for nutritional status at the regular campaigns of Chichu and Arbaraya health posts in Dilla-Zuria District. For the purpose of convenience of data availability, the data collection periods of the study were adjusted to coincide with the regular campaign for nutritional screening of the health posts at Chichu and Arbaraya in Dilla-Zuria District. In two rounds of screening campaigns, including children enrolled in malnutrition treatment and follow- up those were registered with their screening results for nutritional status, the sampling frame was.

## 5. Data Collection Instruments Development

The survey questionnaire contained both close-and open-ended questions developed. Qualitative data collection instrument, focus group discussion guide, in-depth individual interview was also developed. Face-to-face interviews were used to collect data using those standard questionnaires. Educated personnel such as teachers, agricultural extension officers, and health workers collected the data.

## 6. Data Quality Management

The questionnaire was designed in English, then translated to Gede'uffa and then back to English and modified appropriately to control the quality of the data. The questionnaire was pretested on 5% of the sample. Before actual distribution of data gathering instrument, the instrument was tested in order to ensure the reliability. To do this, pilot study carried out at Health post service user-based respondents in Bule district of Gede'o Zone which is non-sampled area for this study.

Then the researcher distributed ten (10) questionnaires to the data collectors then a pilot test-data was collected. Based on this, the researcher analyzed the collected data at Cronbacks alpha 0.05 and the result for this analysis was 0.67 which is questionable reliability. The data collection process was supervised daily by the principal investigator, and the completed questionnaires were checked for completeness and coded.

## 7. Statistical Analysis

Analysis was carried out at two levels. Firstly, the descriptive aspects of data analysis were employed that would help in analyzing the frequency distribution of variables and permit tabular and bar graph presentation of analysis outputs among the different independent variable groups with child nutritional status. Therefore, under descriptive data analysis, with SPSS version 20.0 software used, cross tabulation was preferred for its advantage of enabling co-analysis of both descriptive and inferential statistics of significance tests. Secondly, the

significance of variables (p-value < 0.01) observed in regression and correlation analysis was subsequently included in the analysis. Logistic and leaner regression models and bivariate correlation analysis were applied to examine associations between dependent variables and independent variables.

## 8. Qualitative Inferences

This sort of analysis was employed after supportive information collected during FGDs and independent information exchange with key informants and it helped for inferential interpretation of study findings that discussion and recommendations has supported with.

## 9. Results

### 9.1. Descriptive statistics of Child feeding practice

This section presents the descriptive statistics of child home-feeding practice; whether supplementary food was started at the recommended age, the type of supplementary food initiated, and mealtime frequency while home child feeding. Then the analysis result of bivariate correlation of determination to child malnutrition is shown in the table consequent to figure presentations of descriptive statistics. As can be seen in the descriptive statistical results, 86.4% of the study sample children started supplementary feeding at the recommended age by World Health Organization guidelines for child feeding; below six months of exclusive breast feeding and after home fortification of commercial baby formula, according to the child's age group.

However, the types of food started to inquire for the initiation of feeding and mealtime frequency differed across the feeding practices, as shown below (table 1). Specifically, while child mealtime frequency is recommended at a minimum of three times per day with proper breast for children below 24 months, in a total mean age sample population of 19.53 months, and out of children with under-nourished nutritional status, 42 children were fed twice per day, and 59 children were fed three times a day with data obtained from 24-hour recall question response by the interviewee.

| Feeding practice (n=206) | Frequency | Percentage (%) |
|---|---|---|
| **Supplementary food started at recommended age** | | |
| Yes | 178 | 86.4 |
| No | 15 | 7.3 |
| No, but prescribed | 13 | 6.3 |
| Total | 206 | 100 |
| **Type of supplementary food initiated** | | |
| • Only prescribed therapeutic foods | 20 | 9.7 |
| • Therapeutic and other supplementary food | 83 | 40.3 |
| • Only commercial baby formula | 18 | 8.7 |
| • Only fortified foods made at home | 57 | 27.7 |
| • Commercial and home-cooked foods | 28 | 13.6 |
| • Total | 206 | 100 |
| **Mealtime frequency while home child feeding** | | |
| • Twice per day, | 42 | 20.4 |
| • Three times per day. | 99 | 48.1 |
| • Four times per day. | 51 | 24.8 |
| • Five or more times per day | 14 | 6.8 |
| • Total | 206 | 100 |

