

Article

Socioeconomic status, Eating Habits, Body Mass Index, Weight Gain During Pregnancy, and Birth Weight Urban Poor Populations in Kupang City

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Abstract

Background: Urban poor households in Kupang City face food insecurity caused by economic and environmental constraints. These conditions encourage food coping mechanisms that may affect maternal nutritional status, gestational weight gain, and the risk of low birth weight (LBW). **Objectives:** This study analyzed food coping mechanisms among poor households in Kupang City and their effects on household food security, maternal weight gain, and newborn outcomes. **Methods:** An analytical cross-sectional survey involved 184 pregnant women and their newborns living in urban poor areas. Data were collected through household food security assessments, anthropometric measurements, and interviews. Chi-square tests and logistic regression were used for analysis. **Results:** Most respondents had low educational attainment (62.5%) and were unemployed (74.45%). Household food security was significantly associated with maternal weight gain and infant birth weight ($p = 0.047$). Food coping strategies were also significantly associated with gestational weight gain ($p = 0.049$). Common strategies included seeking side jobs, purchasing cheaper foods, reducing food portions, and borrowing food. **Conclusions:** Chronic food insecurity and negative coping mechanisms increase the risk of chronic energy deficiency in pregnant women, inadequate gestational weight gain, and LBW. Nutrition education, food assistance, and economic empowerment are needed to reduce harmful coping practices and improve maternal and infant health.

Keywords: food coping, food security, weight gained, pregnancy, birth weight, dry land

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1. Introduction

Kupang as the capital of East Nusa Tenggara (NTT) is one of the areas with a high prevalence of poor households. Factors such as climate change, limited access to clean water, and difficult economic conditions exacerbate the food security situation in the region. In urban poor families in Kupang, coping mechanisms for food shortages often involve dietary adjustments that have an impact on pregnant women's nutrition and child development¹. Household food security is a key factor in determining the nutritional status of pregnant women and the growth and development of the newborn baby. In urban areas, especially in poor households, access to adequate and nutritious food is often a challenge due to economic limitations, limited access to food, and less supportive social and environmental conditions². Kupang City, as the capital of East Nusa Tenggara Province, faces significant food security problems, especially among families with low economic levels. Based on the 2022 Food Security Index (IKP) compiled by the National Food Agency, Kupang City obtained a composite score of 73.89. This score places Kupang City at 59th out of 98 rated cities in Indonesia³. IKP measures three main aspects: food availability, affordability, and utilization

Based on data from the Central Statistics Agency (BPS) of Kupang City, in March 2024, the percentage of poor people in East Nusa Tenggara Province (NTT) was recorded at 19.48%, a decrease of 0.48 percentage points compared to March 2023. The number of poor people in that period reached 1.13 million people, a decrease of 13.54 thousand people compared to March 2023. The Poverty Line in March 2024 is set at IDR 527,275 per capita per month, with the average poor household in NTT Province having 5.75 members. Thus, the average expenditure per poor household is IDR 3,031,831 per month⁵. In conditions of food scarcity, poor households usually implement various strategies to overcome food scarcity, known as the food coping mechanism. This strategy includes reducing the amount and quality of food consumption, diversifying food sources, and dependence on social assistance. However, the implementation of this strategy often has an impact on the nutritional adequacy of pregnant women, which directly affects weight gain during pregnancy as well as the health of the baby born⁶.

Various studies show that pregnant women with inadequate nutritional intake are more at risk of insufficient weight gain during pregnancy, which contributes to the birth of babies with low birth weight (BBLR) as well as impaired growth and development of the baby at an early age. Therefore, understanding the relationship between food coping mechanisms, household food security, and their impact on pregnant women's weight gain and infant growth and development is essential to formulate effective intervention policies in improving maternal and child health in urban areas that are vulnerable to food security. Nutritional problems in pregnant women in Kupang City are a serious concern, especially related to the high rate of Chronic Energy Deficiency (SEZ). Data shows that around 1,300 pregnant women in Kupang City suffer from SEZs, which has the potential to increase the risk of giving birth to babies with stunting. KEK and anemia in pregnant women can affect the fetal growth process and are at risk of causing miscarriage, abortion, stillbirth, neonatal death, congenital defects, anemia in babies, intra-partum asphyxia (death in the womb), and babies born with Low Birth Weight (BBLR)⁷.

