JRIIE Journal of Research Innovation and Implications in Education
Center for Research Implications & Practice

Website:www.jriiejournal.com ISSN 2520-7504 (Online) Vol.9, Iss.3, 2025 (pp. 715 - 727)

Exploration of the Nutritional Status of Pregnant Teenagers in Bulilima District, Zimbabwe

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Abstract: *Humanity has always been concerned with teenage pregnancy, and their nutritional status. This study interrogated the nutritional status of third trimester pregnant teenagers (aged13 to 19) who were admitted at Plumtree Hospital, Bulilima District, Zimbabwe. A self-administered questionnaire and document analysis was used to collect data. SPSS 23.0 and Nutrisurvey2007 were used to analyse data. Actual nutrient intake was compared with the Recommended Dietary Allowance (RDA). Relationship between variables was tested using Pearson Correlation computation. Results showed that some nutrients met and some moderately met the RDAs. Extremely low nutrients were calcium, fat, sodium, folic acid and vitamin C., (17.73% to 29.5%). Normal deliveries (77.3%) and (22.7%) with complications. Adolescent pregnancy carries serious health risk for both the mother and the new-born, especially in environments with little resources like Bulilima district. Full-term pregnancies were (83.1%) and (2.6%) preterm. Live babies (93.9%) while 4.5% stillbirth, and 1.5% neonatal mortality. (22.7%) were underweight, (75.8%) normal birth weight and (1.5%) overweight. Recorded birth length (97%) normal and 3% low birth length. (1.5%) small head circumference. Pearson Correlation results showed a significant positive correlation between the mother's weight and the baby's birth weight r =.325, N=75, p .008. The study concluded that teenage pregnancy, mothers' diet and low birth weight are serious public health problems in this District. Based on the results, the study recommends implementation of age-appropriate sex education and nutrition intervention programs in rural schools and communities.*

Keywords: *Pregnant teenagers; Dietary practices, Nutrients, Nutritional status, Mother's weight, Birth weight, Zimbabwe*

How to cite this work (APA):

Gumpo, P. (2025). Exploration of the Nutrition Status of Pregnant Teenagers in Bulilima District, Zimbabwe. Journal of Research Innovation and Implications in Education 9(3), 715 - 727**.** **https://doi.org/10.59765/vbry83uf.**

1. Introduction

Teenage pregnancy is one of the major public health issues across the whole world and is defined by United Nations Children Fund, UNICEF,(2008) as pregnancy in girls aged 13–19 years. Adolescent pregnancy carries serious health risk for both the mother and the child, especially in environments with little resources like Bulilima District, Zimbabwe. Teenage pregnancy is common in Zimbabwe, 22% of girls between the ages of 15 and 19 are either pregnant or have already given birth (ZIMSTAT, 2020).

In Zimbabwe, specifically Bulilima District, studies focusing particularly on the nutrition status of pregnant teenagers is scarce and much remains to be explored. Therefore understanding their nutritional needs and gaps is critical for developing targeted interventions to improve maternal and child health outcomes (Lartey, 2008). Pregnant teenagers in Bulilima are at risk of malnutrition and therefore poor birth outcomes. The diet of pregnant teenagers in Bulilima may be compromised by the geographical location of the district. Bulilima is found in agro-ecological region 5 in Zimbabwe, the region faces severe droughts and has been affected severely by climate change. As a result, food may be scarce and this may compromise the nutrition status of the mother and hence the birth outcomes.

Nutrition has a major role in maternal and child health as pregnancy comes with physiological and metabolic

changes. These affect the foetus developmental stages and consequently affecting the new-born's birth weight and other pregnancy outcomes, such as gestation age at birth, stillbirth, and neonatal mortality (Rahmiwati, 2015). Poor nutrition status during pregnancy is associated with poor birth outcomes. For instance, birth weight is a key health indicator reflecting maternal nutrition status during conception and can be used to predict neonatal health risk (Alemu, and Gashu, 2020). It has also been established that in adult pregnant women, poor nutrition leads to adverse birth outcomes such as LBW and in adolescents, the need for nutrients for their growth and the foetus worsens this problem (Wallace, 2019). For that reason, one of the goals of WHO (2019) is the prevention of low birth weight and prematurity.

Kassa, Arowojolu, and Odukogbe, (2018) state that adolescent is a phase of growth and development, a transition stage from childhood to adulthood and the stage is characterized by rapid growth. The growth rate in adolescents increases the demand for nutrients, during teenage hood there is a competition for nutrients between the mother and the foetus (Wallace, 2019). A shift emerges which coincides with their growing bodies that's increasing their likelihood of undesirable birth outcomes and foetal growth. Macro-and micro-nutrients need to increase during pregnancy to cater for physiological and metabolic changes and foetal growth (Wallace, 2019). The immediate shift in nutrients reservations for the developing foetus in adolescent girls has created space for the exploration of different maternal nutritional status. Black, Victora, and Walker, (2013) and Wallace (2019) agree that besides the important role of maternal nutrient reserves, the result of dietary changes during pregnancy has the greatest impact on nutrition status and birth outcomes.