**Table 1: Frequency distribution of Household Child feeding practice**

## 10. Second Stage Analysis result and Discussion on Child Feeding Practice

The bivariate correlation statistical analysis result shows in (table 2), the Pearson correlation positive numerical value and the nearest to 1.0 of variables (0.891 and 0.594 for type of supplementary food started and mealtime frequency, respectively) indicates that the increase in mealtime frequency and type specification or fortification of supplementary food decreases the probability of child nutritional status failure and The correlation of all three variables is statistically significant at the 0.01 level (2-tailed) with zero bias and error and a 99% Confidence Interval. However, the specific variable that supplementary food started at the recommended age with its negative numerical (-0.270) increased state of feeding increased child malnutrition, conceptually, inferred as all malnourished children were started feeding therapeutic food with prescription even at the un-recommended age of exclusive breast feeding and there were "no" responses for normal nutritional status children as it was not supplementary feeding started at a time.

| | | | | Nutritional status of the child | Supplementary food started at recommended age | Type of supplementary food started | Mealtime frequency |
|---|---|---|---|---|---|---|---|
| Nutritional status of the child | Pearson Correlation | | | 1 | -.270** | .891** | .594** |
| | Sig. (2-tailed) | | | | .000 | .000 | .000 |
| | N | | | 206 | 206 | 206 | 206 |
| | Bootstrap c | Bias | | 0 | .003 | .001 | -.002 |
| | | Std. Error | | 0 | .056 | .010 | .040 |
| | | 99% Confidence Interval | Lower | 1 | -.393 | .859 | .466 |
| | | | Upper | 1 | -.086 | .915 | .691 |

** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).
c. Unless otherwise noted, bootstrap results are based on 206 bootstrap samples

**Table 2 Bivariate Correlation of Household Child feeding practice**

## 11. Statistical result of Household Socioeconomic Variables

The evidence presented in the analysis with bivariate correlation and linear regression statistical analysis shows that the Pearson correlation's positive numerical value of estimated household daily income (0.509) and decision making on household income and property use (0.466) indicated that an increase in income as well as participatory decision making reduces the probability of child nutritional status failure (table 3 and 4).

| | | | | Nutritional status of the child (dependent variable) | Occupation of the wage earner | Wage earner employment condition | Estimated Household daily income in ETB | Decision making on Household income and property use |
|---|---|---|---|---|---|---|---|---|
| Nutritional status of the child | Pearson Correlation | | | 1 | -.091 | -.293** | .509** | .446** |
| | Sig. (2-tailed) | | | | .194 | .000 | .000 | .000 |
| | N | | | 204 | 204 | 204 | 204 | 204 |
| | Bootstrap[c] | Bias | | 0 | -.007 | .006 | .006 | -.002 |
| | | Std. Error | | 0 | .059 | .056 | .041 | .060 |
| | | 99% Confidence Interval | Lower | 1 | -.271 | -.416 | .401 | .281 |
| | | | Upper | 1 | .043 | -.119 | .625 | .587 |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
c. Unless otherwise noted, bootstrap results are based on 206 bootstrap samples

**Table 3 Bivariate Correlations of Household Socioeconomic variables**

The correlation of all three variables, including wage earners' employment condition, is statistically significant at the 0.01 level (2-tailed) with near-zero bias and error and a 99% confidence interval. Whereas one variable, the wage earner's occupation, yielded an insignificant result with $p > 0.01$ (2-tailed) in both the linear coefficient and bivariate Pearson correlation tests. A positive correlation numeric value of household daily income, as shown, is defined as "an increase in income resulted in an increase in child nutritional status and increased decision-making autonomy of caretakers specifically." Mothers tend to be improved Also consider the nutritional status of your child. It is evident by the significance level of the analytic results, as the p-value of both variables showed 0.00 (2-tailed p 0.01 level with 99% confidence interval) with both analyses. The results of the analysis on household decision-making characteristics on household income and property within the nutritional status group revealed that the greater the involvement of women in household decision-making, the better the child nutritional status; the degree of association between the variables was very strong, so it can be concluded that female decision-making involvement and autonomy within households have a significant impact on child nutritional status. The resources and income flows that women control have repeatedly been shown to have a disproportionately positive impact on household health and nutrition.

