

## DETERMINANTS OF GROWTH AND DEVELOPMENT IN UNDER FIVE RURAL CHILDREN: A CROSS SECTIONAL STUDY

Virupakshappa Savadi<sup>1\*</sup>, Sumitra L.<sup>2</sup>, Dr (Prof) Dnyanesh D. K<sup>3</sup>

<sup>1\*</sup> Assistant professor, KLE Academy of Higher Education and Research. Institute of Nursing Sciences, Belagavi, Karnataka, India

<sup>2</sup>A. professor, Vijaya Institute of Nursing Sciences, Belagavi, Karnataka, India

<sup>3</sup>KLE Academy of Higher Education and Research, J.N. Medical College, Belgaum.  
karnataka india

### Abstract:

**Background:** Early childhood development plays a vital role in a child's future health, education, and well-being. Rural children, however, encounter distinct challenges compared to urban ones. Issues like limited healthcare access, poor nutrition, sanitation, and low socioeconomic status are more common in rural areas and can profoundly affect child development.

**Aim and Objectives:** The aim of a study is to explore the determinants of growth and development in children under five years old residing in rural areas is to understand the various factors that influence the physical, cognitive, and socio-emotional development of young children in rural settings.

**Materials and methods:** The study utilizes a cross-sectional research design and focuses on children under the age of five years living in rural areas of Belagavi. Ethical approval preceded data collection. Cluster sampling was done, dividing Belagavi's rural areas into two villages. Samples were randomly drawn from each village, proportionate to the under-five years population.

**Results:** In terms of growth, 66.89% were "developed," and 33.11% were "not developed." The study explored how demographic factors and caregiving related to child development. Younger mothers (<21 years: 40.27%, 21-25 years: 33.45%) had more "not developed" children. Hindus (63.68%) had higher "not developed" rates than Muslims (17.40%) and Christians (18.92%).

**Conclusion:** Socio-demographic factors have a significant influence on child development, guiding targeted interventions for positive outcomes and reducing disparities. Additional research is required to understand complex interactions among these factors and their long-term effects on children's well-being.

**Keywords:** Growth, Development, Social Determinants, Under-five Children

### INTRODUCTION:

Growth denotes a net increase in tissue size or mass, whereas development refers to the maturation of function. It refers to the qualitative changes in an individual's physical,

emotional, and mental states that occur in a continuous process. The process of growth and development begins at conception and continues until the child reaches adulthood.<sup>1</sup> Growth and development are the distinguishing characteristics of a child's life that set him or her apart from an adult. Early life is marked by significant opportunities for growth and development and sensitive to harm.<sup>2</sup>

In the first six years of the existence of an individual, experiences can become biologically imprinted and have an impact, both favourably and unfavourably, throughout the rest of their lives.<sup>3</sup> The early identification of growth or developmental failure facilitates the efficient management of a children's problem and it is crucial.<sup>4</sup>

For the implementation of effective interventions and the promotion of optimal health outcomes, it is essential to identify the determinants of growth and development in children under five years. By identifying these determinants, targeted approaches can be developed to address specific factors that influence the growth and development of children. Detecting risk factors early enables prompt intervention and the prevention of adverse outcomes. The cultural relevance and effectiveness of interventions are ensured by tailoring them to specific populations, such as those in rural areas. Understanding the determinants informs policy formulation and resource allocation with the objective of reducing health disparities and promoting long-term well-being. By focusing on these factors, we can optimise the health of children and lay the groundwork for a healthier future.<sup>5-6</sup>

Therefore, with this light of information it is an impetus to assess and estimate the determinants of growth and development in under-five years rural children.

### **Materials and methods**

The research design employed for this study is a cross-sectional study. Research Setting: The study is planned to be conducted in the rural areas of Belagavi, where data collection was based on the research question's nature and the type of information required. Research Population: The population under investigation consists of children under five years children residing in the rural areas of Belagavi.

The sample selection criteria for this study were as follows: Inclusion criteria comprised children aged below 5 years, specifically between one to four years old, whose mothers provided consent to participate in the study. On the other hand, exclusion criteria included children with a known history of chronic diseases such as protein-energy malnutrition, cretinism, malignancy, Type 1 diabetes mellitus, etc., and orphaned children and mothers with known autosomal recessive genetic disorders. Mothers who refuse to give consent.

Sample: The sample for this study comprises under-five years children from the rural areas of Belagavi. To determine the sample size, Cochran's formula is used, considering a 90% confidence level, a prevalence (p) of developmental delay found to be 7.1% from a previous study, and a relative precision (e) of 20% of p. The calculated minimum sample size is 885, but a larger sample may be included to improve precision.