Nutrients needs during adolescent pregnancy should be met by consuming a well-balanced diet. A healthy diet provides adequate protein, dietary fat, carbohydrates vitamins and minerals (Martinez-Hortelano, Cavero-Redondo, Alvarez-Bueno, Garrido-Miguel, Soriano-Cano, Martinez-Vizcaino, 2020). Maternal carbohydrates and protein have a great influence on weight gain and pregnancy outcomes. Therefore, adolescents need more calories to support their own growth and that of the foetus (Black, et al. 2013). Evidence has indicated that a mother's under nutrition can lead to smaller placental mass, poor vascularization and less nutrient transfer to the foetus (Akseer, 2022). For this reason, a healthy diet may induce weight gain during adolescent pregnancy which is the most modifiable of the infant birth weight. However, weight during the first two trimesters is credited to maternal stores while weight gain during the third trimester is attributed to the foetal growth (Black, et al. 2013).

This study aims at exploring the nutritional status of pregnant teenagers in Bulilima District, Zimbabwe, investigating factors such as dietary diversity, anthropometric measurements and birth outcomes.

1.1 Statement of the problem

There is an increase in teenage pregnancy in Bulilima District. The ages mainly affected are 13 to 19 years. Nutrition plays a major role in teenage pregnancy, poor nutrition results in poor birth outcomes. Teenage pregnancy has increased nutrient demands as a result of rapid physical growth by the teenager as well as nutrient requirement for foetal growth (Wallace, 2019; WHO, 2019). During pregnancy there is competition for nutrients between the mother and the foetus. The diet of pregnant teenagers in Bulilima may be compromised by hash economic conditions and the geographical location of the district. Bulilima is found in region five in Zimbabwe. The region faces severe droughts and has been affected severely by climate change. As a result, food may be scarce and this may compromise the nutrition status of the teenage mother and hence, the birth outcome.

1.2 Research Question

What is the nutritional status of pregnant teenagers in Bulilima District, Zimbabwe?

2. Literature Review

Nutrition plays an important role in promoting a healthy pregnancy outcome, foetal development, and maternal well-being. Adolescent pregnant girls, however, have specific dietary needs because of the growing dietary requirements for foetal development and for their own growth (Debiec, and Simon, 2020). Adolescent pregnancies have increased risks of unfavorable outcomes, for both mother and child, further more poor eating habits in adolescence compromise nutrients intake and energy needed for growth, specifically pregnant adolescent (Debiec, and Simon, 2020). Pregnant teenage mothers also face challenges in accessing nutritious food, education and healthcare. According to Mizero, Dusingize, and Shimwa, (2024). teenage mothers are more susceptible to the negative consequences of pregnancy, due to system-wide and socio-cultural barriers to accessing needed services, posing higher pregnancy complications and health risks to the babies and mothers.

Teenage pregnancy is seen as a serious public health issue in many countries, with severe medical, nutritional, psychosocial, and economic risks for mothers and their infants. According to UNESCO, (2020); Mizero, et al., (2024), teenage pregnancies are more likely to occur in disadvantaged communities, typically those plagued by poverty and a lack of educational and employment possibilities. WHO (2019), recorded that 21 million teenagers aged 15-19 years in developing countries fall pregnant every year and information on childbirths among 10–14 year olds is now widely available.Globally the birth rate among girls aged 10–14 years in 2023 was estimated at 1.5 per 1000 women, higher rates in sub-Saharan Africa (WHO, 2024) There are 252 million adolescent girls aged

15-19 living in developing countries, 38 million of whom are sexually active (WHO, 2020). Sub-Saharan Africa has the highest teenage fertility rate of any region, more than twice as high as the global average of 42 births per 1,000 teenagers. Zimbabwe has the highest rate of adolescent pregnancy in Sub-Saharan Africa (WHO, 2020).

2.1 Nutrition and Teenage pregnancy

Women in impoverished nations are more likely to experience food insecurity and malnutrition, two of the primary causes of maternal and new-born illness, as well as other long-term repercussions that might impact the foetus's growth and development (Misselhorn and Hendricks, 2017). Insufficient diet and insufficient availability to food are considered to have a key part in the overall nutritional status of the mother and foetus, since both under- and over-nutrition can have serious consequences for the mother's and foetal' long-term health status and life expectancy (Kavle, Stoltzfus, Witter, Tielsch, Khalfan, & Caulfield, 2008) and Zeisel 2011). Furthermore, prenatal malnutrition can have long-term consequences for children since both micro- and macronutrients play an important role in the development of the foetus and are required to ensure maternal health throughout the pregnancy (Zeisel 2011). Moreover, a nutrient-rich diet is required during pregnancy to meet certain macro- and micronutrient requirements, such as energy, protein, calcium, folic acid, iron, zinc, and iodine, to mention a few (Zeisel 2011).

