

# Undernutrition among Pregnant Adolescent, A scoping Review

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## Systematic Review

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# Abstract

## Background

In pregnant adolescents, it is hypothesized that there is 'nutrient partitioning', a competition for nutrients between the still growing adolescent mother and her rapidly developing fetus resulting in a compromised nutrition status of both. This scoping review examined the prevalence of undernutrition, associated factors and outcomes of adolescent pregnancy.

## Methods

We used a five stages framework suggested by Arksey & O'Male (2005) to carry out this scoping review. Published articles, reviews and reports were identified through a complete search. We included articles published in English language from 2000 to 2020. We summarized prevalence, associated factors and health outcomes of pregnancy during adolescence.

## Results

25 studies met the inclusion criteria. 32% of the studies are on dietary intake, 20% of them reported nutritional status and associated factors and 48% studies discussed effect of poor nutrition on outcome of Pregnancy during adolescence. Only 4 of the studies are community based and 21 are facility based. Magnitude of undernutrition among pregnant adolescent girls ranged from 23.5–34%; Social determinants of health such as poor access to antenatal care visits, low educational status of partners, poor dietary intake, early marriage, rural residency, young age and having multiple pregnancies are associated with poor nutritional status. Pregnant adolescents have also more risks of poor pregnancy outcomes compared with pregnant adults' women. These include fetal complications like prematurity, low or very low birth weight, and perinatal mortality, major congenital defects; hypertensive pregnancy disorders, abortion, urinary infections, and premature rupture of the fetal membranes,.

## Conclusion

A higher magnitude of undernutrition, less dietary intake and more risks of poor pregnancy outcomes were observed from reviewed studies. This review demonstrated absence of comprehensive literature which might be explored through a population-based prospective study.

## Introduction

Nutrition has magnificent impact in human life and its requirement varies with respect to age, gender and during physiological changes such as pregnancy. Pregnancy is a key phase in human life and mother needs optimal nutrients of superior qualities to support the developing fetus.<sup>1,2</sup> Inadequate maternal

nutrition results in increased risks of short-term consequences such as; Intra Uterine Growth Restriction (IUGR), low birth weight, preterm birth, prenatal and infant mortality and morbidity. It has also been associated with patho-physiologic or metabolic consequences<sup>3</sup>. It results poor growth and development, affects quality of life during adolescence and adulthood.<sup>4</sup>

Pregnant adolescents might face additional challenges and are at higher risk for a number of problems when compared to adult pregnant women. They are at greater risk for certain health conditions, such as pregnancy induced hypertension, pre-eclampsia, preterm delivery, low birth weight, and inadequate weight gain, related to their age and developmental stage, and have limited knowledge of their bodies, reproduction, pregnancy, and birth.<sup>5,6</sup>

Pregnancies during adolescence holds 23% of the burden of disease arising from pregnancy and childbirth, although it only represents 11% of all births worldwide.<sup>7</sup> They incur increased risks for a number of adverse growth and developmental outcomes, in both the offspring and the mother,<sup>8,9,10</sup> that are known to impact adversely on long term morbidity and mortality risk.<sup>9,11</sup> Ninety five percent of the 16 million adolescent pregnancies that occur each year are in low and middle income countries (LMICs)<sup>7</sup> and this is where the burden of small for gestational Age and stunting is concentrated.<sup>12</sup>

It is hypothesized that there is competition for nutrients between the still growing adolescent mother and her rapidly developing fetus, also known as 'nutrient partitioning', which may result in the growth and development of the mother and/or fetus being compromised. An alternative explanation, which may work in tandem with nutrient partitioning, is that optimal fetal development is being traded-off as a result of gynecological immaturity to allow safe delivery.<sup>5,13</sup>

## **Aim of the reviews**

Nutritional status of pregnant adolescents has been less examined; therefore this scoping review synthesized the current information and show research gaps. This review was done with the aims of producing a profile of the research on nutritional status of pregnant Adolescents that can serve as a foundation for more study based on gaps.

## **Material And Methods**

### **Study setting and design**

A scoping review was done on worldwide studies.