| Model | | Un-standardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .315 | .088 | | 3.571 | .000 |
| | Occupation of the wage earner to the family survival | -.052 | .026 | -.116 | -2.036 | .043 |
| | Wage earner employment condition | -.054 | .024 | -.130 | -2.270 | .024 |
| | Estimated family daily income in ETB | .403 | .051 | .445 | 7.841 | .000 |
| | Decision maker on Household income and property use | .186 | .032 | .327 | 5.842 | .000 |
| a. Dependent Variable: Nutritional status of the child | | | | | | |

**Table 4 Linear regression Coefficients of Household Socioeconomic variables**

Similarly, the occupations of household wage earners, which were daily laborer and farmer exclusive households, were related to the nutritional status of undernourished children. The negative numerical value has an analytical meaning and can be interpreted as lowering the variable of such daily laborer occupation and farming of unsatisfied products for a living. In comparison to children from low-income households, almost all multiple wage earners have seen normal nutritional outcomes for their children, as linear regression analysis prevails as the significant correlation (table 4).

## 12. Statistical Result on the Access for Subsistence and Food Items

The variables grouped under this category are those factors that have been affecting the socioeconomic status of households and have had a consequential effect on the nutritional status of children in particular and economic status in general, either directly or indirectly. On the foundation of this concept, the descriptive statistics results of this study shown in (table 5) are based on the evidence of self-reported structured and non-structured questioner data collected, organized, and analyzed. The descriptive result shown is household ownership status of farm land and its size in hectares: 17% were landless, 54.9% have below 0.5 hectares, and 28.2% have equal to or above 0.5 hectares of farm land.

As shown below (figure 1), respondents who owned cultivated farm land claimed the following content and product status: 17.96% were productive enough to meet home and market needs; 14.56% were productive enough but only for subsistence; 43.2% were less productive and did not meet even home needs; 7.28% were not productive at all; and 17% were landless and claimed to be not applicable. Another variable examined in this category was physical and economic access to food items, as it is critical to determine whether the child's feeding condition affects nutritional status. A linear regression coefficient result also confirm the positive correlation between dependent variable access to subsistence in land content with significant statistical result (table 7).

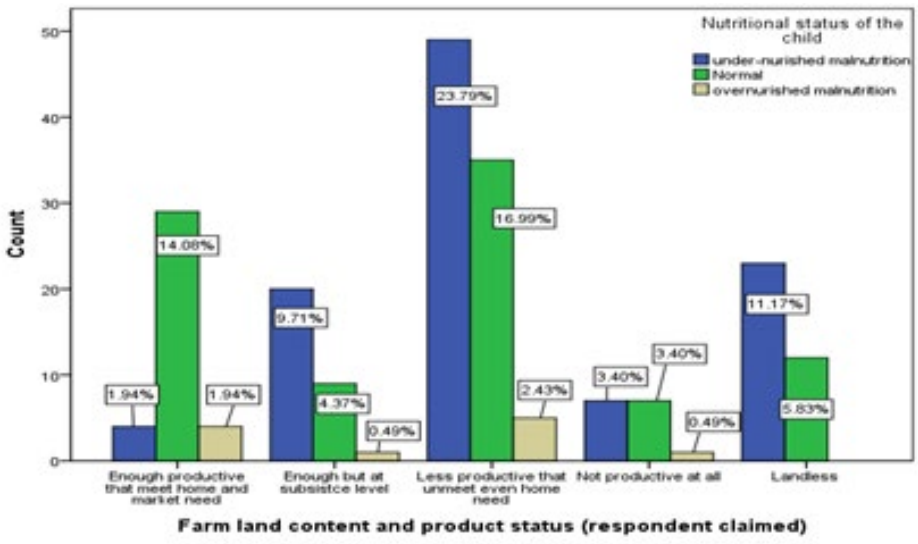


**Figure 1:** Farmland productivity correlates with child nutritional status

The descriptive result of the variable, physical, and economic access to food items was described by the respondent as follows: none of the interviewees responded to the structured questionnaire choice of "abundant with a reasonable price" (0%), 63.6% were replied as available but not cost-effective, 34.5% were replied as less physically accessible and expensive in their availability, and 2.9% were replied as neither available nor cost-effective (table 5).