In 2020, there were 4,747,077 born and 129,815 babies born with BBLR status⁸. According to the Indonesian Health Survey in 2023, the prevalence of BBLR incidence in Indonesia is 6.1%, for East Nusa Tenggara Province (NTT) in 2023 according to the Indonesian Health Survey (SKI) the prevalence of BBLR incidence is 7.7%, for Kupang City itself the prevalence of BBLR incidence is 81.53%⁹. In the Kupang city area, there are 12 health centers, out of 12 health centers, there are a total of 7,916 babies born in 2023 and of the 7,916 babies born, 316 of which are babies with BBLR status. Kupang City has five health centers with the highest incidence of BBLR in 2023, namely the Penkase Oeleta Health Center with a total of 315 live births, 34 of which are BBLR, then the Alak Health Center with a total of 455 live births, 36 of which are BBLR, then the Sikumana Health Center with a total of 1,260 live births, 44 of which are BBLR, and the Penfui Health Center with a total of 472 live births, 48 of which are BBLR. Then for the work area of the Bakunase Health Center for the last five years, the incidence of BBLR has not decreased significantly, always in the range of ≥ 40 , and in 2023 the incidence of BBLR at the Bakunase Health Center with a total of 1,023 live births, 55 of which are BBLR and become the first Puskesmas out of 12 Puskesmas in the city of Kupang with the most BBLR incidence¹⁰.

This study aims to analyze the food coping mechanism model applied by poor households in Kupang City and its impact on household food security, weight gain of pregnant women, and growth and development of newborn babies. The results of this study are expected to be the basis for designing more effective food security and maternal and child health intervention programs in urban areas with high poverty rates. In conditions of food limitations, households often adopt food coping mechanism strategies to survive. This strategy includes various ways, ranging from reducing the quantity and quality of food, finding alternative food sources, to relying on social assistance. However, the impact of this strategy on the nutritional status of pregnant women and the growth and development of the newborn is still not widely researched. The nutritional status of pregnant women has a great influence on the growth of the fetus and the health of the baby after birth. Lack of nutritional intake due to limited food can cause a lack of weight gain in pregnant women, which risks increasing the incidence of babies with low birth weight (BBLR), stunting, and impaired children's cognitive and physical development. Therefore, understanding the relationship between food coping mechanisms, household food security, and the nutritional status of pregnant women and infants is essential to formulate more effective intervention policies in addressing nutrition problems in urban areas.

2. Materials and Methods

2.1 Study Design and Setting

This study is an analytical survey research with a retrospective method and the approach used is Cross Sectional to see the relationship between food security and weight gain of pregnant women and infant growth and development

2.2 Population and Sampling

Pregnant women from poor households in urban Kupang City. Sample: Determined by random sampling or purposive sampling techniques (for example, pregnant women from families with low food security). The population used in this study is all pregnant women and toddlers in January 2024 – June 2025 there are a total of 184 pregnant women and newborns. Samples selected using clustered sampling¹¹. Each region will be selected based on the prevalence of stunting in the area. The subjects are households in each sub-district who will be in clusters according to their respective posyandu.

2.3 Data Collection

measuring food coping mechanism and household food security. Anthropometric Measurements: Weight of pregnant women and length / weight of babies at birth. In-depth interviews: To understand survival strategies in meeting food needs.