### **Data sources and search strategies**

The primary outcome of this review was malnutrition measured at any time of pregnancy. All types of studies published globally and written in English were searched systematically. Publications from January 1st, 2000 to April 1st, 2020 were considered in the following databases and search Engines:

MEDLINE (via PubMed), Hinari, Embase, Google scholar and Google. Moreover retrieving references from a list of eligible studies were done. **Example of search strategy in pubmed** ((((((“nutritional status”) OR malnutrition) OR Undernutrition)) AND (((“Pregnant Adolescents”) OR “Teenage pregnancy”) OR (Pregnan\* adolescen\*) OR (“Pregnancy in adolescence”)) filter: Publication date from 2000/01/01 to 2020/04/01; Studies on- Humans; language- English

## **Inclusion criteria**

*Types of participants* - Pregnant Adolescents

*Concept* - The core concept examined by this scoping review was Nutritional status of pregnant adolescents (nutritional status, dietary intake and outcome of pregnancy during Adolescence).

*Context* - Worldwide

*Types of sources* - The source of information can include any existing literature e.g. all types of Primary research studies, systematic reviews and meta-analyses were considered.

**Exclusion criteria** - studies published other than English language

## **Data extraction**

Initially, searching was conducted through identified data bases, search engines, and Reference lists of selected studies. Second, studies conducted before 2000 and unrelated articles based on their title and Abstract were excluded. Thirdly, those potentially eligible for inclusion were imported to Endnote v-9 and duplicates were removed. Fourth, two independent reviewers conducted abstract and full-text review and data abstraction. In case of disagreement between the two reviewers, discussion was made to reach to agreement. Finally, data were extracted on structured data extraction form and presented using tables. Information's extracted include: Name of Principal Investigator, year of publication, country in which the study was conducted, sample size, tool used to screen malnutrition, cut-off point for screening tool, prevalence and other major findings. JBI Template study details, characteristics and results extraction instrument was used.

## **Methods and analysis:**

A scoping review was performed based on the York methodology outlined by Arksey and O' Malley<sup>47</sup>. The 'York framework' suggested five stages that we have followed for this review:

Stage 1: Identifying the research question

Stage 2: Identifying the relevant studies

Stage 3: Study selection

Stage 4: Charting the data

Stage 5: Collating, summarizing and reporting the results

Stage 6: Consultation

## Results

Application of inclusion and exclusion criteria resulted in overall selection of 25 papers for this review. Literatures selected were from a 20 year period with the oldest from 2000 to the most recent in 2020. 32% of the Studies are on Dietary intake of Pregnant Adolescents, 20% are on Nutritional status and associated factors of Pregnant Adolescents and 48% of the Studies are on Effect or outcome of Teenage Pregnancy. Studies that are exclusively containing Pregnant Adolescents and/or their newborn are taken. (Fig-1)

## Characteristics of the selected Study/ data

Only 4 of the studies are community based and the other 21 are institution/health facility based studies. Regarding study design eight of the studies are cross-sectional study, five are systematic reviews, four are retrospective cohort, three are randomized controlled trial, two are prospective cohort, one of the studies is case control and one other study is longitudinal study. (Table 1)

Table 1: Settings and Data sources of studies on nutritional status of Pregnant Adolescents

## Nutritional status and associated factors among pregnant adolescents

The magnitude of undernutrition ranged from 23.5–34%. Social determinants such as poor access to antenatal care visits, low educational status of partners, poor dietary intake, early marriage, rural residency, young age and multiple pregnancy are some of associated factors identified. (Table 2)

Table-2. Studies on Dietary intake of Pregnant Adolescents included in the Review

## Outcome of Teenage Pregnancy

Different studies showed more risks of poor pregnancy outcomes among Pregnant Adolescents compared with pregnant Adults .These include Fetal Complications like prematurity, low or very low birth weight, and perinatal mortality and major congenital defects; which are fetal complications and hypertensive pregnancy disorders, abortion, urinary infections, and premature rupture of the fetal membranes, which are maternal complications. (Table 3)

Table – 3 Nutritional status and associated factors among pregnant Adolescents

Table 4 Effect or outcome of Teenage Pregnancy

## Discussion

We observed greater data scarcity from community-based studies as the great majority of the studies were sampled from facility-based hospital record review (secondary data) which has many limitations. Therefore, information from this scoping review may not represent the true picture of nutrition problem among pregnant adolescents.