As elements of access for subsistence and food items, distance and transportation concerns to social services and income earnings were also assessed, and the descriptive result of the response is shown as follows: 52.9% of respondents claimed "no" to any distance concern, while 23.78% of respondents claimed "yes" to job search for daily earnings (see table 6 for correlations).

| Household Geo-economic Variables (n=206) | Frequency | Percentage (%) |
|---|---|---|
| **Household owned farm land size in hectare** | | |
| Have no cultivated land | 35 | 17 |
| < 0.5 Hectare | 113 | 54.9 |
| > 0.5 Hectare | 58 | 28.2 |
| Total | 206 | 100 |
| **Farm land content and product status (respondents claimed)** | | |
| Enough productive that meet home and market need | 37 | 17.96 |
| Enough but at subsistence level | 30 | 14.56 |
| Less productive that unmeet even home need | 89 | 43.2 |
| Not productive at all | 15 | 7.28 |
| Not applicable ( landless household) | 35 | 17 |
| Total | 206 | 100 |
| **Physical and economic access of food items** | | |
| Abundant with reasonable price | 0 | 0 |
| Available but not cost effective | 131 | 63.6 |
| Less physical access and expensive in its availability | 69 | 34.5 |
| Neither available nor cost effective | 06 | 1.9 |
| Total | 206 | 100 |
| *Mean farm land size= 0.3236 hectare*<br>*Mean farm land size per-capita = 0.0449 hectare* | | |

**Table 5: Frequency distribution of access for subsistence and food items**

## 13. Second Stage Statistics of access for Subsistence and Food Items

It has provided directions for the next stage of investigation as descriptive statistics evidence by identifying critical variables to the study result. Within the variable group descriptive result, it is clear that household land asset ownership and quantity, as well as product quality, demonstrated a significant difference in the sample population's child nutritional status. Aside from the obvious landless households, another concerning condition was the mean farm land size of 0.3236 hectares and the mean farm land size per capita of 0.0449 hectares (mean farm land divided by the mean population). In essence, this numerical figure shows more progress than the evidence from the Dilla-Zuria woreda office of finance and economic development suggests. The socioeconomic and geospatial data analysis and dissemination core process reported that mean cultivated land per capita in 2014/15 was 0.008 hectares, and the carrying capacity of farm land has been questionable in the study area.

Accordingly, the second-stage analysis of bivariate correlations and linear regression coefficients reveal a significant level with a p-value of 0.01 for households' owned farm land size, farm land content, and product status with zero bias and error and a 99% confidence interval, and the bivariate correlation of the positive numeric value of farm land ownership and its size in hectares indicates that an increase in farm land decreased the probability of child malnutrition as well. Despite the fact that the result of distance concern was statistically insignificant, as shown in (table 6), nearly half (21.84%) of a sample population of undernourished malnutrition children have distance concern for their daily job search. This is due to the fact that the majority of wage earners in this household group of children with low nutritional status have been escorting their economic needs with undefined employment.

| | | | | Nutritional status of the child | owned farm land size in hectare | Farm land content &product status | Physical and economic access of Food item | Distance concern to social and economic activity put in |
|---|---|---|---|---|---|---|---|---|
| Nutritional status of the child | Pearson Correlation | | | 1 | .237** | -.267** | -.072 | .068 |
| | Sig. (2-tailed) | | | | .001 | .000 | .302 | .334 |
| | N | | | 206 | 206 | 206 | 206 | 206 |
| | Bootstrap[b] | Bias | 0 | 0 | .000 | .000 | .000 | .000 |
| | | Std. Error | 0 | 0 | .000 | .000 | .000 | .000 |
| | | 99% Confidence Interval | Lower | 1 | .237 | -.267 | -.072 | .068 |
| | | | Upper | 1 | .237 | -.267 | -.072 | .068 |

