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

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In the Faculty of Nursing

By

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Registration No: KLEU/Ph.D./DO1218006/Year:2018-19

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2024

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Gratitude is a quality similar to electricity: It must be produced and discharged and used up in order to exist at all.

- William Faulkner

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Date:

Place: *Belagavi* ***Mr. VIRUPAKSHAPPA.S***

ABBREVATIONS:

Sl.No	ABBREVIATION	EXPANDED FORMS
1.	**AOR**	Adjusted Odds Ratio
2.	**AUC**	Area under the ROC Curve
3.	**BMI**	Body Mass Index
4.	**CI**	Confidence Interval
5.	**DHO**	District Health Officer
6.	**HT**	Height
7.	**ICMR**	Indian Council of Medical Research
8.	**IEC**	Institutional Ethics Committee
9.	**LBW**	Low Birth Weight
10.	**MLR**	Multiple Linear Regression
11.	**OR**	Odds Ratio
12.	**SE**	Standard Error
13.	**SES**	Socio-Economic Status
14.	**SPSS**	Statistical Package for Social Sciences
15.	**WHO**	World Health Organization
16.	**WT**	Weight
17.	**IAP**	Indian Academy of Pediatrics
18.	**VLBW**	Very low birth weight
19.	**MUAC**	MID-Upper Arm Circumference

ABSTRACT

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

Background: A child's later achievement levels are influenced by their optimal development during the early years of life.

Objectives: To evaluate the growth and development in children less than five years in rural Belagavi and to estimate the determinants of growth and development among children less than 5 years in rural Belagavi.

Methodology: A cross-sectional study was conducted in 885 under 5 children in rural Belagavi by using simple random sampling. The assessment was done using the Indian Council for Medical Research (ICMR) Development Screening Test.

Results: Based on biological factors, the distribution of birth patterns revealed that, of mothers who gave birth, 41.80% had a repeat adult pregnancy, 63.30% had prenatal care, and 60.90% had gestational diabetes at birth. Consanguinity is 61.90% when looking at patterns, and 51.40% when breastfeeding. Nonetheless, the mode of delivery revealed that, at most, 45.60% of mothers gave birth to their infants vaginally.

Examining in rural Belagavi, the accuracy of predicting a child's vision and fine motor development by delivery pattern is 62.70%, pattern consanguinity is 54.40%, mode of delivery is 43.30%, antenatal care is 65.10%, gestational age at birth is 63.30%, and breastfeeding is 39.60% for children under five. The accuracy of the following patterns of delivery: mode of delivery: 45.50%; antenatal care: 62.70%; gestational at birth: 63.70%; breastfeeding: 53.00%; pattern consanguinity: 66.00%;

and hearing, language, and concept development of children under five years old in rural Belagavi: 91.80%. The accuracy of using religion to forecast the growth of a child's personal skills among under-five-year-olds in rural Belagavi is 43.20%, whereas monthly income is 60.90%. Pregnancy care accounts for 58.90% of the accuracy in forecasting a child's growth and development in personal skills among children under five in rural Belagavi based on mode of delivery, consanguinity, and delivery pattern (54.90% and 58.10%, respectively). However, rests have a slight but noticeable impact. The accuracy of the following measures for predicting the growth and development of social skills in children under five in rural Belagavi: mode of delivery (42.30%), consanguinity (63.30%), antenatal care (62.30%), gestational age at birth (61.80%), history (54.60%), and breastfeeding (36.70%).

Conclusion: The study results concluded that delay in development is prevalent in a significant number of children under five, potentially impacting their overall life potential achievement.

Keywords: Growth and Development, under five children, rural area, Biological factor, Consanguinity, Antenatal care, Gestational at birth, Social Skill, Breastfeeding

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CHAPTER -I

INTRODUCTION

1.1) Background

The most significant biological process during the first twenty years of an individual's life, including the nine months of fetal development, is growth.[1] Growth is the expansion of a physical portion or the body as a whole. It is a basic quality shared by every living thing. The interconnectedness of development and maturation is primarily caused by ongoing interactions between genes, hormone fluctuations, nutrition, and other variables. While making up 16.5% of the population, children less than 5 years accounted for 40% of all deaths in the country.[2] The health of the general public or sizable populations is seriously threatened by the epidemiological shift from communicable to non-communicable diseases, or from a mix of both.

The slow emergence of biologically specified qualities and characteristics in children as they gain experience is known as child development. Due to factors such as poverty, ill health, hunger, and insufficient care, nearly 200 million children under five in developing nations do not grow to their full potential in terms of cognitive and social skills[3]. Mmajority of these kids are from South Asia and Sub-Saharan Africa, and a lot of them face several developmental hazards like deprivation, starvation, ill health, and a dull family environment. The negative health effects of social circumstances, poverty, and malnutrition prevent a person from developing to their full potential. Other variables that hinder growth during pregnancy and after birth include parental behavior, dietary deficiency, chronic illnesses, exclusive breastfeeding, inappropriate feeding methods, and a lack of stimulation.[4]

Future health outcomes are significantly predicted by birth weight and child growth in both individuals and populations. Unusual development throughout pregnancy and youth might have detrimental implications on one's health both now and in the future. In underdeveloped nations, pregnancy-related complications (PRCs) represent a major factor in mother and newborn mortality.[5] If more people had access to institutional care prior to, during, and after pregnancy and delivery, the majority of these deaths may have been avoided. The health of the mother and child is guaranteed when using government health facilities during pregnancy and childbirth. Furthermore, it lowers maternal and child problems and morbidity, supports, preserves, and maintains the mother's health during pregnancy, and increases public awareness of environmental sanitation, personal hygiene, child care, and mothercraft education.[6]

The settings that people are "exposed" to throughout their lives have an impact on their development and health, and these are known as social determinants. A wide range of non-genetic characteristics that are ingrained in the interactions among people and their respective social and physical surrounding are represented by social determinants, which operate at different levels of influence, interact with one another, and include living conditions, peer relationships, family dynamics, sociodemographics of the family, learning environments in childcare and schools, and access to green spaces.[7]

The intricate interplay of socioeconomic variables shapes an individual's lifetime trajectory of health vulnerability during the formative years of life.[8]

Researchers, governments, and policymakers are trying to better understand the circumstances in which children attain optimal health and developmental outcomes because environmental interventions have the potential to improve population health outcomes. For example, the WHO Commission on Social Determinants of Health was founded in 2004 with the goal of promoting worldwide interventions and research on the environmental and social aspects that influence health and development across the life span. Early phases of a child's development, such as conception, pregnancy, and the postnatal period, are greatly influenced by social determinants.[9]

Children under the age of five make up 40% of all deaths in the nation and represent 16.5% of the total population.[10] Human development is a lifelong process that follows a regular pattern and involves changes in the biological, psychological, and emotional domains.[11]A child's physical and cognitive development develops at a quick pace during the first five years of their existence, making this a critical time in their development. This time is critical for fostering their social and emotional development as well as their future learning capacities. The brain and nervous system continue to grow for a long time in youngsters. beginning early in the gestational cycle and ending when the child turns six years old.[12–13]

200 million children less than 5 years of age do not realize their full potential in developing nations. A startling 43 percent of children less than five who reside in middle and low income nations are thought to be at risk of either suboptimal development or impaired growth and development as a result of inadequate psychosocial stimulation, chronic infections, and malnutrition, according to numerous studies. Because hazards to health and well-being extend beyond these two

categories, the burden is currently underestimated.[13,14] In addition to inadequate nutrition during pregnancy, a child's growth and development are influenced by environmental factors such as standard of living, sanitization, socioeconomic position, low birth weight, recurring infections, parental attitudes, and child rearing techniques. Children's growth is influenced by nutritional factors such as the duration of exclusive breastfeeding, awareness of colostrum, weaning techniques, and eating during illness.[15]

Child development is affected by a wide range of maternal and child-related factors, such as biological, psycho-social, and sociocultural aspects.[16] There have also been reports linking order of birth, preterm status, birth weight, and the kid's APGAR scores at birth with the mothers' attendance at prenatal care to the growth of the child. Only 64% of women worldwide obtain prenatal treatment four or more times during their pregnancy.[17] Measurements of length, height, weight, and age are used to determine a child's growth status. This is usually determined by combining the markers of weight for length/height, weight for age, and length/height for age (stunting).

This is usually determined by combining the markers of weight for length/height, weight for age, and length/height for age.[18] The socioeconomic condition of the home, child feeding practices, environmental factors, access to and usage of health services, and household cleanliness practices are just a few of the many variables that influence a child's growth and development status in childhood.[19–20]

The body of scientific research indicates that delayed development is closely linked to hampered cognitive, psychosocial, and learning capacities.[21–22] The multifaceted theories of child growth and development are linked to biological, socioeconomic, and environmental factors. According to published sources, the majority of researchers have either looked into risk variables connected to malnutrition or risk factors related to developmental delays in children. Nonetheless, there are a lot of shared determinants among these constructs and they are related. Risk factors for both child growth and development have been linked to poverty, including constraints on consumer goods and services, food, and psychosocial stimulation; poor prenatal conditions have also been linked to these issues.