Sampling Technique/Procedure: Stratified cluster sampling was used. The rural areas of Belagavi was classified into two villages, and samples were drawn from each village based on the proportion of the under-five years population, using simple random sampling.

Data Collection: Ethical clearance was obtained before data collection.

### Operational Definitions:

Growth: The quantitative increase in body size, measured in centimeters and kilograms.

Development: The qualitative progression in skills and physiological maturation of the individual.

Under Five Children: Children who are less than five years old.

Determinants: Factors that influence growth and development in the present study.

**Data Analysis:** Data was analyzed using statistical methods such as measures of central tendency and dispersion for continuous variables and frequency and proportion for categorical variables. A chi-square test was performed to obtain an association between the demographic variables and outcome variables.

### Results:

A summary of the data related to demographic variables is provided through a descriptive analysis, as shown in Table 1.

**Table 1: Descriptive analysis of demographic variables (N=885)**

Age of the mother	No of participants (%)
<21yrs	260 (29.38)
21-25yrs	253 (28.59)
26-30yrs	227(25.65)
>30yrs	145(16.38)
<b>Religion</b>	
Hindu	436(49.27)
Muslim	261(29.49)
Christian	188(21.24)
Total	885(100.00)
<b>Dwelling</b>	
Katcha	258(29.15)
Pucca	627(70.85)
<b>Mother's literacy</b>	
Illiterate	10(1.13)
Primary school	276(31.19)
Higher primary	154(17.40)
SSLC	301(34.01)
Graduate	65(7.34)
Postgraduate	79(8.93)
Total	885(100.00)
<b>Occupation</b>	
Housewife	479(54.12)
Daily wages	157(17.74)

Government employee	139(15.71)
Private sector employee	110(12.43)
<b>Monthly income</b>	
Less than Rs. 2,000	188(21.24)
Rs. 2,001-4,000	263(29.72)
Rs. 4,001-6,000	82(9.27)
More than Rs. 6,000	352(39.77)
<b>Type of family</b>	
Nuclear	375(42.37)
Joint	266(30.06)
Extended	244(27.57)
<b>Who takes care of child during day</b>	
Self	380(42.94)
Father	89(10.06)
Grandparents	237(26.78)
Siblings	117(13.22)
Relatives	62(7.01)
Total	885(100.00)
<b>Type of diet</b>	
Vegetarian	202(22.82)
Non-vegetarian	326(36.84)
Mixed	357(40.34)
<b>Status of growth and development</b>	
Developed	592(66.89)
Not developed	293(33.11)

Table 2 depicts a simplified summary of the information relevant to the relationship between demographic components and the outcome variable. Regarding growth and development, 66.8% and 33.1% participants were classified as developed and non-developed respectively. Age of the mother, Religion, Dwelling, Mother's literacy, Occupation, Monthly income, Type of family, Who takes care of child during day and Type of diet are found to have significant association with developed and non developed conditions (Table 2)

**Table 2: Association between demographic variables and outcome variable (N=885)**

Variables	Not developed (%)	Developed (%)	Total (%)	p-value
<b>Age of the mother</b>				
<21yrs	118(40.27)	142(23.99)	260(29.38)	<b>0.0001*</b>
21-25yrs	98 (33.45)	155(26.18)	253(28.59)	
26-30yrs	64 (21.84)	163 (27.53)	227(25.65)	
>30yrs	13 (4.44)	132 (22.30)	145(16.38)	
<b>Religion</b>				