2.4 Variables and Operational Definitions

The data analysis technique used is chi square analysis technique and logistic regression, which is one of the methods to determine the cause-and-effect relationship between one variable and another. As an effort to anticipate the existence of subjects who dropped out of this study, the number of subjects was added to 9 households for each group, showing that the number of subjects was 184 households, the sampling procedure and recapitulation).

2.5 Data Analysis

Logistic regression, correlation test, or differential test to see the relationship between variables and build a model that is able to explain or predict the target variable. Linear & Logistic Regression Method: for the relationship between independent and dependent variables. Decision Tree & Random Forest: Decision tree-based model for classification and regression

2.6 Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of Nusa Cendana University Number 001883/KEPK FKM UNDANA/2025. Participants were informed about the study's aims, assured of confidentiality, and provided written consent. Anonymity was maintained by assigning pseudonyms to all participants

3. Results

3.1. Subsection

Socioeconomic characteristics

Socioeconomic conditions are circumstances that include income, education, employment, and family social status¹³. These factors affect pregnant women's access to nutrition, health services, and a healthy living environment, which ultimately affects weight gain during pregnancy and the baby's weight at birth. Pregnant women with good socioeconomic conditions tend to have access to balanced nutritious food (protein, vitamins, minerals, sufficient energy); can perform regular pregnancy checks; able to avoid stress and excessive physical fatigue as a result, weight gain during pregnancy as recommended by WHO (about 11.5–16 kg for normal BMI)¹⁴. Mothers with higher levels of education tend to have better nutritional knowledge, so they are able to choose nutritious foods during pregnancy. As a result, her weight gain is more in line with medical recommendations (usually 11.5–16 kg for mothers with normal nutritional status). Higher incomes allow access to nutritious groceries and routine pregnancy checkups. Mothers from low-income families are at risk of underweight gain due to nutritional limitations¹⁵. Mothers who work hard or have high work stress may experience appetite disorders or insufficient energy intake, so their weight gain is lower than that of housewives¹⁶. Most of the respondents were aged 20-25 years (48.19%; -0.002) with low education level (62.5%; 0.008) and not working (74.45%; -0.049), further can be seen in Table 1

Table 1. Respondents' Socioeconomic Characteristics

Respondent Characteristics	Total (N=184)		P value
	n	%	
Mother's Age (years)			
<20	52	28,26	-0,002

20-35	85	46,19	
>35	47	25,54	
Mother's age (years) : Average $\pm$ SD	29.39 $\pm$ 0.388		
Education			0,008
Tall	69	37,5	
Low	115	62,5	
Employment Status			-0,049
Work	47	25,54	
Not Working	137	74,45	
Food Expenditure			0,320
Tall	47	25,54	
Low	137	74,45	
Food Expenditure (Rp) Average $\pm$ SD	761141.30 $\pm$ 36546.81		
Non-Food Expenditure			0,095
Tall	69	37,5	
Low	115	62,5	
Non-Food Expenditure (Rp) Average $\pm$ SD	575815.21 $\pm$ 30145.70		
Income			0,069
Tall	37	20,11	
Low	147	79,89	
Average Income (Rp) $\pm$ SD	1367119.56 $\pm$ 58892.01		

Nutritional conditions of maternal health

The nutritional condition of pregnant women reflects the balance between the needs and intake of nutrients (energy, protein, vitamins, minerals). Good nutrition: The mother had a normal nutritional status before pregnancy (BMI 18.5–24.9) and ate a balanced nutritious diet¹⁷. This condition supports optimal fetal growth and maternal weight gain as recommended. Malnutrition: Mothers lack energy and protein intake, or suffer from chronic diseases. As a result, weight gain during pregnancy is low, the fetus is at risk of malnutrition, and the baby is potentially born with BBLR (low birth weight <2500 grams). Overnutrition: The mother is overweight or obese. Usually excess weight gain, the risk of a large baby (macrosomia), and complications such as gestational diabetes. A mother's physical and mental health also affects weight gain and fetal growth¹⁸. Infectious diseases (e.g. anemia, malaria, tuberculosis, etc.) can inhibit the absorption of nutrients, resulting in reduced maternal weight gain. Stress and fatigue can also decrease appetite or cause metabolic disorders. Reproductive health (the distance between pregnancy is too close, age <20 years or >35 years) can decrease nutritional status and increase the risk of babies being born with low body weight. Maternal weight gain is an indirect indicator of nutritional status during pregnancy. Recommended weight gain according to pre-pregnancy nutritional status (WHO/Ministry of Health): BMI <18.5 $\rightarrow$ 12.5–18 kg; normal BMI $\rightarrow$ 11.5–16 kg; BMI >25 $\rightarrow$ 7–11.5 kg