Few studies, nevertheless, have looked at growth and development at the same time. This would help identify potentially more precise risk factors for each construct, which is crucial for the development of preventative and intervention plans for both developmental delay and malnutrition in children. Therefore, the current study's goal is to assess the developmental achievements and factors linked to child growth and development in rural children under the age of five.[21-23] Socioeconomic differences in the world's rates of illness and death have received enough attention in recent years.[24,25] Worldwide, child diseases are mostly caused by poor sanitation and hygiene standards.[26]

Reduced maternal education has been linked to delayed breastfeeding initiation postpartum and inadequate complementary feeding habits for children under two years old, both of which have an impact on the nutritional health of the child.[27] A child's later accomplishment levels are influenced by their early cognitive development. However, exposure to numerous contextual risk factors during early

childhood may be impeding many children's normal development. The most economical interventions in the field of preventive child health are those that involve early detection of developmental issues and corrective remedial measures. Undernutrition, iron, iodine, and low levels of cognitive stimulation are major risk factors for suboptimal performance in underdeveloped nations like India.

However, the majority of primary healthcare professionals are ignorant of the significance of developmental milestones being met on time by the children in their charge. Furthermore, there is a paucity of data in India about preschoolers' timely, delayed, or advanced achievement of developmental milestones in community settings. This is particularly valid for kids from underprivileged social groups. If such developmental problems are common and children's acquisition of competencies is significantly delayed, then there is a strong case to be made for the introduction of the concept of developmental surveillance in primary health care, just as it is for physical growth for millions of young children in India.[28]

The most economical interventions in the field of preventive child health are those that involve early detection of developmental issues and corrective remedial measures. However, the majority of primary healthcare professionals are ignorant of the significance of developmental milestones being met on time by the children in their charge. A compelling argument can be made for the introduction of the concept of developmental surveillance in primary health care, household surveys, anganwadi, and community health centres, as is done for physical growth for millions of young children in India, given the prevalence of developmental problems and the significant delays in children's acquisition of competencies.[28]

In India, undernourishment in children under five is a serious public health issue.[29] The world has the highest prevalence of it, nearly twice as high as in Sub-Saharan Africa.[30–31] Eighty percent of the world's malnourished children reside in 20 countries. Almost 60 million children in India are underweight. [32] A 2006 UNICEF report stated that the primary causes of malnutrition in children are low protein diets, recurrent illnesses, inadequate nursing practices, and a delayed introduction of complementary foods. Other factors influencing food intake include growth, dietary choices, health status, and food taboos.

Malnutrition can also result from inadequate food amounts, irregular meal schedules, parental ignorance, and maltreatment.[33] India is ranked 102nd out of 119 countries in the 2019 report. The National Family Health Survey 4 (NFHS 4) in India reported that 21% of children were wasting, 38.4% were stunted, and 35.7% of underweight children were undernourished.[34,35] According to data from the first to the fourth National Family Health Surveys, undernutrition has not decreased as planned. According to the 2016–2018 Comprehensive National Nutrition Survey report, 33% of Indian children under the age of four were underweight.[36] of which 35% were stunted and 17% were wasting.

The United Nations Children's Fund has dubbed malnutrition in the form of undernutrition—that is, underweight, stunting, and wasting—the "silent emergency." [37, 38, 39]

The Sustainable Development Goals (SDGs) are something that the Indian government is adamant about achieving by 2030. Encouraging sustainable agriculture, attaining food security, enhancing nutrition, and putting an end to hunger are among the.[40] Sustainable Development Goals (SDGs). If undernutrition is not

appropriately eliminated, the country will not be able to meet its SDG goal of lowering child mortality.[41] The socioeconomic situation, mother's level of education, the availability of safe drinking water, and awareness of ailments like diarrhoea and acute respiratory tract infections all have an impact on children's nutritional status in developing nations.[42]

According to statistics, lower respiratory tract infections, diarrhoea, measles, and malaria are the leading causes of death for underweight children. Early childhood undernutrition has detrimental long-term implications on cognitive and physical development.[43] A global analysis of the relationship between child stunting and economic results found that a one-centimeter rise in height was linked to a 4% increase in men's wages and a 6% increase in women's wages. One of the most important investments in economic and human growth is the eradication of child malnutrition.[42] There is a considerable correlation between the severity of weight-for-age shortfalls and mortality rates, according to data from six longitudinal studies on the relationship between anthropometric status and mortality of children aged 6-59 months.

Malnutrition is thought to have had a role in 6.3 million, or 54%, of the 11.6 million deaths of children less than five years that took place in developing countries in 1995.[44] A basic battery of screening tests was created by the ICMR and WHO to evaluate children's psychological development. Ninety milestones fall under the five main developmental domains covered by this screening test: auditory, verbal, and conceptual development, fine motor and visual, social, individual talents and gross motor.

By establishing a correlation between sociodemographic and biological parameters and BMI, age-appropriate height and weight, language perception, personal and social skills, gross and fine motor abilities, and hearing, this study seeks to determine the elements that impact growth and development. Future detection and management planning will benefit from identifying the severity of problems and their associated factors.

1.2) NEED FOR THE STUDAY

A child's early years are a precious time for development because of the quick advances in their physical and psycho-social development, which will help them in the future with learning as well as social and emotional skills. Children below five years constitute one-sixth of the population, and one-fifth of the children die before the age of five years. As a youngster learns from experiences, biologically specified characteristics and traits gradually emerge as part of their development.[45]

In underdeveloped nations, one-third of children under five suffer from linear growth retardation. Young children are recognized to be dependent on the care they get, and their development is influenced by the carers' abilities. Early childhood neglect severely impairs a child's development, health, ability to change their personality, and cognitive function. It has been determined that responsiveness and sensitivity are essential aspects of carer behavior linked to early childhood development and health outcomes. In 2011, 28% of people living in poor income countries had stunting.[46]

Certainly, understanding the determinants of development in rural children less than 5 years of age is crucial for several reasons:

Health Interventions: Identifying the factors influencing growth and development in young children can inform targeted health interventions. This knowledge can help healthcare professionals and policymakers design programs that address specific issues prevalent in rural areas, such as malnutrition, lack of access to healthcare, or inadequate sanitation.

Policy Formulation: Governments and non-governmental organizations formulate policies and programs to enhance child health and development. Research on determinants can provide evidence-based insights for policy development, ensuring that interventions are tailored to the unique challenges faced by rural communities.

Resource Allocation: Understanding the determinants can help in the effective allocation of resources. For instance, if the study reveals that a significant number of children in a particular region are stunted due to nutritional deficiencies, resources can be directed towards improving nutrition in that specific area.

Early Intervention: Early identification of factors affecting growth and development allows for timely intervention. Early interventions can be more effective in mitigating the impact of adverse determinants, leading to better long-term outcomes for children.

Community Empowerment: Knowledge about the determinants can empower local communities. It enables them to actively participate in the decision-making process regarding the health and development of their children. This community involvement is essential for the sustainability of any intervention or program.

Research Gap Filling: There might be gaps in the existing literature, especially in the context of rural areas. Your study could contribute valuable information to the academic and scientific community, helping to fill these gaps and providing a foundation for future research.

Global Health Initiatives: Understanding the determinants of growth and development in under-five children contributes to global health initiatives aimed at

achieving sustainable development goals related to child health. Your study could provide valuable data for international efforts to improve child health worldwide.

Education Programs: The findings of your study could also be integrated into educational programs targeting parents, caregivers, and community health workers. This education can focus on promoting practices that positively impact the development of young children in rural areas.

Socio-cultural, biological, and psycho-social factors were identified as maternal and child-related determinants associated with child development. According to estimates, 25% of children less than five years were considered stunted, meaning that their height was below average for their age. This indicates a noteworthy decrease from 1990, when 40% of young children had stunting. For children less than five years, sub optimal development represents a substantial biological risk factor for both morbidity and mortality, according to a comprehensive analysis. The multifaceted theories of child growth and development are linked to biological, socioeconomic, and environmental factors. Instruments used to assess child development must to be made to compare a person's performance to standardised norms and measure individual performance.[47]

To assess a child's growth status, the three anthropometric indices weight-for-height, height-for-age, and weight-for-age are most commonly used.

The following interpretation of these anthropometric indices is possible: Low mass relative to height: Wasting or being thin usually means that one has lost a significant amount of weight recently, and this is frequently linked to acute famine and serious illness. Another reason for wasting could be a long-term negative

circumstance. During the second year of life, low weight-for-height prevalence usually peaks. Low stature relative to age: A process of falling short of linear growth potential due to inadequate nutrition or health is known as stunted growth. High rates of stunting are linked, among other things, to low socioeconomic status and a higher chance of early and frequent exposure to unfavorable circumstances like disease and/or improper food habits.

Similarly, improvements in a nation's general socioeconomic situation are typically indicated by a decline in the national stunting rate.[48] It is estimated that in children under five years old, these anthropometric deficiencies cause of deaths as well as of disability-adjusted life-years lost.

Young children are more exposed to biological and psychosocial hazards due to poverty and the sociocultural background. These risks can impact development by altering brain structure and function as well as causing behavioral changes. In our work, we focus on individual dangers, although children are often exposed to several, cumulative risks.

In the framework of health supervision, every developmental domain needs to be evaluated as part of continuous developmental surveillance. It is not possible to draw broad conclusions about development from the evaluation of abilities in a single developmental area [49] (for example, gross motor milestones cannot be used to characterize an infant's cognitive development).