Furthermore, women who are malnourished during the early stages of pregnancy are at a higher risk of metabolic problems and complications during labour and birth. It has been stated that enough maternal weight gain throughout the last two trimesters of pregnancy is required to promote the foetal growth (Tran, Nguyen, Berde, Low, Tey and Huynh, 2019). Throughout pregnancy, maternal food intake and nutritional status have an impact on the health of both the mother and the new-born. A healthy pregnancy result is influenced by a variety of factors, including proper nutrition, suitable supplements, and exercise levels (Napier, Warriner, Sibiya, and Reddy, 2019) It is sad that many programs have directed the implementation and monitoring of nutrition interventions toward new-borns and early children excluding pregnant or postpartum women.

Malnutrition is a risk factor for poor pregnancy outcomes. According to a comprehensive study conducted by Marvin-Dowle, Burley, and Soltani, (2016), pregnant adolescents had low macro- and micronutrient intakes when compared to the recommended dietary limits.Tran, et. al (2019) show concern that a large proportion of pregnant women in their study did not have adequate intakes for a number of key nutrients that are critical to maternal and infant health calcium, iron, zinc, vitamins A, Bs, D, and E. There have been few studies that look at the relationship between anthropometry, nutritional status, and birth outcomes in pregnant adolescents. Several studies, however, have found an association among pregnant adults. For example, a study in Ethiopia found that maternal excess weight gain during pregnancy was linked to premature babies (Woldeamanuel, Geta, Mohammed, Shuba, and Bafa, 2019), whereas low body weight (less than 50 kg) during pregnancy was also linked to low birth weight infants in adult women (Anil, Basel and Singh, 2020). Ahmed, Hassen, and Wakayo, (2018) found that adult women with a MUAC of less than 23 cm had LBW babies, whereas Cnattingius, Villamor, Johansson, Bonamy, Persson, Wikstrom, Granath, (2013) discovered that maternal obesity during pregnancy is connected with preterm birth in adult women.

2.2 Diet during adolescent pregnancy

Foetus development is impacted by maternal nutritional and metabolic changes, which in turn affects the new-born's birth weight (Roland, Friis, and Godang, 2014). According to Saeedeh, Hamid, and Atieh, (2024) an assessment of maternal health, which includes dietary history and micronutrient status, is important to consider potential risks and ensure adequate nutrition. Increasing evidence show that optimal maternal nutrition before pregnancy, including micro-nutrient adequacy both in the preconception period and during pregnancy is important for later-life health (Koletzko, Godfrey, Poston, Szajewska, van Goudoever, de Waard, Brands. Grivell, Deussen and Dodd, 2019) In order to meet the foetus's increased nutritional needs and the mother's increased bodily demands, calorie intake should be increased focusing more on proteins, healthy fats and enough energy (Perera and Wijesinghe, 2007 and Saeedeh, et al. (2024). Low birth weight (LBW) and intrauterine growth restriction are two undesirable birth outcomes that have been linked to poor maternal nutritional status and may have long-term developmental effects (Gala, Godhia and Nandanwar, 2016). Therefore, raising the nutritional status of the mother both before and throughout pregnancy is crucial to raising the birth weight of the baby. However, a variety of factors affect the relationship between maternal nutrition and the outcome of child.

The foetus is totally dependent on the mother's intake and storage of nutrients, particularly lipids and protein, during pregnancy (Saeedeh, et al. 2024). Furthermore, the amount of fat and protein consumed by the mother has a significant impact on the growth and result of the foetus. In essence a balanced diet including nutrient-dense foods like whole grains, vegetables, fruits, dairy, legumes, fish, and lean meats is necessary to meet caloric needs during pregnancy(Saeedeh, et al. 2024). Gala, et al. (2016) says low mother haemoglobin concentration during pregnancy contributes to poor foetal growth in addition to a lack of protein and fats. Gala, et al. (2016) and Abu-Saad, and Fraser, (2010) agree that the level of maternal haemoglobin during pregnancy has a significant impact on the birth

outcome of the infant, particularly on birth weight. A mother may become susceptible to nutritional deficiency anaemia, if her diet does not contain enough iron to meet the increased nutritional requirements during pregnancy. According to Figueiredo, Gomes-Filho, Batista, Orrico, Porto, Pimenta, Conceiç˜ ao, Brito, Ramos, and Sena, (2019) maternal anaemia during pregnancy can cause foetal growth retardation, which lowers the birth weight of the resulting children. They further explain that it reduces the oxygen supply and nutrient supplementation to the foetus, resulting in intrauterine growth retardation and low birth weight.

Woldeamanuel, et al. (2019) discovered that pregnancy related maternal anthropometries, such as height, weight, BMI, and the total amount of weight gain, are also strongly correlated with birth weight and foetal growth. In the same study it is confirmed that the foetus grow normally and the birth experience will be better when the mother's height and weight are adequate.