Different studies<sup>40,41,42</sup> including a systematic and scoping review on maternal health service utilization of adolescent women in sub-Saharan showed as a significant number of adolescents do not access and use maternity services from health facilities during pregnancy.

Among studies which compared effect or outcome of teenage pregnancy and pregnancy during adulthood only one study<sup>34</sup> reported comparable risk and all others showed a greater risk of poor pregnancy outcome among teenage pregnancy than adulthood pregnancy. Estimation of adverse risks could be biased as most studies were implemented in health institutions, mainly located in urban Areas, which had the capacity to perform caesarean sections and other better services. This results in underestimation of adverse risks, which may limit the generalizability of findings.

Africa, especially Sub-Saharan Africa has the highest rate of adolescent pregnancy<sup>35,37,43</sup> in the world however most studies are in developed countries. Developed countries, such as the United States gave more attention to this group. There is a huge gap of literature on developing countries; more researches need to be done to know the real causes for poor pregnancy outcomes of pregnancy during Adolescence. Moreover, we need studies to gain deeper understanding of the nutrient requirements needed during and before adolescent pregnancy to help in giving them with a necessary diet.

Compared to adult pregnant women, very few studies have assessed the nutritional status of pregnant Adolescents. Gaps on very important nutrition study among pregnant Adolescents have been identified; these include Anemia, iodine deficiency, dietary diversity score, longitudinal study on first 1000 days and Undernutrition / PEM with better methods than MUAC/BMI. More over health and nutrition education, macronutrient and micronutrient supplementation and school feeding programs interventions are also crucial.

Adolescent girls are at a greater risk of iron deficiency anemia due to fast growth during adolescence and onset of menarche.<sup>44,45</sup> During pregnancy there is increased demand for iron for expansion of maternal tissues and fetal growth, which makes pregnant adolescents a highly vulnerable group. However, we found a literature gap on Anemia among pregnant Adolescents which this important problem.

Globally, changes are happening in food and nutrition-related policy environment with many countries taking actions to improve food and nutrition environment to promote healthy diets and nutrition.<sup>46</sup> However; pregnant adolescent's nutrition issue is not adequately addressed. They demand special attention, countries should incorporate strong interventions regarding these important population group.

The review has some limitations. Information reviewed may not be exhaustive, because of inaccessibility of some databases and grey literature sources. However, this review provides helpful insights for future

research needs on study regarding nutritional status of Pregnant Adolescents.

## Conclusion

Magnitude of undernutrition ranged from 23.5–34%; No Antenatal care visits, Low educational status of partners, poor dietary intake, Women married before 15 years, rural residency, young age and multiple pregnancy are some of the associated factors identified. Pregnant Adolescents have less dietary intake and more risks of poor pregnancy outcomes compared with pregnant Adults .These include Fetal Complications like prematurity, low or very low birth weight, and perinatal mortality and major congenital defects; which are fetal complications and hypertensive pregnancy disorders, abortion, urinary infections, and premature rupture of the fetal membranes, which are maternal complications. This review demonstrated absence of comprehensive literature which might be explored through a population-based prospective study.

## Declarations

### Acknowledgments

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### Authors' contributions

AT involved in conception of the study; **MG, DT and TB** involved in searching, selection of articles and manuscript preparing and editing. All authors contributed on drafting or revising the article and gave final approval of the version to be published and agree to be accountable for all aspects of the work.

### Disclosure

The authors report no conflicts of interest in this work.