To identify the early pattern that are pathologic and may point to a potential delay in development or disability, one must have a thorough understanding of normal development as well as permissible variances in conventional developmental

patterns. In order to diagnose developmental delays or disabilities, early skill evaluation and milestone tracking are essential, as is enrolling patients in early intervention programs as soon as feasible.[50]

It is reasonably simple for the practitioner to comfort parents and oneself about a child's failure to meet developmental milestones through analysis of the data acquired on developmental delays.

Under a UNICEF-developed paradigm, poverty is identified as one of the primary causes of undernutrition, along with surrounding environmental, economic, and sociopolitical variables. Since weight is a simple indication to measure, the majority of previous data sets have been gathered for it. Research indicates that children who are underweight, even slightly, have a higher chance of dying, and those who are extremely underweight are even more vulnerable. Valid developmental diagnostic assessment instruments must be used to identify children who require early intervention.

Early identification of the disability in development is a challenge that demand tools that responds to local differences in cultural perceptions across the country. Early identification of developmental delay has an impact since there is a scope of intervention and children have responsiveness towards a therapeutic approach.[51]

When a child does not reach any one of the following developmental milestones by the optimal age of [52–53]: gross motor, fine motor, language/speech, and social development, the kid is said to have developmental delay (DD). Numerous

factors, including socioeconomic, biological, maternal, environmental, dietary, and genetic factors, can impact a child's developmental status. [54–55].

Children residing in environments with little resources are more likely to come across elements that negatively impact their capacity to reach their full developmental potential.[55,56,57] There was an estimate in 2017 that 250 million children in low- and middle-income countries (LMIC) might not reach their full developmental potential.[58] According to the Early Childhood Development Index, over 38% of children in South Asia are thought to have low developmental scores.[59]

In Nepal, the percentage of children aged 3- 5 years [60] who had probable developmental disabilities (DD) for ECDI was 35.1%. It has been discovered that children at high risk of delayed development incur greater healthcare costs than children who are not.[61] According to follow-up research, most of the children who were diagnosed with delayed development at age three were socially isolated, either jobless, staying with their relatives, and monetarily dependent on them.[62]

Children who live in extremely low resource settings and have delayed development are prone to subpar academic performance, which will result in increased fertility, low earnings, and inadequate child care, ultimately resulting in the intergenerational transmission of poverty.[63] This can happen if timely identification and intervention are not implemented.

In south Asia, 227 million people were estimated by the UN to be staying in slums or informal settlement in 2018.[64] As of 2018.[65] 49.3% of people in Nepal lived in slum-like conditions. Nepal is the South Asian nation that is urbanising the fastest, with.[66] It can result in the creation of additional slum inhabitants because informal

settlements, or slums, have become one of Nepal's biggest obstacles to urban development.[67] Moreover, the governments of South Asia are finding it difficult to adapt to the current rate of expansion.[68]

It has been shown that the best and most economical time to guarantee that every child reaches their full potential is during the early childhood phase. [69]

Additionally, it is asserted that long-term investments in early childhood have a significant positive impact on health promotion and illness prevention.[70]

To emphasise the necessity of early childhood development-focused interventions and policy, research evaluating children at risk of development delay in all domains may be crucial.[71] Furthermore, a correlation has been demonstrated in the past between children's development outcomes and dietary, anthropometric, and biological parameters [72,73]

A kid's growth and development are most sensitive and precious throughout the first 24 months, also referred to as the initial thousand days of life (from 270 days of pregnancy to the age of two years).[74] The brain's capacity to change in response to events, takes place during this time. At one month old, a child's total brain volume is roughly 36% of an adult's, rising to 72% at one year old and 83% at two years old, when the child is 75 years old. During this time, environmental and genetic variables both play a role.

For kids to grow and develop as best they can at this time, good and correct parenting—which includes providing a healthy diet and adopting appropriate feeding practices—as well as appropriate stimulation, good health, and environmental factors—such as the place where a child lives, grows, and develops—are crucial.[74,75]

Growth is measurable in terms of body weight, height or length, head circumference, and upper arm circumference. It can be quantified using common measurement instruments. The term "development" describes the rise in intricate skills and physiological processes that are qualitative in character and exhibit a pattern as a result of maturation.[76]

There are various facets of child development, such as language, fine and gross motor skills, cognitive abilities, personal qualities, and social skills.

Kids that don't accomplish any of these developmental milestones by a given age are said to have developmental delays. A variety of factors, including social, maternal, biological, environmental, dietary, and genetic ones, might contribute to this.[77–78] The three basic requirements that children have—the need for training/stimulation (skill-building), the desire for attachment (love), and the physical/biomedical needs—must be satisfied as soon as possible.[79]

Up until now, there have been concerns about both rural and urban areas in a number of areas, such as economic equality and parents' knowledge of how to meet their children's needs. Furthermore, urban areas have dense populations, but rural geographical factors result in sparser population densities. This further distinguishes the contact patterns in rural and urban families.[80]

The environmental aspects of the communities where children reside have a significant impact on their development and growth. In comparison to urban areas, rural populations have higher rates of poverty and stunting. Furthermore, compared to rural areas, metropolitan areas have more complete infrastructure and amenities, such as access to clean water, healthcare, and educational opportunities. This

demonstrates how children who reside in rural locations are more likely to lack access to quality infrastructure and amenities that would promote their development and growth.[81]

Children make about one-third of Indonesia's population. Indonesia has the fourth-highest child population in the world, with almost 80 million children living there. Certain kids reside in big cities. Children in isolated rural locations suffer with poverty and limited access to essential amenities, while children in metropolitan areas are primarily concerned with pollution and poverty.[82]

In an analysis of growth abnormalities and weight deficits in toddlers in urban and rural settings, Muljati et al.'s study revealed that 42.6% of toddlers in urban areas and 53.8% in rural areas had below-normal growth. Over half of the participants in this study were from rural areas, and 62.9% of them were classified as poor.[83] As a result, initiatives to enhance nutrition should also align with initiatives to strengthen the economy, particularly in rural areas.

Additional research examining the association between socioeconomic position and short stature at 24 - 60 months of age indicates that children from middle-class to lower-class families are more likely to have short stature. Short stature.[84] is strongly correlated with fathers' employment, family incomes, parents' educational attainment, and weight for age.

The first twenty-four months of life, or the period from conception to twenty-four months of age, are critical for a child's overall growth. The aim of this research was to describe the developmental stage and the environmental factors influencing it

in children between the ages of six months and two years who live in both urban and rural areas.

A study was carried out from November 2022 to December 2022 at particular healthcare center in the city of Bandung. These research sites were purposefully chosen. Healthy children between six months and two years of age, along with their consenting parents, were the subjects of a cross-sectional study. Employing the Developmental Pte-screening Questionnaire, which provides classifications for both developmental delays and typical developmental test results, researchers conducted developmental testing.

A total of 346 kids fulfilled the study's inclusion requirements, making up 164 males (47.4%) and 182 girls (52.6%) in the sample. Between children with developmental delays in urban and rural locations, there were no appreciable differences.

The child's age, amount of screen time, level of stimulation, diet, and use of the mother-child guidebook are the factors that contribute to developmental delays in the two research domains.[85] In the Bhatar block of the Burdwan district, cross-sectional research conducted in a community include children aged two to twenty-three months was carried out between July and November of 2016. The computed sample size was 277 with respect to 9.5% prevalence (as reported by Meenai et al. from Bhopal), 95% confidence range, 5% absolute error, design effect 2, and 5% non-response.

Equal numbers of children were picked from each of the fourteen gramme panchayats in the Bhatar block, and one village was chosen at random. A pre-planned timetable was used to interview the respondents in order to gather data.

The developmental status was assessed using the Trivandrum developmental screening chart. Using the logistic regression and chi-square test, a value of $p<0.05$ was deemed statistically significant. Globally, developmental delay is a hazard for public health. Approximately 200 million children under five show substantial delays each year; 86% of these children live in developing nations. For effective measures, screening and early detection have thus been prioritized. The study aimed to ascertain the correlation between demographic and socioeconomic characteristics and the prevalence of developmental delay in children under two years of age. 7.9% of people had a developmental delay overall. Gender, birth weight, mother education, and place of delivery were found to have significant associations using the chi-square test; these factors also remained significant in logistic regression.

There was no significant correlation between socioeconomic level, gestational length, or age at delivery. Children in rural areas have a notably higher rate of developmental delays. A more comprehensive investigation utilizing suitable diagnostic instruments could determine the true burden and factors that dictate the required actions.[86]

309 children under the age of five who matched the inclusion and exclusion criteria were included in the study, which ran from May to August 2023 using a cross-sectional study design. The home socioeconomic factors, sanitation and hygiene parameters, and child characteristics are among the data used. The weight-for-age index was used to measure children's nutritional status, which served as the

dependent variable. If the children's z-score was less than -2 standard deviation (< -2 SD), they were categorized as underweight. The chi-square test was utilized in bivariate analysis.

For multivariate analysis, multiple logistic regression testing with a significance threshold of less than 0.05 was employed. There are numerous reasons associated with underweight, including socioeconomic and familial factors. Early-life linear growth retardation, or stunting, is characterized by a reduction in physical, neurodevelopmental, and economic potential as well as an increased risk of morbidity and mortality. Compared to wasting/thin children, stunted children are more likely to be underweight. Examining the risk factors for underweight in children under five in the stunting locus area of West Java, Indonesia is the aim of this study. According to the findings, 20.4% of the kids were underweight. According to a logistic regression analysis, children who consume less iodized salt are more likely to be underweight (OR: 1.789; 95% CI: 1.004-3.218), and children whose fathers have lower levels of education are more likely to be underweight (OR: 1.895; 95% CI: 1.070-3.354).