2.3 Birth weight and nutritional status

Birth weight is an important health indicator that reflects the nutritional status of the mother during conception and can be used to predict the health risk of new-born infants (Alemu and Gashu, 2020). Poor nutrition status causes undesirable birth outcomes such as LBW in adult pregnant women, but for teenagers, the demand for nutrients for their growth and the foetus

exacerbates this (Wallace, 2019; WHO, 2019). As a result, children born to adolescent women are more likely to have LBW below 2.5kg, preterm birth, stillbirth, small-for-gestation age, and neonatal mortality than children born to adults (Figueiredo, et al, 2019). Furthermore, LBW children at birth are more likely to acquire diabetes, hypertension, and cardiovascular disease later in life (Alemu and Gashu, 2020).

The long-term negative repercussions of poor birth outcomes need addressing inadequate nutrition among pregnant mothers, especially among pregnant adolescents due to increased risk (Wallace, 2019; Woldeamanuel, et al., 2019). Yet, much remains to be discovered about pregnant adolescents' nutritional condition and its relationship to delivery outcomes. In order for developing countries to meet its LBW reduction target, pregnant teenagers must be given special attention (Woldeamanuel, et al., 2019). Such studies seek to investigate nutritional status of pregnant adolescents in Bulilima District, Zimbabwe. To the best of our knowledge, this was one of the first of such studies in Bulilima District, and it was very timely.

3. Methodology

The purpose of the study was to explore the nutritional status of pregnant teenage mothers in Bulilima District. This chapter outlines the methods that were used in the research. The chapter covered the study population, the sampling procedure, sample size, instrumentation, ethical consideration, data collection and analysis.

3.1 Research Paradigm

Positivism paradigm was used to determine the relationships between independent and dependent variables. The independent variables were nutritional status of the pregnant teenager, birth outcomes were the dependent variables and the moderating variables were psycho social factors.

3.2 Research design

A descriptive correlation design was employed in order to test the relationship between variables. In this study, the association between nutritional status and birth outcomes were explored. The quantitative approach was used because scores were calculated. Participants were assigned scores based on their responses to dietary intake. Food variety and dietary diversity scores was calculated to assess dietary quality of the pregnant adolescent. With respect to anthropometric measurements participants' weight, height and MUAC were measured as well as the birth weight of the newly born infants, WHO cut-offs for BMI and Z-scores for assessing weight for age and height for age was used.

3.3 Population of the Study

The study was health centre based and population of this study was 773 pregnant teenagers aged between 13 to 19 years of Bulilima District, Zimbabwe. It was health centre based because pregnant teenagers were found in waiting mothers' shelters during the third trimester. Bulilima comprises of 16 clinics which are Bezu, Malalume, Solusi Mission, Sikhathini, Makhulela, Huwana, Hingwe, Tegwani, Matjinge, Lady Stanley, Masendu, Ndiweni, Village 13, Ndolwane, Madlambudzi and Dombodema. According to a report by Solusi clinic the clinics are allowed to register pregnant teenagers and monitor them up to 35 weeks. At the end of 35 weeks, they are referred to Plumtree District hospital for further monitoring and delivery. Antenatal information of all registered pregnant teenagers is sent to Plumtree district hospital. Therefore, information on antenatal care and statistics was obtainable from Plumtree hospital.

3.4 Inclusion criteria

The study included all pregnant teenagers age 13 to 19 years from 16 clinics in Bulilima. The study considered pregnant teenagers who were at their third trimester and admitted at Plumtree hospital.

3.5 Exclusion criteria

The study excluded all pregnant teenagers below 35 weeks gestation stage.

3.6 Sample size estimation and Sampling Techniques

Purposive and convenience sampling was used to obtain responses from pregnant teenage mothers in Plumtree district mother's waiting shelters. The two sampling technics were used because the population of the study is hard to get therefore the selection was based on the availability of the respondents. The responses were obtained from 10% of the population, a sample size of 77. Plumtree district hospital was chosen because it is a referral hospital for the 16 clinics that are in Bulilima district.

3.7 Instrumentation

A self-administered questionnaire and a document analysis were used to collect data. The questionnaire had four sections. Section A collected data on psycho social demographic variables, section B collected information on diet and section C collected data on nutritional status and section D focused on birth outcomes. The district nurses and nutritionist assisted with data collection.

Psychosocial demographic characteristics included the following: Age in years, marital status, occupation, parity, income, education, expected date of delivery and phone number. Information on diet included 24hour recall. The questionnaire developed paid particular attention to the 24-hour Dietary Recall (24HR) method which delivers comprehensive, quantitative information on individual diets by inquiring respondents about the type and quantity of all food and beverages taken during the previous 24-hour period. The main components of these questionnaires were the list of foods, frequency of consumption and the portion size spent.