Table 2. Maternal Health Nutritional Conditions

Criterion	Total (N=184)		P value
	n	%	
BMI Before Pregnancy:			
Thin	115	62,5	-0,031
Usual	47	25,5	
Obesity	11	5,98	
LILA	11	5,98	0,468
Usual	37	20,11	
CAKE	147	79,89	
WIDTH (cm): Average $\pm$ SD	19 $\pm$ 3.11		
Weight Gain during Pregnancy			0,001
Usual	16	8,69	
Low	168	91,30	
Weight gain during pregnancy : Average $\pm$ elementary school	9.02 $\pm$ 4.12		
Immunization			0,143
Yes	127	69,02	
Not	57	30,98	
Compliance with Fe tablet consumption			0,408

Yes	37	20,11
Not	147	79,89
Fe tablet consumption compliance:	77±18.8	
Average SD ±		
ANC	0,045	
Yes	101	54,89
Not	83	45,11
ANC: Average SD ±	1.1±0.87	

4. Discussion

Sociodemographic factors related to food coping strategies are the education of the head of the family, the number of family members, income and expenses¹⁹. The results of the correlation test showed a significant relationship between food coping strategies and household food security (Sig.0.002). Food insecurity often occurs in households with low education and income. ²⁰Coping strategies with household food security (Sig. 0.002) Analysis of coping strategies obtained results that showed that most households carried out coping strategies including low (63.4%) and only performed two levels out of three levels. The condition of the archipelago's limited dryland, the level of food security that is vulnerable, and other uncertain factors such as the arrival of a long dry season are very likely to be carried out by various kinds of local people to be able to survive. Food security is a condition for the fulfillment of food needs for households which is reflected in the availability of adequate food, both in quantity and quality, safe, equitable and affordable. Food security consists of 3 subsystems, namely 1) Food Availability 2) Food Access 3) Food Absorption. A survey of household food security using the HFIAS method found that most of the respondents were prone to light food²¹. Factors that affect household food security include Coping Strategy is various efforts made in conditions or situations under pressure or difficulty. The definition of coping strategy as an effort to survive²². Nutritional status is the state of the body as a result of food consumption and the use of nutrients. Children under five are children who are in the growth and development period, and are vulnerable to nutritional and health problems. The nutritional status of toddlers can be known through three types of indexes, namely the BB/U index, the TB/U index, and the BB/TB index. Based on the results of the study, as many as 87.8% of toddlers have normal nutritional status based on the BB/U index and 12.2% of toddlers have abnormal nutritional status (wasting). The nutritional status of toddlers is classified as normal based on the PB/U index of 85.4% and as many as 14.6% are categorized as stunting. Based on the BB/PB index, the highest percentage was obtained which was normal as many as 36 children (87.8%)²².