Support for sustained iodized salt fortification from the local government is necessary, as is the incorporation of gender and family dynamics into nutrition program implementation.[87]

For children, the development of their early years has a major influence on their future health and well-being. to ascertain the impact of sociodemographic variables on children under the age of five's Early Child Development Index (ECDI). The factors that had the biggest impact on ECDI were child's age and sex, followed by the mother's educational attainment, financial circumstances, child's nutritional

state, reading children's literature, and functional concerns. In Bangladesh, Costa Rica, and Ghana, boys had lower development odds than girls, and children between the ages of 36 and 47 months had worse development odds than those between the ages of 48 and 59 months.

In Costa Rica, urban children had worse chances of developing than rural children, while in Ghana, the odds were higher. In all three nations, we advise governments to take the required actions to improve children's early development and well-being through increased educational attainment, better economic conditions, and access to a healthy diet.[88]

Early childhood development (ECD) describes the physical, mental, and motor development of a child, and socioemotional development up to the age of eighty-nine or ninety.[89] Eleven percent of children under five are underweight, five percent exhibit signs of wasting, and twenty percent develop slowly.[90] Child development begins at conception, and the first few years are crucial since this is when the brain develops its capacity for improvement and improves at the fastest rate. This foundation is related to health and quality of life.[91]

During the first five years of life, a child's brain develops by 90%, making these years crucial.[92] ECD is slated to be a priority for the twenty-first century, according to the Sustainable Development Goals (SDGs) Agreement. [93] One aim (4.2) in the new sustainable development agenda is pertinent to ECD. According to Target 4.2, governments must guarantee that all boys and girls have access to high-quality preprimary education, early childhood development, and care by 2030 in order to prepare them for primary school. [94] The SDGs' benefits to ECD, however, go beyond this objective specifically focused on education. Strengthening ECD by

addressing issues of poverty, hunger, health (including child mortality), education, gender, water and sanitation, and inequality is essential to meeting at least seven of the Sustainable Development Goals.

It is imperative that children receive attentive care, a healthy diet, affection, and a secure atmosphere in order for them to reach their maximum potential. [95] In 2007, a number of studies found that due to inadequate learning opportunities and nutritional deficits, almost 200 million children under the age of five in low- and middle-income countries (LMICs) could not reach their full developmental potential. [96-97]

Diverse climates and economic downturns have also increased the number of impacted children.[98-99] Poverty combined with biological and behavioural risk factors causes an imbalance in ECD that puts adult productivity and educational performance at jeopardy.[100–101]

The cognitive and socioemotional development of young children is significantly impacted by high-quality preschool education.[102-103]

Costa Rica, which mandates preprimary schooling for all young children, has emerged as a global leader in early childhood development (ECD). Preschool allowances are increased in Costa Rica, especially for kindergarten, and children aged three and four must attend first-grade preprimary education.[104–105] in order to be admitted to the first-grade school. Due to inadequate nutrition, frequent illness, and an unfavorable environment, one in five children in Ghana grow slowly. This stunting of growth affects the child's early learning, academic performance, and, in the end, their socioeconomic development.[106] Ghana introduced a two-year

preprimary education program in 2007 for kids ages three to four. Preprimary school attendance has gone up recently, and Ghanaian education has been better.[107–108]

Due to significant obstacles like poverty, a shortage of trained educators and healthcare providers, and a lack of financing, our understanding of ECD is still developing.[109] Ssince the majority of parents lack experience with child care and raising. The Centre seeks to offer vital components of infant development, including learning,[110] early nutrition, stimulation, and security. A small number of the Center's events are directed towards parents or kids younger than three, while the majority are geared towards preschoolers.

Numerous studies have demonstrated that a variety of variables, including poverty and education, have prevented many children under five in LMICs from developing to their full potential. The current study sought to identify factors influencing the growth and development of rural children in Belgaum. This should give academics and decision-makers current knowledge on the development of young children and assist them in creating relevant guidelines and initiatives.

1.3) TITLE OF THE STUDY

Determinants of growth and the development in under five rural children: a cross sectional study.

1.4) OBJECTIVES OF THE STUDY

- To assess the growth and the development among under five children in rural Belagavi.
- To estimate the determinants of growth and development among under five children in rural Belagavi.

1.5) ASSUMPTIONS:

- Mother of children less than five years have knowledge regarding growth and development
- Under five children's of rural area are highly nourished in to some extent.

1.6) HYPOTHESES

Hypotheses is tested at 0.05 level of significance

H_1: Children under the age of five growth and development will be significantly Associated with the Demographic factors that were chosen for them.

H_2: There will be significant association between biological factors. Demographic factors and status of growth & development among under five-year children.

1.7) OPERATIONAL DEFINITIONS:

- **DETERMINANTS:** A determinant is a cause or a factor that directly influences a decision or causes something to happen. In the current study, "determinants" refers to the variables that affect development and growth.
- **GROWTH:** It is a quantitative shift brought about by the process of physical maturation that causes the body to grow in size, it can be measured in centimeter's, kilograms.
- **DEVELOPMENT:** It is the process by which an individual's skill and capacity to function gradually increase as they mature physiologically and functionally. It is a shift in quality.
- **UNDER FIVE CHILDREN:** Children less than five years of age.
- **RURAL:**The areas that are located outside of urban centers and are characterized by lower population density

Assessment is done based on

- Anthropometric measurements (height and weight) Assessed By WHO Standard Tools.
- Growth and development assessed by five Domains ICMR Development Screening Scale

CONCEPTUAL FRAMEWORK

Conceptual framework based on UNICEF model for analyzing the causes of growth and development, 2020 16

The model of concept is a collection of interconnected portions or/ and summaries that are organized in a chronological and systematic order according to their relevance to one framework, and this model is sometimes referred to as or also called as conceptual framework.A conceptual framework is a collection of statements, each of which expresses a relationship. The statements are organized in a logically interconnected deductive system that allows new statements to be derived from them.

Theory is known as an abstract and systematic explanation of several aspects of reality. To describe some of the part of the globe in a theory each of the concepts are connected to one another in a systematic and interconnected ways. Theories play a vital role in both qualitative and quantitative research. A conceptual framework for understanding growth and development in children under five years is essential, as these early years are foundational for physical, cognitive, emotional, and social development. This conceptual frame work emphasizes that child development is multidimensional and influenced by an interplay of biological environmental, social and personal skills.it can guide intervention and policies aimed and improving outcomes for under five children's

In this study UNICEF's model was used to analyze the causes of growth and development of under-five children. The main reasons for child's growth and development are caused by mainly three reasons, namely immediate, underlying and basic causes.

Immediate factors

This study discovered that the majority of mothers breastfed their newborns, despite the fact that nursing has a positive impact on a child's survival.

Breastfeeding is always best milk to children’s growth and development also important for growth and development of children’s lowers illnesses including infant diarrhea and respiratory tract infections, which were thought to be primary causes of growth and development.

Birth weight is a key indicator of a newborn's health and can have lasting effects on growth, development, and even health outcomes later in life.

Antenatal care plays a crucial role in supporting healthy fetal growth and development. Proper antenatal care ensures the mother’s health, which directly influences the child’s growth in the womb and sets a foundation for healthy development after birth. Here's how antenatal care contributes to a child’s growth

Underlying factors

A mother’s age, education level, and occupation can significantly impact a child’s growth, development, and long-term health outcomes. Here’s how these factors influence different aspects of child development.

Mother’s age, education, and occupation collectively shape a child’s early environment, impacting health, cognitive development, social skills, and emotional well-being. Each factor contributes uniquely, and support systems or interventions can help address potential challenges, promoting healthy growth and development for the child.

The household and dwelling aspects significantly impact a child's growth and development in various ways. These factors create the physical, emotional, and social environment that shapes a child's early experiences the household and dwelling aspects significantly influence a child's growth and development through safety, health, emotional support, and access to resources. Creating a nurturing and resource-rich environment is essential for fostering healthy development in children under five years old, as it sets the foundation for their future physical, cognitive, and social well-being.

Basic factors: Child growth and development influenced by a combination of biological, environmental and social factors

Biological factors: Play a crucial role in shaping a child's growth and development. Here are some key biological factors and their impacts

Maternal Health: The mother's health during pregnancy (nutrition, stress levels, and exposure to toxins) significantly impacts fetal development.

Birth Weight: Low birth weight is associated with increased risks of developmental delays and health complications.

Motor Skills Development: Biological readiness for physical activity affects motor skills development, which is important for overall growth and coordination.

Environmental factors significantly influence a child's growth and development as Socioeconomic Status

Income Level: Higher socioeconomic status typically correlates with better access to healthcare, nutrition, and educational resources.

Education of Caregivers: Educated parents are often more aware of health and developmental needs, providing better support for their children.