Hindu	59(20.14)	377(63.68)	436(49.27)	<b>0.0001*</b>
Muslim	158(53.92)	103(17.40)	261(29.49)	
Christian	76(25.94)	112(18.92)	188(21.24)	
<b>Dwelling</b>				
Katcha	111(37.88)	147(24.83)	258(29.15)	<b>0.0001*</b>
Pucca	182(62.12)	445(75.17)	627(70.85)	
<b>Mother's literacy</b>				
Illiterate	7(2.39)	3(0.51)	10(1.13)	<b>0.0001*</b>
Primary school	107(36.52)	169(28.55)	276(31.19)	
Higher primary	57(19.45)	97(16.39)	154(17.40)	
SSLC	100(34.13)	201(33.95)	301(34.01)	
Graduate	6(2.05)	59(9.97)	65(7.34)	
Post graduate	16(5.46)	63(10.64)	79(8.93)	
<b>Occupation</b>				
Housewife	194(66.21)	285(48.14)	479(54.12)	<b>0.0001*</b>
Daily wages	58(19.80)	99(16.72)	157(17.74)	
Government employee	23(7.85)	116(19.59)	139(15.71)	
Private sector employee	18(6.14)	92(15.54)	110(12.43)	
<b>Monthly income</b>				
Less than rs. 2,000	83(28.33)	105(17.74)	188(21.24)	<b>0.0001*</b>
Rs. 2,001-4,000	97(33.11)	166(28.04)	263(29.72)	
Rs. 4,001-6,000	40(13.65)	42(7.09)	82(9.27)	
More than rs. 6,000	73(24.91)	279(47.13)	352(39.77)	
<b>Type of family</b>				
Nuclear	111(37.88)	264(44.59)	375(42.37)	<b>0.0001*</b>
Joint	117(39.93)	149(25.17)	266(30.06)	
Extended	65(22.18)	179(30.24)	244(27.57)	
<b>Who takes care of child during day</b>				
Self	83(28.33)	297(50.17)	380(42.94)	<b>0.0001*</b>
Father	17(5.80)	72(12.16)	89(10.06)	
Grandparents	118(40.27)	119(20.10)	237(26.78)	
Siblings	57(19.45)	60(10.14)	117(13.22)	
Relatives	18(6.14)	44(7.43)	62(7.01)	
<b>Type of diet</b>				
Vegetarian	126(43.00)	76(12.84)	202(22.82)	<b>0.0001*</b>
Non-vegetarian	44(15.02)	282(47.64)	326(36.84)	
Mixed	123(41.98)	234(39.53)	357(40.34)	

**Discussion:**

Majority of the under developed babies were born of younger mothers who were less than 21 years. We also found that the association between the maternal age and development status was statistically significant. This was supported by the study conducted by Elisabeth et al who found the similar relationship.<sup>7</sup> Due to the fact that younger girls are still growing and physically immature, their nutritional and energy needs may compete with those of the foetus, resulting in developmental problems and low-birthweight infants.<sup>8</sup> Moreover, behavioral and social aspects might also play a role in the inferior outcomes observed in infants of young mothers. These factors could involve a lack of maturity, inexperienced childbearing, and an increased likelihood of adolescent pregnancies being unplanned and unwanted.<sup>9</sup>

We found that the level of development of the babies decrease with decrease in the mean years of education of mothers. This finding was corroborated by the study conducted by Wu et al who found that parental education plays a crucial role in influencing the timely achievement of developmental milestones in children.<sup>9</sup> The reason behind this observation could be attributed to various factors, such as lower maternal knowledge and awareness about child development, reduced access to healthcare and resources, and limited socioeconomic opportunities for both the mother and child. Additionally, mothers with lower education levels may face challenges in providing optimal care and stimulation to their babies, which can impact their developmental progress.<sup>10</sup>

More than half of the under developed babies were born from mothers who were housewives. This was supported by the study conducted by Torabi et al where they found that about 80% of the babies were born from housewives.<sup>11</sup> This is due to a fact that majority of the study participants were housewives. Child development is the result of a gradual, multifaceted relationship that involves parental and carers education, living and working conditions, social circumstances, and the availability of health facilities. A negative social or external environment during the early years of life is typically associated with compromised development.<sup>12</sup> In our study, proportion of children with compromised development or underdevelopment is inversely linked to the monthly family income. i.e. most of the children without the proper development belonged to family with less income. This was supported by the studies conducted by Hurt et al<sup>13</sup> and Gunardi et al<sup>14</sup>. In addition, the socioeconomic status of a family is one of the determinants of its children's nutritional status.

Most of the vegetarian mothers gave birth to underdeveloped children and the groups with respect to the type of diet were comparable. This is consistent with a study conducted by Sari et al who highlighted that animal source food is rich in micronutrients as a result of its high content of iron, vitamin A, vitamin B-12, zinc, iodine, and protein, which are scarce in plant source foods.<sup>15</sup> The type of family and the primary caregiver during the day show associations with development status. Nuclear family structures and self-care of the child are more prevalent in the "Developed" group. Bishwokarma A et al found that more than half of the study participants who were development delay hailed from nuclear families.<sup>16</sup> We found that the difference among the study participants with respect to the type of family is statistically significant.

The limitations of the study include potential biases in self-reported data, limited generalizability due to a specific regional focus, lack of longitudinal data for long-term effects,

absence of interventions to assess their impact, and exclusion criteria affecting representation of certain populations.

### Conclusion:

This study underscores the significant influence of socio-demographic factors on child development outcomes. Identifying and understanding these associations can guide policymakers and practitioners in formulating targeted interventions to promote positive child development, reduce disparities, and foster a more inclusive and equitable society. Further research is warranted to explore the complex interactions among these factors and their long-term effects on children's well-being.