Nutritional status was determined by taking anthropometric measurements. For the mother this included weight, height and Mid-Upper Arm Circumference, (MUAC). The weight in kilograms was measured using a digital weighing scale, while height was measured in centimetres using a stadiometer and all measurements were done with participants barefooted. Weight of mother was measured while in light clothing and their height while barefooted. Then the body mass index (BMI) was then calculated by dividing weight by height squared. MUAC was measured using inelastic tape measure. MUAC is measured to determine the nutrition status of the mother and is done by locating the midpoint above the elbow on the participants' left hand.

3.8 Document analysis

Hospital records were used to collect information on birth outcomes of the infants and delivery outcomes of the mother. For the infant this included birth weight, birth length and head circumference. Information on gestation age at birth, birth weight and birth delivery method, was collected.

3.9 Validity and Reliability

The questionnaire, which was the instruments for the study, was presented to experts at Solusi University to establish the content validity. A pilot study was done before the actual for the purposes of reliability. A sample of 10 pregnant teenagers from Solusi clinic were conveniently sampled. The data collected was computed using SPSS version 16.0 (Solusi university licensed). Reliability of the instrument was assessed using Cronbach's alpha.

3.10 Data collection procedure

The researcher requested for space at Plumtree hospital to allow privacy during data collection. Pregnant teenagers were addressed individually with the help of nurses to collect all information required. After collecting all the required data, participants' telephone numbers and addresses were recorded on the questionnaire and in an exercise book, and expected date of delivery for each participant was recorded. All participants were called on the exact date to check if they have delivered. After delivery the researcher went to Plumtree hospital to collect data on birth outcomes.

3.11 Data analysis

Quantitative data was collected and analysed using SPSS version 23.0 (Solusi university licensed) and Nutrisurvey2007 software. The analysis was done based on the objective.

3.12 Ethical considerations

A letter to carry out the study obtained from Solusi University authorities and Ethical approval for the study was attained from the Ministry of Health ethics committee in Bulilima district Plumtree. The researcher also asked for permission to carry the study from Plumtree hospital. Study protocols were first explained to all participants in their local language (Ndebele or Khalanga). Written and signed informed consent obtained from all participants by following the ministry of health ethics regulations before recruiting for the study. Also, parents and guardians were asked to sign a written consent form on behalf of participants below 16 years old.

4. Results and Discussion

This Chapter provides a detailed analysis and interpretation of the study. The study purposed to Explore the nutritional status of pregnant teenagers in Bulilima District, Zimbabwe. The results are interpreted in the tables. The results were coded analysed using SPSS 23.0 and Nutrisurvey2007. The findings are reported in this section according to the research question of the study which says, What is the nutritional status of pregnant teenagers in Bulilima District, Zimbabwe?

Table 1: Respondents Nutritional status categories (N=77)

Variable		Frequency	Percent
Nutrition status	Normal weight	36	46.8
	Overweight	25	32.5
	Obese	14	18.2
	Total	75	97.4
Missing	System	2	2.6
Total		77	100.0

Table 1 presents the nutritional status of the pregnant teenagers. 36(48%) had a normal weight, 25(33.3%) were classified as overweight, and 14(18.7%) fell into the obese category.

Table 2: Food variety score

	Food name	score	Food name	Score
1	Samp	2	Lucy star tinned fish	4
2	Soup	14	Chicken	2
3	Sweet potatoes	18	Bread with sun jam	3
4	Black tea	50	Fizz drinks	3
5	Sadza (refined)	6	Clay	3
6	Sadza (straight run mealie meal)	71	Spaghetti	5
7	Cow beans	2	Matemba	4
8	Makanyanisi beef dried mince	5	Cabbage	11
9	Chomolia	39	Instant porridge	1
10	Strait run mealie meal porridge	15	Chunks	11
11	Refined mealie meal porridge	25	Maas	3
12	White bread	22	Okra	2
13	White rice	12	Tomato sauce	2
14	Beef	7	Biscuits	3
15	Tomato and onion soup	2	Mazoe orange crush	1
16	Inkobe (combined grain and legumes)	30	Roasted ground nuts	4
17	Sugar beans	17	Umxhanxa	1
18	Plain buns	4	Peas	1
19	Macimbi (Mopani worms)	43	Tea / coffee whitener	1
20	Umfushwa (dried cow beans leaves)	9	Igwadla	1
	Total number of scores	40		

The food Variety Score (FVS) was adapted and modified from Clausen and colleague in 2005. FVS is defined as a measure used to assess the diverseness of an individual's diet, which involves counting the number of different food

items consumed over a specific period. and and can be calculated by counting the number of food groups consumed (FAO, 2018). FVS was calculated by adding the number of food items consumed by pregnant teenagers in 24 hours. Food variety score was calculated to determine the number of food items consumed within 24 hours. The results showed that the respondents consumed 40 items. See Table 2. In order to ascertain the adequacy of nutrients in the diet of the pregnant teenagers the 40 items of food were classified into food groups using dietary diversity scores. Six food groups were identified. The food groups were self-created and as such.