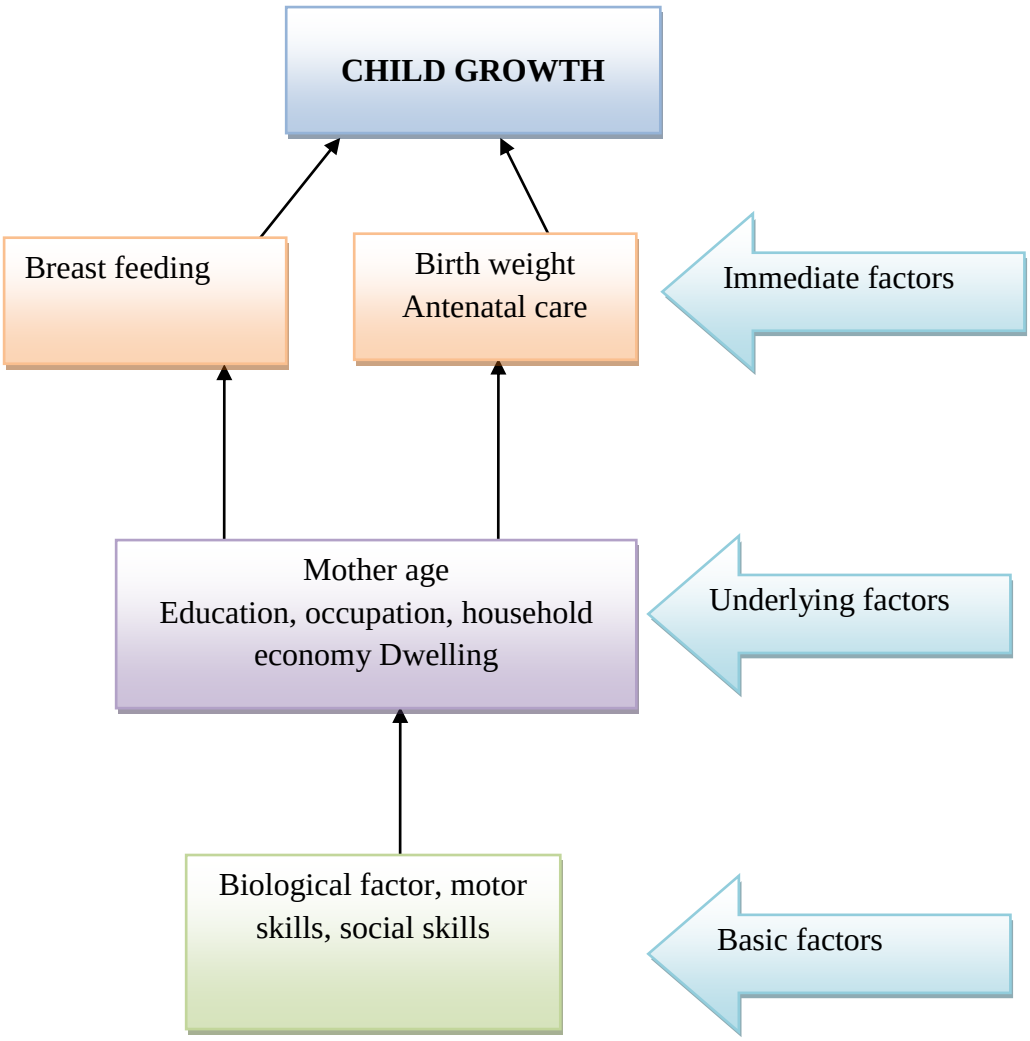
The environment in which a child grows up plays a vital role in their physical, cognitive, social, and emotional development. A supportive and enriching environment can help children thrive and reach their full potential.

Social factors play a crucial role in a child's growth and development, influencing various aspects of their physical, cognitive, emotional, and social well-being. Here are some key social factors and their impacts: Family Size: Larger families may mean less individual attention for each child, potentially affecting emotional and educational support.

Language and Communication: Cultural factors influence language development. Children exposed to rich language environments tend to develop better communication skills and cognitive abilities.

Social Skills Development: Interactions with peers help children develop important social skills, such as sharing, cooperation, and conflict resolution, which are critical for emotional and social growth.

Social factors significantly shape a child's growth and development by influencing the resources available to them, the quality of their relationships, and the overall environment in which they grow up. Addressing these social determinants through supportive policies, community programs, and family interventions can lead to better outcomes for children, fostering healthier, more resilient individuals.



Conceptual framework adapted from UNICEF

CHAPTER -II

REVIEW OF LITERATURE

A literature review establishes the study's framework and generates fresh concepts for investigation. An early literature review in the report gives readers a context for comprehending what is currently known about the subject and highlights the importance of the new research.[111] the following literature, which has been divided into the following headings, has been evaluated by the investigator in the course of organizing the current investigation.

Literature Pertaining to

- **Literature Pertaining to Biological factors**
- **Literature Pertaining to Growth and development delay**
- **Literature Pertaining to Social determinants**

- **Literature Pertaining to Biological factors**

A study was states that C-section babies are more likely to be colonized by opportunistic pathogens, affecting growth. We compared the effects of C-section (elective/emergency) versus vaginal delivery on weight and linear growth at one year. The MAASTHI cohort 2016-2019 included 638 mother-infant pairs. Medical records revealed delivery mode. BMI-for-age (BMI z) and length-for-age (length z) were calculated using WHO child growth standards. In both cases, multivariable linear and Poisson regression models were used. The C-section rate was 43.4 percent (26.5 percent: emergency, 16.9 percent: elective). 14.9 percent of infants were overweight. Elective C-sections had a BMI of 0.57 (95 percent CI 0.20, 0.95) higher than vaginal deliveries. Elective C-section babies had a 2.44 (95% CI 1.35, 4.41) higher risk of being overweight than emergency C-section babies. In addition, elective C-section delivery was linked to reduce linear growth at one year (=0.38, 95 percent CI 0.77,0.01). Elective C-section delivery may contribute to excess weight and possibly reduced linear growth in children aged one year.

A study was stated Consanguineous marriages are common in North Africa, Central and Western Asia, and most of South Asia. Researchers believe consanguinity harms children's development, but proving this is difficult because marrying a relative may be endogenous to other socioeconomic factors. Using a unique dataset collected in rural Pakistan, this study examines consanguinity and child cognitive ability. It's possible that prior research understated the negative effects of consanguinity on child outcomes. After adjusting for current household wealth and parent education, this study examines the impact of endogenous consanguinity on child cognitive skill and height-for-age. A lower IQ, shorter height-for-age ratios, and a higher risk of severe

stunting in consanguineous children Notably, when endogeneity of consanguineous unions is considered, negative effects on child development are substantial and likely to be greater than previously thought. The goal of improving child development in areas where cousin marriage is common should be to reduce the incentives for consanguineous marriage.

- A study was conducted to understand the relationship between the time of developmental milestones and preadolescent obesity and the route of delivery (vaginal vs. CS). The study used a parent survey and dual energy x-ray absorptiometry in preadolescence. For each developmental milestone, the parent provided information on the child's age for rolling over, sitting up, standing, walking, talking, potty training, dressing, and feeding themselves. 10 year olds (N = 104) were included. The outcome measures included the combined z-score for developmental benchmarks, delivery mode, and preadolescent adiposity. Infants delivered vaginally had accomplished developmental benchmarks ahead of both planned and emergency caesarean sections. They also shed light on the impact of elective versus emergency CS.[112]

- A study was conducted to compare the effects of Caesarean-section (elective/emergency) versus vaginal delivery on weight and linear growth at one year. The MAASTHI cohort 2016–2019 included 638 mother-infant pairs. Medical records revealed delivery mode. BMI-for-age (BMI z) and length-for-age (length z) were computed following the WHO's guidelines for child growth. In both cases, multivariable linear and Poisson regression models were used. The C-section rate was 43.4 percent (26.5 percent: emergency, 16.9

percent: elective). 14.9 percent of infants were overweight. Elective C-sections had a BMI of 0.57 (95 percent CI 0.20, 0.95) higher than vaginal deliveries. The study concluded that the elective C-section delivery may contribute to excess weight and possibly reduced linear growth in children aged one year.[113]

- A study was done on rural Pakistan patients to examine the relationship between consanguinity and child cognitive ability. After adjusting for current household wealth and parent education, this study evaluates the impact of endogenous consanguinity on child cognitive skill and height-for-age. A lower IQ, shorter height-for-age ratios, and a higher risk of severe stunting in consanguineous children Notably, when endogeneity of consanguineous unions is considered, negative effects on child development are substantial and likely to be greater than previously thought. The goal of improving child development in areas where cousin marriage is common should be to reduce the incentives for consanguineous marriage.[114]

- A research was done to study consanguineous marriages and fertility. 999 families from five Muslim communities in Jammu were recruited. The inbreeding coefficient was calculated using family pedigrees (F). Intensity of selection, secondary sex ratio, and lethal equivalents were measured. The results showed that inbred groups had higher gross fertility than unrelated families ($P < 0.05$), and consanguineous families had higher mortality rates than non-consanguineous families in all populations. The highest inbreeding coefficient families had the highest mortality rate (F). The selection intensity (SI) increased with increasing inbreeding coefficients. Autosomal inheritance

had higher LEs/gamete values than sex-linked inheritance. Our findings show that consanguineous marriages negatively impact reproductive outcomes.[115]