### Additional Files

- The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Abbreviations

ANC Anti-natal care

BMI body mass index

CI confidence interval

DRI daily required intake

EAR estimated average requirement

EER estimated energy; requirement

IUGR Intra Uterine Growth Restriction

LBW low birth weight

LMICs low and middle income countries

MDD-W Minimum Dietary Diversity for Women

MPA mean probability of adequacy

MUAC mid upper arm circumference

WHO World Health Organization

WDDS-10 10-food group Women Dietary Diversity Score

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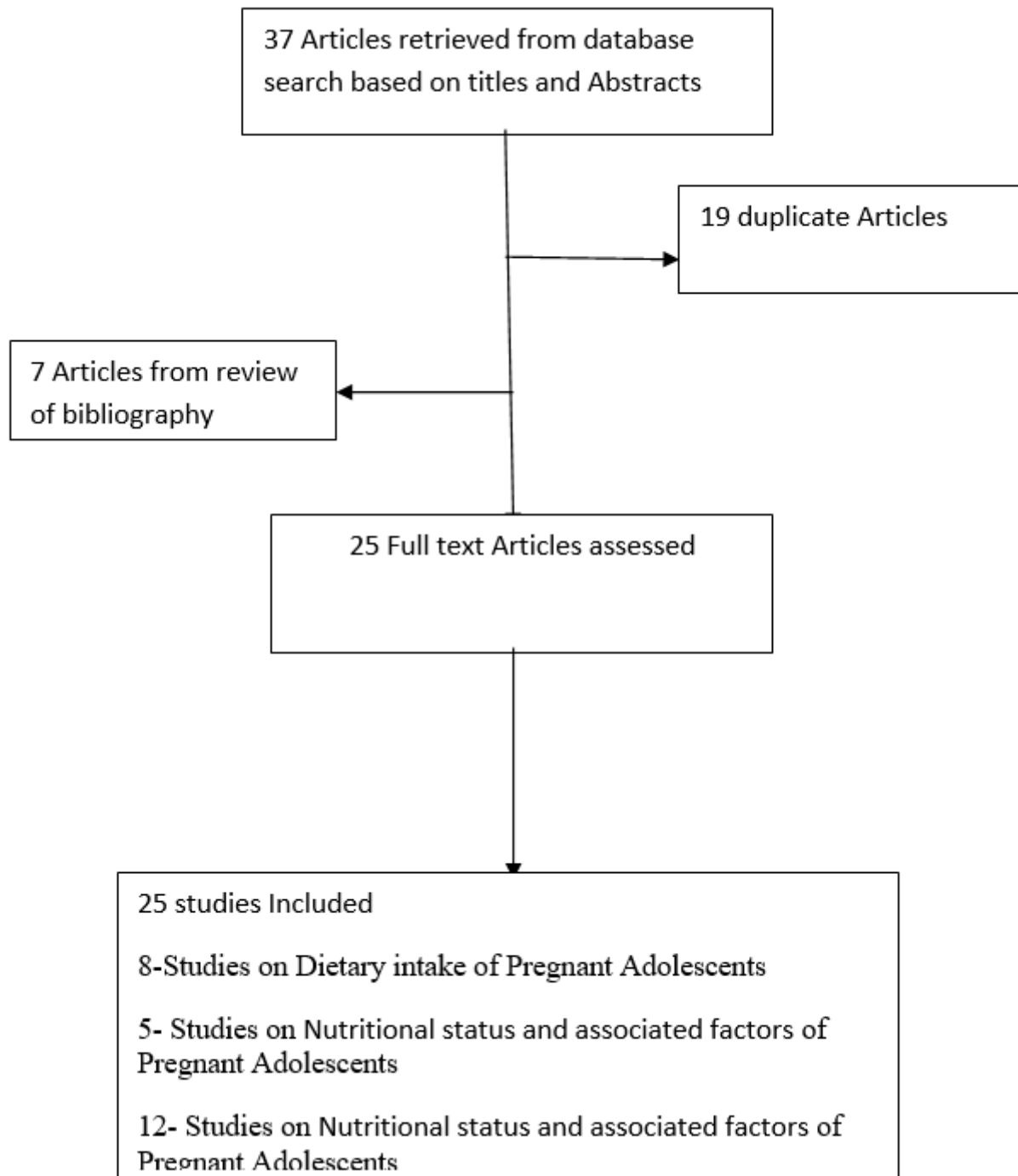
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## **Tables 1-4**

Tables 1-4 are available in the Supplementary Files section.

## **Figures**



**Figure 1**

The figure caption is not available with this version of the manuscript.

## Supplementary Files

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