Table 3: Dietary Diversity Score

Food Groups	Frequency per week
Grains (samp, isitshwala/ sadza,rice,bread, mixed legumes, buns)	133
Vegetables (covo, cabbage,tomatoes,onions, dried vegetables)	65
Protein/Meat(soya/Kapenta/beans/chicken/beef/macimbi)	75
Fruits	0
Dairy	3
Beverages	51
Total Dietary Diversity Score	327

Dietary Diversity Score (DDS) is referred to as the number of food groups consumed across and within a reference period of time (Heidari-Beni, Hemati, Qorbani, 2022)**.** The DDS was analysed using the six food groups namely grains/cereals, vegetables, meats/ beans, fruits, dairy and beverages according to MyPyramid 2025. Foods listed in Table 3 were combined into the six food groups as recommended by MyPyramid 2025. The teenage mothers did not serve fruits and dairy products in their diet. Teenage mothers therefore consumed foods from the four of the six food groups namely; carbohydrates, vegetables, proteins and beverages. The result revealed that the teenage mothers diet fell far short of nutrients as recommended by MyPyramid 2025. Regular consumption of a limited number of food groups indicates inadequacy of nutrient in the diet. The findings revealed that the mothers did not have food diversity resulting in low nutrient intake.

Table 4: Summary of selected Nutrient Intake by pregnant teenagers (N=77)

Nutrient Content	Actual nutrient intake value	RDA value/day	Percentage
Energy	1521.51 kcal	2036.3 kcal	74.7%
Water	407.52 g	2700.0 g	15 %
Protein	49.96 g (14%)	60.1 g (12 %)	83 %
Fat	18.9 g (11%)	69.1 g (< 30 %)	26.62 %
Carbohydrate	283 g (76%)	290.7 g (> 55 %)	97.6 %
Dietary fibre	32 g	30.0 g	108 %
Alcohol	0.0 g	-	-
PUFA	5 g	10.0 g	50 %
Cholesterol	42.46 mg	-	-
Vit. A	722.99 µg	1100.0 µg	65.72%
Carotene	4.77 mg	-	-
Vit. E (eq.)	7.0 mg	13.0 mg	54.4 %
Vit. B1	1.33 mg	1.2 mg	110 %
Vit. B2	0.74 mg	1.5 mg	49.93%
Vit. B6	1.55 mg	1.9 mg	81.75 %
Tot. Folic Acid	175 µg	600.0 µg	29.28 %
Vit. C	32.45 mg	110.0 mg	29.5 %
Sodium	569.72 mg	2000.0 mg	28.48 %
Potassium	1666.12 mg	3500.0 mg	47.6 %
Calcium	177.26 mg	1000.0 mg	17.73%
Magnesium	406 mg	300.0 mg	135%
Phosphorus	979 mg	800.0 mg	122%

Iron	11.13 mg	30.0 mg	37%
Zinc	9.8 mg	10.0 mg	98.7%

Table 4 present the nutrient intake by the pregnant teenage mothers. The actual nutrient intake was compared with recommended dietary allowance (RDA) for pregnant mothers. The results of energy in kilo-calories showed that energy requirement did not meet the RDA. Actual intake in comparison with the RDA was 74.7%. Carbohydrate, proteins and dietary fibre fairly met the RDA standards 97.6%, 83% and 108% respectively. The energy nutrients fats recorded 26.62% which on the lower side compared with the RDA and PUFA were on the average with 50%. Regarding the micro nutrient, four of these nutrients met the RDA limits. These are Vitamin(Vit) B1 with 110%, magnesium with 135%, phosphorus 122% and Zinc with 98.7%. The following micro nutrients met the average RDA by Vit A, Vit E, Vit B2, Potassium, and iron in ascending order: 65.72%, 54%, 49.93%, 47.6% and 37% respectively. The rest of the nutrients were extremely low ranging from 17.73% to 29.5% and these are calcium with 17.73%, sodium with 28.48%, folic acid at 29.28% and vitamin C at 29.5%.

Regarding birth outcomes only 66 (85.7%) respondents were examined because 11(14.5%) respondents were referred to higher health care institution due to complications.