### References:

- [1]. R Agarwal N Sankhyan V Jain Growth Paul VK A Bagga O P Ghai P Textbook of Pediatrics 8th Edn. CBS publisher and distributors 2019
- [2]. Rukmanee Butchon Tippawan Liabsuetrakul The Development and Growth of Children Aged under 5 years in Northeastern Thailand: a Cross-Sectional Study *J Child Adolesc Behav* 2017;05(01)
- [3]. Brooks-Gunn J, Duncan GJ, Maritato N. New York, NY: Russell Sage Foundation; 1997. Poor Families, Poor Outcomes: The Well-Being of Children and Youth. In: Consequences of Growing Up Poor. [[Google Scholar](#)] [[Ref list](#)]
- [4]. Merrick J. Child health and human development over the lifespan. *Front Public Health*. 2013 Mar 19;1:1. [[PMC free article](#)] [[PubMed](#)]
- [5]. Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, 369(9555), 60-70.
- [6]. Shonkoff JP, Garner AS; Committee on Psychosocial Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*. 2012 Jan;129(1):e232-46. doi: 10.1542/peds.2011-2663. Epub 2011 Dec 26. PMID: 22201156.
- [7]. Elisabeth Gebreegziabher and others, Influence of maternal age on birth and infant outcomes at 6 months: a cohort study with quantitative bias analysis, *International Journal of Epidemiology*, Volume 52, Issue 2, April 2023, Pages 414–425, <https://doi.org/10.1093/ije/dyac236>
- [8]. Neal S, Channon AA, Chintsanya J. The impact of young maternal age at birth on neonatal mortality: evidence from 45 low and middle income countries *PLoS One* 2018 ;3:e0195731
- [9]. Wu H, Zhao M, Liang Y, Liu F, Xi B. Maternal age at birth and neonatal mortality: Associations from 67 low-income and middle-income countries. *Paediatr Perinat Epidemiol*. 2021 May;35(3):318-327. doi: 10.1111/ppe.12734. Epub 2020 Nov 16. PMID: 33200435.
- [10]. Black MM, Walker SP, Fernald LCH, Andersen CT, DiGirolamo AM, Lu C, McCoy DC, Fink G, Shawar YR, Shiffman J, Devercelli AE, Wodon QT, Vargas-Barón E, Grantham-McGregor S; Lancet Early Childhood Development Series Steering

- Committee. Early childhood development coming of age: science through the life course. *Lancet*. 2017 Jan 7;389(10064):77-90. doi: 10.1016/S0140-6736(16)31389-7. Epub 2016 Oct 4. PMID: 27717614; PMCID: PMC5884058.
- [11]. Torabi F, Akbari SA, Amiri S, Soleimani F, Majd HA. Correlation between high-risk pregnancy and developmental delay in children aged 4-60 months. *Libyan J Med*. 2012;7. doi: 10.3402/ljm.v7i0.18811. Epub 2012 Sep 21. PMID: 23008747; PMCID: PMC3449296.
- [12]. World Health Organization . *Developmental difficulties in early childhood: prevention, early identification, assessment and intervention in low-and middle-income countries: a review*. Geneva: World Health Organization; 2012. [[Google Scholar](#)] [[Ref list](#)]
- [13]. Hurt H, Betancourt LM. Turning one year of age in a low socioeconomic environment: a portrait of disadvantage. *J Dev Behav Pediatr*. 2017;38(7):493–500. doi: 10.1097/DBP.0000000000000469. [[PMC free article](#)] [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)] [[Ref list](#)]
- [14]. Gunardi H, Nugraheni RP, Yulman AR, Soedjatmiko S, Sekartini R, Medise BE, Wirahmadi A, Melina E. Growth and developmental delay risk factors among under-five children in an inner-city slum area. *Pediatr Indonesian*. 2019;59(5):276–283. doi: 10.14238/pi59.5.2019.276-83. [[CrossRef](#)] [[Google Scholar](#)] [[Ref list](#)]
- [15]. Sari M., De Pee S., Bloem M.W., Sun K., Thorne-Lyman A.L., Akhter R.M.-P.N., Kraemer K., Semba R.D. Higher household expenditure on animal-source and nongrain foods lowers the risk of stunting among children 0–59 months old in Indonesia: Implications of rising. *J. Nutr*. 2010;140:195S–200S. doi: 10.3945/jn.109.110858. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
- [16]. Bishwokarma A, Shrestha D, Bhujel K, Chand N, Adhikari L, Kaphle M, Wagle A, Karmacharya I. Developmental delay and its associated factors among children under five years in urban slums of Nepal. *PLoS One*. 2022 Feb 10;17(2):e0263105. doi: 10.1371/journal.pone.0263105. PMID: 35143516; PMCID: PMC8830665.