The results of the study found that there was a relationship between household food security and weight gain of pregnant women and birth weight (p0.047). Research on household food security and its relationship with maternal weight gain during pregnancy stated that the same results were associated with household food security and birth weight (p0.047). In this study, it means that the better the food security, the better the mother's weight gain during pregnancy so that it has an impact on normal birth weight, reducing the risk of BBLR. The results of the study found that there was a relationship between coping strategy and maternal weight gain during pregnancy based on body mass index (p0.049). The results of other studies show that the inability of families to meet food needs will cause food insecurity. This will have an impact on meeting food needs and sufficiency²³. The survey results show that wives are more dominant in making decisions to determine the food menu, the amount of spending on food, and the determination and processing of nutritious food. Mechanism Food Coping Strategy in the countryside consume less desirable and cheaper foods, gather wild plants, hunt, or harvest early, and borrow food or ask for help from a friend or relative²⁴.

The concept of integrated agriculture is a system that combines agricultural, plantation, forestry, livestock and fisheries activities in one land so that it is expected to be one of the alternative solutions for increasing land productivity, environmental development and conservation programs and the development of "Integrated Villages". Meanwhile, sustainable agriculture is basically a conception of the challenge for producers to start considering the long-term implications of cultivation methods, the interaction of farming systems and the dynamics of agricultural systems. This conception also encourages consumers to be more involved as active participants in the food system²⁵. In the ecological context, agriculture is closely related to efforts to maintain biological systems so that they can continuously provide output at the same level without using input excess²⁶. On a practical level, this conception requires an understanding of

the dynamics of nutrients and energy, the interaction of various plants and other organisms in an ecosystem, as well as their balance with profit/income, community interests and consumer needs²⁷. If it is associated with the repeated past experiences, for the East Nusa Tenggara (NTT) region, it is also related to the environmental conditions of dry land, undulating, hilly and mountainous topography as well as various repeated threats in the past that haunt the survival of the community. Thus, the environmental conditions of dryland characterized by drought that bring the risk of crop failure, must always be taken into account by the people of NTT in their daily lives²⁸. This reality is experienced repeatedly and shapes the senses and perceptions and mindsets of the community which ultimately influences behavior, as part of the culture of dryland communities with dry climates. Thus, each community will have its own culture according to the environmental conditions as a place where they live and live to meet basic needs. A culture with all its institutions can change and even always change dynamically because there is no culture that is static and closed. Cultural change can occur due to internal and external factors.

The NTT region as a whole is actually not exactly included in the Semi Arid area, because there are areas that have relatively high monthly CH. NTT Province is an archipelago consisting of 75.0% of the sea and the rest of the land. NTT Region covers an area of 47,349.90 km², consists of 566 large and small islands, and only 42 are inhabited. Morphologically topographically, 73.13% of the land area is mountainous and hilly, which with a slope of 15%-40% is 38.07% and with a slope of > 40% is 35.46%; with variations in altitude between 100-1,000 m above sea level. According to the CIDA report (1976) of the total area of NTT, there are 66.4% (3,227,660 ha) that have a sharp slope so that they are not suitable for cultivation as agricultural land. The area of agricultural land is about 1,637,000 ha (34% of the area), 92% of which is dry land. Dry land with a dry climate with undulating and mountainous topography has an impact on the culture of the people of NTT which includes the mindset, behavior and behavior results of the community. In other words, based on a special environment, the people of NTT are a dryland community. Dryland communities in dry climates have socio-cultural characteristics that distinguish them from people living in wetlands or drylands in wetlands.²⁹³⁰.

5. Conclusions

The most dominant food coping mechanism in poor households is to find a side job, buy food that costs lower and reduce the type and portion of food. Chronic food availability causes the risk of increasing the number of SEZ of pregnant women so that it has an impact on low maternal weight gain during pregnancy and giving birth to babies with low birth weight. Restrictions on the amount and type of eating habits of mothers during pregnancy are the beginning of stunting cases in dryland areas such as in Kupang City. Improving food security through targeted interventions—such as nutritional education, food assistance programs, and economic empowerment—can help reduce the need for negative coping mechanisms. Ensuring pregnant women have access to adequate and nutritious food is crucial for optimal maternal weight gain and healthy infant growth and development in urban poor communities in Kupang City.

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7. Conflicts of Interest

No potential conflict of interest."

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