Table 5: Method of delivery and Gestation age (N=66)

Variable		Frequency	Percent
Method of delivery	Normal birth	51	77.3
	Normal pathway with complications	15	22.72
	Total	66	100.0
Gestation age	Full term	64	97.0
	Preterm	2	3.0
	Total	66	100.0

Among the 66 respondents in the study on Table 5, 77.3% had a normal birth without complications. However, 22.7% of the respondents experienced a normal delivery with complications. Regarding gestation age among the respondents, 83.1% had full-term pregnancies and 2.6% were preterm

Table 6: State at birth and Birth weight range (N=66)

Variable		Frequency	Percent
State at birth	Live baby	62	93.94
	Still born	3	4.54
	Neonatal mortality	1	1.5
	Total	66	100.0
Birth weight range	Low birth	15	22.72
	Normal birth weight	50	75.75
	Overweight	1	1.5
	Total	66	100.0

Table 6, shows 66 respondents with available data, 93.9% respondents reported having a live baby, 4.5% respondents reported stillbirth, and 1.5% respondent reported neonatal mortality. With regards to birth weight, 22.7% infants had a low birth weight, indicating a weight below 2,500 grams. 75.8% infants had a normal birth weight, falling within the expected range for their gestational age and 1.5% were overweight.

Table 7: Birth length range and Head circumference range (N=66)

Variable		Frequency	Percent
Birth length range	Low birth length	2	3.0
	Normal birth length	64	97.0
	Total	66	100.0
Head circumference range	Small	1	1.5
	Normal	65	98.48
	Total	66	100.0

Table 7, shows 66 respondents with available data, concerning birth length 97% infants had normal birth length, while 3% respondents reported low birth length. About 65 respondents 98.5% reported their infants having a normal head circumference; and1.5% respondent reported a small head circumference.

Table 8: Correlation data

		BMI	BIRTH WEIGHT	BIRTH LENGTH
Respondents (mother) Weight in kg	Pearson Correlation	.855**	.325**	-.074
	Sig. (2-tailed)	.000	.008	.553
	N	75	66	66
BMI	Pearson Correlation	1	.203	-.172
	Sig. (2-tailed)		.103	.168
	N	75	66	66

Pearson Correlation was used to analyse the data on SPSS. The results showed that there was significant positive correlation between the mother's weight and the baby's birth weight r, =.325, N=75, p .008< 0.05, Based on these results it can be safely concluded that mothers who had higher weight gain gave birth to infants who had higher weight than those mothers who had gained little weight.

Results of the study highlight that teenage pregnancies are prevalent within this district, with girls becoming pregnant during their adolescent years. Comparing these findings with health standards, it is evident that the age at pregnancy in the study deviates from what is considered normal. Generally, early pregnancies during adolescence are associated with increased health risks for both the mother and the child. WHO, (2020) recommends that women should delay pregnancy until the age of 18 to ensure better maternal and child health outcomes. Therefore, the high prevalence of teenage pregnancies in Bulilima District raises concerns about the well-being of these young girls and their offspring.

The current study shows that the district is not on track with SDG 3, which aims to ensure healthy lives and well-being for all. The high prevalence of teenage pregnancies in the district suggests a need for urgent action to align with the goals of Agenda 2030 and improve reproductive health outcomes.

Nutritional status during pregnancy, as related to BMI, is a crucial aspect of maternal and foetal health. According to the study conducted in Bulilima, the nutritional status of pregnant teenagers was evaluated based on BMI categories. BMI is a widely accepted parameter used to assess nutritional status during pregnancy (Napier, et. al 2019). Comparing the study's findings to established

standards, it is essential to consider the recommended BMI ranges for pregnant women.

The results revealed that among the surveyed pregnant teenagers a greater number had a normal weight, others were classified as overweight, and 18.7% fell into the obese category. These percentages are not meeting the expected ranges based on WHO guidelines, which indicate that a majority of pregnant women should fall within the normal weight range, with a smaller percentage classified as overweight or obese. Elchert, Beaudrot and DeFranco (2015) conducted a study in United States and found similar results, with a significant proportion of pregnant teenagers being either underweight or overweight, indicating suboptimal nutritional status. The surveys in Bulilima District were conducted to assess the nutrition status of pregnant teenagers.

Analysing the nutrient presentation obtained from the field, it is evident that there are discrepancies between the actual nutrient intake of the surveyed pregnant teenagers and the recommended dietary allowances (RDA) for pregnant women. This inadequate nutrient intake may contribute to the abnormal BMI categories identified in the study.

The current study highlights the deviation of adequate nutrition among pregnant teenagers from the established standards. This discrepancy emphasizes the need for interventions addressing access to nutritious food and nutritional education.

The nutrient intake and dietary quality during pregnancy play a crucial role in supporting the health and well-being of both the mother and the developing foetus. In this study conducted on pregnant teenagers in rural Bulilima District, some nutrients met the recommended standards and some did not.