- A prospective longitudinal cohort study was done to assess the relationship between caesarean birth, body fat percentage, BMI, and childhood obesity. Children born between November 2007 and February 2011 were included. Success metric The International Obesity Task Force defines obesity as being overweight or obese. 362 (27.8%) of 1305 babies were delivered CS. Regression analysis found no significant differences in BF percent at two months. Baby born via CS had a higher BMI at six months (adjusted mean difference=0.24; 95 percent confidence interval [CI] 0.06-0.41, p=0.009). At two years, there was no difference in the risk of being overweight or obese, when children who were macrosomia at birth were excluded from the model. CS babies had a higher BMI at six months, but this did not last into childhood. There was no evidence that the mode of delivery affected the child's risk of obesity.[116] This study was in consistent with Stefan kuhle et al.[117]

- The UK Millennium Cohort Study, was used to assess the CS delivery and childhood obesity (MCS). Maternal-infant pairs were recruited for MCS. Using sampling weights ensured the sample was representative of the population. Contraception, assisted vaginal delivery (AVD), planned and emergency caesarean sections (CS) were all exposed (CS). Obesity prevalence in children aged three, five, seven, eleven, and fourteen was calculated using IOT criteria. They used mixed-effects linear regression to account for variables like maternal age, pre-pregnancy BMI, education, and infant macrosomia. There was no correlation seen between child BMI and either

planned (adjusted mean difference = 0.00; There was no association between planned CS and BF percent at ages 7 and 14. [118]

- In Belahara, Dhankuta district, 150 children under the age of five participated in a cross-sectional comparison study. Anthropometry was used to estimate the prevalence of underweight, stunting, and wasting. The statistical tool of logistic regression was employed to examine the impact of various factors. Stunting, wasting, and underweight prevalence were 27%, 37%, and 11%, respectively. Stunting was found to be less common in children from joint families than in nuclear families. Only at the 10% level of significance were other factors, like the child's ethnicity and the mother's age at conception, found to be significantly correlated. Given that maternal age at pregnancy has been linked to children's nutritional status, nutrition guidance during ANC visits ought to take this into account.[119]

- A Community-based under-five children in South Delhi during 2016 on 500 samples by using random sampling technique to know the growth and development of children. A study's findings indicated that babies made up 23.5% of the sample, followed by youngsters aged 13 to 24 months with 29% of the total. 13.8% of the kids were seriously underweight, and 4.0% of the kids were underweight overall. A maximum percentage of kids (9.2%) had delays in their concept development, language, and hearing, while 6.2% had delays in their fine motor and vision skills. The percentage of eligible research participants with delayed gross motor development was less than 2%. In the areas of social and self-help abilities, there was a 0.8% and 0.7% developmental delay, respectively. [120]

- A multicenter study was conducted on the creation and harmonisation of psychosocial development measures that are suited for different cultures for kids in China, India, and Thailand between the ages of 0 and 6. 13270 kids in all were registered for the study. The study found that while most gross motor skills were developed at roughly the same age, vision, fine motor, language, and concept development were developed relatively later. In the Asian series, the mean social skills development period ranges from 22.1 months to 26.6 months. [121]

- A collaborative multicenter cross-sectional study was done on children less than 6 years to assess the creating straightforward and trustworthy signs to identify developmental problems early by using ICMR Developmental Screening Scale. The children's 50th centile figures from Chandigarh and Jabalpur studies were compared with the ages at which the students at the Hyderabad programme achieved their academic goals. According to the study's findings, these centiles can be used as benchmarks for comparing kids in the same neighbourhood. The outcomes for rural children in the Hyderabad centre were quite comparable to those in the rural areas. [122]

- A cross sectional descriptive research study was conducted at Aligarh on four hundred and sixty-eight children to assess the global developmental delay. A total of 468 youngsters, ages 0 to 3, were enrolled in the study, according to the results. The age group of 0–12 months had the greatest delay (7.0%). Prematurity and undernutrition accounted for the two most common etiological diagnoses (21% each). Stepwise binary logistic regression revealed that maternal illiteracy and stunting were the microenvironmental factors,

whereas preterm and a history of seizures were the significant biological predictors. The results of a study indicate that some biological and environmental factors can predict developmental delays, which can help with the start of the appropriate interventions.[123]

- A cross sectional study was done on 933 study population by simple random sampling by using a questionnaire. Demographic data, nursing habits, sociocultural and economic aspects, and anthropometric measurements (weight and height) were all included in the questionnaire. The study included 453 boys and 480 girls. Compared to children in nuclear households (18.15%), it was higher in children living in blended families (23.86%). Children of moms with only a secondary education or less were more likely to be stunted. Mothers who worked as farmers had a greater rate of stunting (35.5%), with a p-value of 0.027. There was no statistically significant variation in either nutritional status or socioeconomic standing.[124]

- A cross-sectional school-based study was carried out to ascertain the prevalence of obesity and evaluate the factors linked to it among the 1185 secondary school students in Udupi. Body Mass Index was computed using the measured weight and height. Overall, it was discovered that 6.2% and 10.8% of children were fat and overweight, respectively. It was discovered that there was a substantial correlation between being overweight or obese and attending private schools, identifying as Muslim, and having a parent who works in business. The start of adult obesity may be traced back to childhood, so it's critical to execute school health programs effectively to lessen the burden of childhood obesity. [125]

- A cross-sectional study was conducted at 20 posyandus, or integrated health posts, in Ngemplak, Boyolali, Central Java, 2018. By using simple random sampling, 203 youngsters under the age of five made up the sample. The development of the youngster was the dependent variable. The independent variables included the mother's age at conception, the duration of labour, the birthweight, hypoxia at delivery, and family income. Prolonged labour had a negative impact on children's development. Maternal age during pregnancy, the lack of birth asphyxia, birthweight, and family income all positively impact the development of the child. Prolonged labour has a negative impact on a child's development. Posyandu has a significant contextual impact on a child's growth. [126]

- A comprehensive evaluation of the literature was done to identify modifiable paediatric obesity risk variables that are present from conception to age two years old. The results of childhood overweight or obesity (BMI ≥85th percentile for age and sex), which were gathered between the ages of 6 months and 18 years, were the main focus of the study. There was a consistent correlation found between a number of risk variables during the first 1,000 days and subsequent childhood obesity. A smaller number of studies also corroborated the following risk factors for childhood obesity: infant antibiotic exposure, gestational diabetes, low SES, weak mother-infant relationships, reduced sleep, inappropriate bottle use, introduction of solid food before 4 months of age, and child care attendance. [127]

- A study was conducted to evaluate the development and growth of children under five in a chosen Haryana community using the latest WHO growth

standards. In order to evaluate the growth and development of the rural and urban communities in Ambala, Haryana, a descriptive design research was carried out. Through a door-to-door survey, 140 under-five children from a conveniently chosen environment were enrolled. Regarding the start of breastfeeding, 73 (52.1%) of the newborns were nursed for one hour. When it came to the introduction of solid food, almost half of the children began at 6-7 months of age. A nutrition education program for parents of young children is necessary because, while few children were actually malnourished, many were at risk of both acute and chronic malnutrition.[128]

- A research was done to assess the relationships between a child's cognitive and visual-motor abilities at age three and their weight gain from birth to six months of age. They examined 872 individuals in the ongoing prospective longitudinal prebirth cohort known as Project Viva. Their primary predictor of baby weight increase was the weight-for-age z score at six months, adjusted for the weight-for-age z score at birth. There was no correlation found between slower infant weight gain and worse neurodevelopmental outcomes in healthy, term 3-year-old children.These findings should help identify the best growth patterns for infants in order to balance the long-term health outcomes' benefits and hazards.[129]

- **Literature Pertaining to Growth and development Delay**

- A research study was done to investigate young children's developmental profiles. The Trivandrum developmental screening chart (Nair, 1991) was used to measure developmental delay, and ICMR Screening Test Battery was used to measure psychosocial development. 384 children under the age of two

who were specifically chosen from Kochi, Kerala's coastline area make up the sample. Using the TDSC, 3.9 percent of children demonstrated a delay; on the ICMR screening test battery, the thorough screening exam, the delay varied from 1.3 to 8.1 percent. [130]

- A study was done to determine the incidence of developmental delay from 2003 to 2016 and analysed the resulting trends. The federal government has compiled data from local centres into a national registry. They analysed the data from the national registry. Participants During the study period, the number of children under six years old ranged from 1,164,150 to 1,577,443 per year. They computed annual incidence rates by age, gender, and geographic region and evaluated trends throughout the study period. Because females had a higher percentage of early reporting, it is doubtful that male sex was a risk factor for DD because boys did not appear to receive as much attention. Additionally, we discovered that children with DD seemed to be more likely to reside in rural areas. [131]

- A cross sectional study was sone on 202 mothers and their infants. Infants' developmental status was evaluated using the Psychosocial Development Screening Test, created by the Indian Council of Medical Research, and mothers were questioned to gather sociodemographic information. According to the results, 92.5% of infants met their personal skills milestones on time, 91.8% met their 90.6% of them achieved their gross motor milestones and the benchmarks for hearing, language, and idea development. The percentages for social skills (81.4) and vision and fine motor (88.6) were lower. The infant's sex and the family's socioeconomic standing have a big impact on the few

domains of development. Other variables such as the age of the newborn and the mothers' literacy level were not substantially impacting the development. [132]

- A study was done to understand the socioemotional and cognitive development of 0–5-year-old children, as well as the percentage of kids that have developmental delays and the variables that go along with them. A community-based cross-sectional study of 520 Delhi children was conducted. Using the ICMR Development Screening Test, development was evaluated. Overall, 10.6% of 5-year-old children were developmentally delayed. A maximum percentage of children (10.1%) were found to have delayed hearing, language, and concept development. The strongest association was found between all factors and alcohol misuse, stunting, father education, and participation in playschools and Anganwadi programs. [133]