**. Correlation is significant at the 0.01 level (2-tailed).
b. Unless otherwise noted, bootstrap results are based on 206 stratified bootstrap samples

**Table 6: Bivariate correlations of access for subsistence and food Items**

As shown in (table 5), 98.1% of the respondents claimed worse physical and economic access to food items. The majority of the study population, whose households had malnourished children, earned their living from daily labor rather than agriculture. The capacity of the agricultural sector in the study area reflects how it determines the level of physical and economic access to food items.

| Model | Un-standardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (Constant) | .901 | .230 | | 3.922 | .000 |
| Owned farm land size in hectare | .191 | .080 | .213 | 2.390 | .018 |
| Farm land content and product status | .162 | .045 | .331 | 3.573 | .000 |
| Physical and economic access of Food Items | -.181 | .074 | -.166 | -2.450 | .015 |
| Distance concern to social and economic activity put in | .006 | .014 | .032 | .461 | .645 |

a. Dependent Variable: Nutritional status of the child

**Table 7: Linear regression Coefficientsa of access for subsistence and food Items**

Furthermore, almost all of the respondents in this study stated in the focus group discussions and explanations of open-ended questionnaires that the soil of their agricultural farm land, which may or may not be fertile, combined with farm land scarcity, has posed a challenge to agricultural activities. This is due to the high population density per square area and the fact that the land is insufficient to accommodate everyone. As a result, most wage earners on insufficient farm land worked as casual laborers, working for someone else in the local land owner's farmlands or gardens, and were paid daily to earn a living by offering their labor to the local hosts. They also get food in exchange for casual labor, work, and safety-net programs, leading a noxious life.

## 14. Discussion

The nutritional status of children is used as an indicator of parental and societal investment in child quality and can be captured by various measurements [12]. Most of the studies in Ethiopia, including Christiansen and Alderman, found household wealth/ income as an important determinant of child nutritional/health status. Because, for example, better-off households have better access to food and higher cash incomes than poor households, allowing them a better-quality diet, better access to medical care and more money to spend on essential non-food items such as schooling, clothing and hygiene products [10]

The prevalence of undernutrition in the Gede'o Zone of southern Ethiopia is still high, which could lead to child morbidity and mortality. Those children in the study area who consumed a limited number of food items had an inadequate intake of nutrients, which resulted in the high prevalence of malnutrition. The study showed that those children of families that are economically better off have the opportunity to access commercial baby formula and also home- processed food items with good nutritional content. Children from low-income families, on the other hand, have less access to foods high in important nutritional components. It is well understood that children's quick growth and development during their early years is heavily influenced by the aforementioned elements. For optimal physical, mental, social, and cognitive development, exclusive breastfeeding, proper complementary feeding, a safe

environment, and care must be provided. As cited by Daniel, the nutritional status of children is used as an indicator of parental and societal investment in child quality and can be captured by various measurements. Widely held studies in Ethiopian found that household wealth or income to be an important predictor of children's nutritional and health status.

Because, for example, better-off households have better access to food and higher cash incomes than poor households, allowing them a better-quality diet, better access to medical care, and more money to spend on essential non-food items such as schooling, clothing, and hygiene products [1,2]. The socioeconomic status of households and children's care givers, basically, women, was found to be a positive influence on child nutritional status. Actions to improve food and nutrition security include raising incomes. Provision of livelihood support in the creation of social capital and an explicit focus on female economic empowerment and child nutritional health are essential to enhance and sustain people's ability to procure, produce, and use the amount and variety of nutritious food required to be active and healthy.

## 15. Conclusions and Recommendations

People's ability to make choices in response to the possibilities available to them determines their health. In this aspect, a society's social and economic conditions are the two sides of a single coin that often defines its health state. Nutrition is critical for living a healthy and active life, and it has a direct impact on intellectual capacity, which has a good impact on social and economic growth.