Comparing the findings with world standards, it is evident that the nutrient intake of pregnant teenagers in Bulilima was inadequate. International organizations like the World Health Organization (WHO) provide guidelines and recommendations on optimal nutrient intake during pregnancy. These standards emphasize meeting the RDA for various nutrients. The presented data shows deficiencies in energy, water, fat, vitamins (such as vitamin A, vitamin E, and vitamin C), minerals (such as calcium, iron, and zinc), and other essential nutrients. The listed nutrients are very important in the development of both the mother and the foetus. For example, the diet of these mothers had inadequate dairy products and this lead to calcium deficiency. This impairs the health of both the mother and the growing foetus, lack of calcium causes bone pain and hypertension to the mother. Lack of iron in the diet of pregnant mothers can cause foetal death because the mother will not be having enough oxygen in the blood. In cases of severe iron deficiency, the mother will be fainting, feeling tired and having difficulties in breathing. Some Vitamin deficiency may lead to serious health effects on the brain of the foetus like vitamin C. Deficiency of water lead to lower amniotic fluid which influence the foetal development and dehydration can cause nutrient deficiency.

Previous surveys conducted in the developing world have also highlighted the association between poor nutrition and teenage pregnancy. Gyimah, (2024) demonstrated the nutritional deficiencies among pregnant adolescents and their impact on birth outcomes. Similarly, studies by Black, (2013) and Gyimah, (2024) emphasize the critical role of maternal nutrition in reducing the risk of adverse birth outcomes and supporting child development.

Several factors may have contributed to the suboptimal nutrient intake and dietary quality among pregnant teenagers in Bulilima. These factors may include limited access to diverse and nutritious food, inadequate knowledge about nutrition, cultural practices, and socio-economic challenges such as poverty and food insecurity. The prevalence of these challenges in rural areas can make it difficult for pregnant teenagers to meet their nutritional needs.

Birth outcomes can be influenced by various factors such as maternal nutrition, access to healthcare, socioeconomic conditions, and cultural practices. Teenage pregnancy is often associated with increased risks and challenges compared to pregnancies among older women. This study confirms that a significant portion of the respondents (14.5%) experienced complications and were referred to higher healthcare institutions. This suggests a higher incidence of adverse birth outcomes among pregnant teenagers in rural areas compared to global standards.

5. Conclusion and Recommendations

5.1 Conclusion

In conclusion, one can say that this research has highlighted the importance of nutrition in teenage pregnancy and birth outcomes. Maternal nutrition plays a significant role in supporting healthy development in infants. However, teenage mothers face unique challenges in accessing a balanced and nutritious diet. Addressing these challenges through comprehensive sex education, improved access to healthcare and nutrition services, targeted interventions, and strengthened support systems can positively impact maternal and infant health outcomes.

It is imperative to recognize that teenage pregnancy is a multifaceted issue that requires a multidisciplinary approach. By addressing the nutritional needs of pregnant teenagers and providing comprehensive support, we can contribute to better health outcomes for both teenage mothers and their infants. Further research and continued efforts are necessary to develop effective interventions and policies that promote the well-being of teenage mothers and improve birth outcomes in this vulnerable population.

2. Recommendations

Based on the key findings outlined above, several recommendations can be made to address the issue of nutritional status and teenage pregnancy in Bulilima District. Additionally, there are areas for further study that can enhance the understanding of the factors contributing to teenage pregnancies and inform more effective interventions. Below are the recommendations and areas for further study:

1. Comprehensive sex education: the education system, health system and stakeholders should implement comprehensive and age-appropriate sex education programs in schools and communities. These programs should provide accurate information on reproductive health, contraception, sexually transmitted infections, and the consequences of early pregnancy. Tailor the content to the specific cultural context of Bulilima District, ensuring that it is inclusive, non-judgmental, and empowers young individuals to make informed decisions about their sexual and reproductive health.
2. Nutrition support: policy makers should come up with policies that empower decision makers and communities to coming up with interventions to address the unique challenges faced by teenage mothers in accessing a balanced and nutritious diet. This can involve nutrition education programs that emphasize the importance of a healthy diet during pregnancy and provide practical guidance on sourcing and preparing nutritious meals. Additionally, initiatives such as community gardens or agricultural projects can promote local food production, increasing the availability of fresh and nutritious food options.

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5.3 Areas for Further Study

1. In-depth analysis of the impact of dysfunctional homes in Bulilima district: Further studies should focus on qualitative research to explore the specific dynamics of dysfunctional homes in Bulilima District and their influence on teenage pregnancies. Investigate the role of family structure, domestic violence, substance abuse, and parental support in shaping the reproductive choices of young individuals.
2. Long-term follow-up studies: Further research to be conducted on a longitudinal study to track the outcomes of teenage mothers and their children in Bulilima District. Monitor factors such as educational attainment, nutritional status, economic stability, and the well-being of both the mothers and their infants. This will provide insights into the long-term consequences of teenage pregnancies and inform targeted interventions.

By implementing these recommendations and pursuing further study in the identified areas, stakeholders can gain a deeper understanding of the factors contributing to

nutritional status of pregnant teenage mothers in Bulilima District and develop evidence-based interventions to address the issue effectively. Collaboration between researchers, policymakers, healthcare providers, and community organizations is crucial to ensure the holistic well-being of teenage mothers, empowering them to break the cycle of poverty and achieve healthier and brighter futures.

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