- A study was performed to determine how common developmental and growth delays are in kids between the ages of one and five and explore their association with mother’s age. Among them were seventy Thai moms, all under thirty-four, who had brought their first child to a regional hospital's postpartum unit. Although the prevalence of language delay was larger in boys than in girls (21.4% versus 9.5%), the difference was not statistically significant. Children between the ages of 36 and 62 months showed considerable delays in their development, especially in the area of gross motor skills.Underweight and stunting were prevalent among children aged 12 to 35 months, whereas wasting was more prevalent among those aged 1-3 years. [134]

- A cross-sectional investigation was done to evaluate development status of infants and their mothers by using psychosocial developmental screening test developed by Indian Council Medical Research. The study's conclusions were 92.5% for gross motor milestones, 91.8% for language, hearing, and idea development, and 90.6% for personal skills. For social skills (81.4%) and vision and fine motor (88.6%), these percentages were lower. A study came to the conclusion that the infant's sex and the family's socioeconomic standing have a substantial impact on the few developmental domains. Infant growth was not much impacted by other characteristics, such as the infants' age or the mother's level of literacy.[135]

- A study was performed to assess the growth faltering and determinants like employing a pre-tested questionnaire to gather information on vaccination history, morbidity profile, food history, and child feeding practices. According to a study's findings, each child's anthropometric measures are taken every month. Among children aged 0 to 6 years, the cumulative incidence of growth faltering was 930 per 1,000 children annually (95% CI 900.8–959.2). According to the study's findings, the multivariate analysis revealed that the presence of anaemia, the existence of any disease, and inadequate ventilation in the home were the three main predictors of development halting. [136]

- A cohort study was conducted to establish the determinants of cognitive development among village children of Haydon, North-central Tanzania to determine the risk variables connected to unhealthy and poor growth in children. A study result shown that an association was established among cognitive outcomes at 1.5 years of age, socioeconomic standing and living

conditions at six months of age and nutritional status of children. Also, the development of the motor, cognitive, and language domains were assessed. 262 children were recruited for this study, however only 137 with 15-month Bayley scores were analysed. According to the findings of a study, hunger was linked to poorer gross motor development and poverty to slower cognitive development. [137]

- A research was done by assessing NHFS-1 and 3 datasheets that were accessible to them in order to calculate the WHO growth requirements for 2006. Three indicators of children's nutritional status are provided by this survey: weight-for-height (which indicates short-term malnutrition), height-for-age (which indicates both acute and chronic malnutrition), and height-for-age (which indicates long-term malnutrition). According to the study, a large portion of the growth faltering in the early years of life could be linked to stunting, or faltering in height for age, as roughly half of all faltering that had occurred by the end of the first three years of life was present at birth. [138]

- In a rural Uttar Pradesh, India, setting, preschool-aged children from low socioeconomic backgrounds had their nutritional anthropometry measurement done. The boys' and girls' weights were lower than the international average for their age and height. Furthermore, height for age reveals previous nutritional history; these underweight kids experienced development failure for extended periods of time at a later age or for shorter periods of time at an earlier age.[139]

- A multicenter cross-sectional research with 185 children suffering from uncomplicated severe acute malnutrition was conducted. They conducted a screening for clinical problems and nutritional status in children ages 6 to 59 months. Children who met the requirements for inclusion completed the Denver Development Screening Tool II (DDST-II). In order to determine the sociodemographic and dietary characteristics that are predictive of developmental delay, a pretested questionnaire was utilized to gather data. This data was then analyzed using a multivariate logistic regression model. Infants under two years old were especially vulnerable because of inadequate nursing care. This highlights the necessity of giving parents in distant locations with enough infrastructure and information in order to prevent developmental delays. [140]

- In a 2018 study, 150 children under the age of five had their growth patterns and the frequency of undernutrition was examined. By comparing the anthropometric measures of children under five years old to the 2006 WHO standards for height and weight according to age, the study aims to assess the nutritional status of these youngsters. The study reports that the overall prevalence of stunting and underweight in the studied population is 31.33% and 20.65%, respectively. [141]

- A cohort study was designed to assess, in a generally well-nourished population, the relative impacts on cognition of both overall and period-specific postnatal development, as well as their interplay with foetal growth. 1052 kids were included in the study design as a potential cohort. Growth velocities for each phase, including early infancy, late infancy, toddlerhood,

and early childhood, were also estimated, along with standardized overall. Lower verbal IQ was correlated with higher overall BMI velocity. Higher picture memory score and lower verbal IQ were associated with increased BMI velocity in late infancy, whereas higher design memory score was not. Generally well-nourished children may not gain cognitively from quicker linear development, with the probable exception of those with lower birthweights compared to gestational ages.[142]

- A cross-sectional study was performed in which 2000 seemingly healthy children between the ages of 0 and 6 (1200 in urban areas and 800 in rural ones) had their nutritional and developmental needs evaluated, and potential risk factors in their surroundings were carefully examined. Among the sample that showed a direct positive correlation with the 45 skills examined, more wealth was the only significant protective factor, notably for the 2–6 year age group. Nineteen developmental skills showed strong developmental predictions. A prototype for a home-based screening record was developed to monitor progress, and even a primary care physician with no training could use it. [143]

- A community based study was conducted to assess children under five who resided in the impoverished areas. The data analysis software used was R. After utilising chi-square to evaluate the association between associated factors and developmental status, logistic regression was carried out. Children's height for age, gender, socioeconomic status, availability of learning resources, prevalence of infectious diseases, and age were found to be highly linked ($p<0.05$) with the developmental stage of the children in the

study. In four different regions, more than half of the children in the research showed signs of developmental impairments. The results of the study suggest that children living in conditions similar to slums ought to be the focus of similar studies. [144]

- A research was conducted to determine the factors influencing the motor, linguistic, and cognitive development of Nepalese infants aged 6 to 11 months. Using the third edition of the Bayley Scales of Infant and Toddler Development, six hundred newborns with a length-for-age z-score <-1 were evaluated (Bayley-III). Data were gathered on the home environment, clinical and biological variables, child and maternal demographics, and socioeconomic aspects. Deficient cognitive and language composite scores were linked to parental accounts of physical punishment and absence of spontaneous vocalisation, respectively. Their results highlight the significance of biological risk factors that marginalised children in low- and middle-income nations like Nepal confront, and they also uncover significant variables for developmental scores in infancy. [145]

- A study was conducted to determine the extent of malnutrition and the factors influencing it in both tribal and non-tribal people in a rural area of southern Rajasthan.In the 200 houses from each of the two communities that were included in the cross-sectional survey conducted between March 2018 and February 2019, there were 334 and 295 children under the age of five, respectivelyIt was shown that there was a high correlation between malnutrition and variables such as mother literacy and family income.Separate strategic interventions for tribal and non-tribal children, along with health

education, good access, and healthcare utilisation, can be very successful measures to overcome the burden of malnutrition. [146]

- **Literature Pertaining to Social determinan**
  - A questionnaire based study was conducted in an Islamabad tertiary care hospital. Inquiries were made about the participants' ages and educational levels as well as their castes and the number of anomalous children they had. Using convenience sampling, 62% of 300 women had consanguineous marriages and 38% had non-consanguineous unions. Congenital anomalies were absent in the consanguineous group. The marriage type had no effect on miscarriage rate. Regardless of education or social status, most women prefer cousin unions for traditional and familial reasons. Prenatal genetic counselling sessions should be included in community programs to raise awareness about the effects of consanguinity on future generations. [147]

- A study was performed to understand the relationships between blood-related marriage and children's nutritional health. Bivariate and logistic regression models were used in the study. In Pakistan, 71 percent of consanguineous marriages (66%) are in Sindh, followed by Baluchistan (70%) and Punjab (65%) and ranges from 72-78 percent among socioeconomically disadvantaged groups and rural (71%) areas. Compared to non-consanguineous marriage, the risk of child stunting and child underweight is higher in consanguineous marriage. Even after adjusting for other CMW characteristics, the findings point to a relationship between consanguineous marriage and stunting and underweight children. Consanguineous marriages

(CM) child health interventions must provide tailored information on awareness and programs. [148]

- A research was done to examine the association between mode of delivery and BMI in 4–5-year-old children of White British (WB) and Pakistani ethnicities. Data were gathered from the Born in Bradford (BiB) cohort, which recruited pregnant women between 2007 and 2010 at the Bradford Royal Infirmary. Children were divided into three categories: obese, overweight, and underweight/healthy weight, and the likelihood of adiposity was determined using logistic regression models. Results reported here utilizing WB and Pakistani households from the BiB research group disprove concerns that CS causes children to become more obese. [149]

- A study was conducted to examine the relationship between caesarean versus vaginal delivery and childhood adiposity, and whether the relationship varies by the type of labour preceding caesarean delivery. Waist circumference, sum of subscapular and trigeminal skinfold thickness (SS+ TR) (mm) were used to determine child adiposity (cm). This study used generalised estimating equations (GEEs) to adjust for child sex and age at outcome using linear regression models with generalised estimating equations. While caesarean delivery was linked to a higher childhood BMI-z, waist circumference and SS + TR were not statistically linked. The outcome of adiposity was unaffected by c-section delivery preceded by labour. [150]