As correlational analysis result of this study presented the positive correlation with statistical significance, Child feeding practice showed that the basic determinant of nutritional status was As a result, the most important prerequisite to children's nutritional status is economic feature; human capital should be planned with nutritional status security in early childhood. Local political leadership, finance, and economic development sectors should have to make an appropriate plan and maintain collaborative linkage for mainstreaming nutritional issues in all developmental efforts as a basic schema.

Governmental and non-governmental organizations should step up their efforts with nutritional mainstreaming to have an augmented effect on the evolving Sectoral integration of all responsible stakeholders with clearly defined responsibilities and accountabilities for nutrition action. As a multi-Sectoral intervention, the agricultural sector should emphasize nutrition-friendly agriculture as the most important theme as an essential part of a broader nutrition-sensitive development framework. The health sector also should have pursued the household dietary diversity score card approach for child supplementary feeding, the quality and quantity of different food groups consumed over a given reference period being a proxy indicator for the fine score.

In the education sector, training and intellectual capacity building through formal as well as informal education, special attention would have been paid to nutritional specialization for health, agriculture and rural development workers as well as adult education with a special package.

## 16. Operational Definitions of Key Terms

• Caregiver: a person /individual responsible for child care and support to meet the physical, mental and social needs and child's mother culturally articulated as major child care giver within the household
• Food: any solid or liquid that provides nourishment to the body.
• Household: one or more people who live in the same dwelling and also share at meals or living accommodation, and may consist of a single family or some other grouping of people.
• Malnutrition: Condition that results from insufficient or excessive intake of nutrients.
• Normal (for nutrition status): a nutritional status of the children which stated as healthy standard with anthropometric measurement
• Nutrition: It encompasses the processes of accessing food, consumption and utilization of nutrients by the body.
• Nutritional status: the condition of the body resulting from the utilization of essential nutrients available to the body.
• Over-nourished malnutrition: malnutrition that is caused by eating a diet in which imbalanced nutrients that it causes health problems.
• Socioeconomic variables: variables involving a combination of social and economic factors
• Therapeutic food: food that is provided for under-malnourished children for treatment purpose and expected to discontinue after needed target of progress.
• Undernourished malnutrition: malnutrition that is caused by eating a diet in which nutrients are not enough or are too much such that it causes health problems.

## 17. Declarations

I declare that all the research activities were conducted in accordance with the Helsinki Declaration. Also, the research activities involved in the study project for which this manuscript was produced were conducted in accordance with the ethical guidelines of Dilla University. Therefore, a researcher obtained a letter from the research and dissemination office at Dilla University and delivered it to the authority of the district in which this study was conducted. Since rural caretakers would face difficulty in reading and comprehending the consent form, the institutional research review board at Dilla University justified verbal informed consent in local language on the basis of the multi-lingual skills of the researcher. The author also obtained all necessary permissions from the zonal health department, as well as from the health offices of the respective districts and from local administration as well.

## 18. Ethics Approval and Consent to Participate:

The study protocols under this manuscript were approved by the institutional research review board at Dilla University. However, ethical clearance was waived because this study only used physical measurements of the study subject and no tissue or part of the body was involved. I declare that the study was conducted on the basis of an agreement made with informed consent by the rightful caretaker or legal guardian of each child included in

this study as participants. (See Annex "C" in the supplementary).

Written informed consents that explained the confidentiality, voluntary participation, withdrawal, and risks and benefits of the study were administered to the caregivers of the children. The study participants were declared to have understood the objective of the study and their responsibilities as participants. A researcher presented informed consent to study participants and explained in their native language that those who can put their signature using a ballpoint pen used it to sign, and thump prints were taken from those who can't before taking part in the study. A researcher checked whether each informed consent form was completed and signed by the participants. The study questionnaires were anonymous, and interviews were conducted in a private setting to maintain the privacy of the respondents. Study participants were also informed that all the data obtained from them would be kept confidential using codes instead of any personal identifiers.

## 19. Acknowledgements

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