- A cross-sectional, predictive correlation study was carried out on 92 children to evaluate their cognitive and linguistic development, growth, and their environmental and biological variables. Families were belonging to

Socioeconomic class D with poor prenatal education. The prevalence of stunted growth (14.1%), cognitive (28.6%) and language (28.3%) was below average. Educational institutes were identified as insufficient and 69.6% of homes existed with risk for development. Low scores were observed for factors associated with the neighborhood environment. The study concluded that high prevalence of stunted growth and below average results for cognitive/language development in children. Biological variables were associated growth and environmental factors were associated with development. [151]

- A research was conducted to study the determinants of growth retardation under five years children using multilevel model. For the study, 3,746 children were enrolled from the 15 Brazilian municipalities, with three phase examinations (municipalities, households and children). National census 1991provided municipality details, household and individual information was procured from predesigned questionnaires during 1999 to 2001. At the end of Multilevel module, it was reported that poor prenatal care at municipality level, low environmental, economic conditions and maternal education at household level and incomplete immunization, history of malnutrition, low birth weight and breast feeding was not reported at the individual level was the robust association with linear growth retardation. [152]

- Demographic and Health Survey (DHS) data was used to analyse the effect of change in the socio-demographic futures on underweight and stunting. The study incorporated 31,630 children aged less than five years, during 1992 to 2016 from DHS. Study outcome measure is stunting (height/weight for age)

and underweight (weight for age) scored less than -2 SD. To determine the association between socio-demographic futures with stunting and underweight, logistic regression was analysed. Even after moderate decrease in underweight and stunting in Malawi, significant in southern and central Malawi and intervention for malnutrition is required in Malawi. [153]

- A study was conducted to exclusively understand the sociodemographic relationships between consanguineous marriages and their frequency in South and Middle East Asia. Data for the study were gathered at a tertiary care hospital in Islamabad using a specially created questionnaire. There was evidence that some castes, including the Rajput and Awan, preferred marriages between first cousins. It's interesting to note that the kind of marriage did not affect the miscarriage rate ($p = 0.69$), and there were no congenital anomaly instances in the consanguineous group ($p = 0.0001$). To raise awareness of the possible impacts of consanguinity on future generations, the authors suggested incorporating prenatal genetic counseling sessions into community programs.[154]

- A cohort research was done on family socioeconomic position, home and neighbourhood environmental factors, child health and nutritional status, psychosocial stimulation, and attendance at nursery school. The cognitive performance of children at five years of age was found to be negatively correlated with unfavourable socioeconomic conditions, low birth weight, an uneducated mother, an absent father, unsanitary conditions at home and in the neighbourhood, and low birth weight. On the other hand, there was a positive correlation discovered between high levels of home stimulation and nursery

school attendance. Children's cognitive development in urban environments in developing countries could be greatly enhanced by policies that support early psychosocial stimulation and preschool experience. [155]

- A research was conducted to examine the association between early-life stunting. More than 2000 Filipino youngsters between the ages of 8 and 11 were included in the sample. This was closely correlated with less schooling. Stunting and education did not significantly interact, suggesting that both stunted and nonstunted children benefited from more education. Severe stunting at age 2 years was still substantially linked to subsequent cognitive ability losses even after multivariate adjustment. Test performance was also correlated with the time of stunting, mainly because children who had stunting at a young age also tended to have severe stunting ($\chi 2P = 0.000$). Children's scores showed less deficits at age 11 than they did at age 8. [156]

- A study examined in preterm children aged 4 to 24 months the neurodevelopment trajectories, prevalence of delays, and protective variables associated to cognitive, motor, and linguistic development. 186 preterm infants, aged 4 to 24 months, were evaluated using the Bayley Scales of Infant Development - III. The neurodevelopment scores at one year of age and the subsequent neurodevelopment at eighteen and twenty-four months showed positive, robust, and significant associations. However, the only factors that significantly predicted the variation in neurodevelopment for infants born moderately or late preterm were APGAR and maternal behaviour. To avoid unfavourable consequences later in life, intervention methods for preterm infants should begin as early as 4 to 8 months of age. [157]

- A cross-sectional study was done on 2015–16 National Family Health Survey (NFHS) on child height and weight, as well as potential confounding factors. These data were then used to build anthropometric age-profiles by a range of bio-demographic and socioeconomic parameters. Variations in the degree of stunted growth in height and weight during the first two years of life were observed in children from all socioeconomic groups under investigation. Risk factors were evaluated at the child, mother, neighbourhood, and district levels, with differing effects on child growth indicators depending on the child's age. These underlying age heterogeneity for growth determinants should be taken into consideration in nutritional treatments intended to prevent low linear growth in children in India. [158]

- In a study conducted in Melbourne, Australia, A group of 227 extremely preterm babies (birth weight less than 1250 grammes or gestational age less than 30 weeks) were included in the cohort and monitored at the ages of two and five. Poorer expressive and receptive language outcomes at age five were predicted by lower mother education and the child's lower communication skills at age two. On neonatal magnetic resonance imaging, moderate-to-severe white matter abnormalities were similarly linked to lower expressive language scores. The findings underscore the importance of taking into account biological and environmental factors in the development of language impairments and support their involvement in the follow-up of premature newborns.[159]

This studay is conducted studied the relationships between blood-related marriage and children's nutritional health. Using the third cross-sectional round of the Pakistan Demographic Health Survey in 2019-20. Bivariate and logistic regression models were used in the study. Nearly two-thirds of CMW reported consanguineous marriage. In Pakistan, 71 percent of consanguineous marriages (66%) are in Sindh, followed by Baluchistan (70%) and Punjab (65%) and ranges from 72-78 percent among socioeconomically disadvantaged groups and rural (71%) areas. Compared to non-consanguineous marriage, the risk of child stunting (UOR=1.52, CI=1.31-1.67; AOR=1.24, CI=1.02-1.51) and child underweight (UOR=1.59) is higher in consanguineous marriage. Even after adjusting for other CMW characteristics, the findings point to a relationship between consanguineous marriage and stunting and underweight children. Consanguineous marriages (CM) child health interventions must provide tailored information on awareness and programmes.

A studay was conducted examined the association between mode of delivery and BMI in 4–5-year-old children of White British (WB) and Pakistani ethnicities in Bradford, United Kingdom. Data were gathered from the Born in Bradford (BiB) cohort, which recruited pregnant women between 2007 and 2010 at the Bradford Royal Infirmary. A subsample (n = 6410) of the BiB cohort (n = 13,858) was used for these analyses. The correlation between delivery method (vaginal or CS) and BMI z scores at 4–5 years was determined using linear regression models. Children were categorised as underweight/healthy weight, overweight, and obese, and the likelihood of adiposity was determined using logistic regression models. Effect modification by race was also investigated. In this population, CS was not associated with greater adiposity in children aged 4–5 years compared to vaginal delivery. Concerns about

CS increasing adiposity in children are not supported by the results reported here using the WB and Pakistani families from the BiB study population.

A studay was conducted 2021 Some researchers attributed C-sections to childhood obesity. Few studies have examined whether labouring before delivery reduces this association. They used adiposity measurements from at least one follow-up visit (3369 total observations) to determine the mode and type of labour in 1443 mother-child dyads from Project Viva (median 12.9 y). Waist circumference, sum of subscapular and trigeminal skinfold thickness (SS+ TR) (mm) were used to determine child adiposity (cm). With 333 caesarean deliveries, 23% of women were in spontaneous labour, with 74% having induced labour, 97% not in labour, and 5% having an unknown labour status. BMI-z (0.15, 95 percent confidence interval [CI]: 0.04, 0.26); and non-significantly higher waist circumference (0.50 cm, 95 percent CI: 0.34, 1.34); (0.47 mm, 95 percent CI: 0.52, 1.46). Compared to vaginal deliveries, caesareans were not associated with childhood BMI-z (0.08, 95 percent CI:0.07, 0.23), waist circumference (0.12 cm, 95 percent CI:1.09, 0.85), or SS + TR (0.25 mm, 95 percent CI:1.44, 0.93). While caesarean delivery was linked to a higher childhood BMI-z, waist circumference and SS + TR were not statistically linked. The outcome of adiposity was unaffected by c-section delivery preceded by labour

JUSTIFICATION

- There is a limited studies related to determinants of growth and development in under five rural children.
- There is a limited studies related to determine of estimation of growth and development in under five rural children.
- This study fill the gap of Biological factors, Development delays, Social determinants I.e. influencing factors for the growth and development of fewer than five rural children.
- No study undertaken related to determinants of the growth in under five rural children of belagavi.
- A child's early years are a precious time for growth and development because of the quick advances in their physical and psycho-social development, which will contribute to their future learning capacities and social and emotional intelligence.
- More associated difficulties have been reported by residents of rural locations than in urban areas overall, and this difference may also apply to developmental delays.
- As per literature reviewed previous research studies mainly focused on the prevalence of development among under five children.
- A child's development is the slow, natural emergence of features and attribute that are shaped by their biology and that come from their experiences.

- In 2016 there were 28% of low- and middle-income nations that have chronic malnutrition, also known as stunting (height-for-age z-score less than -2).

- Reliable national data on the prevalence of various developmental delays are scanty even in highly developed countries.

- Stunting, wasting, and underweight have all been linked in numerous studies to mortality. According to estimates, these anthropometric deficiencies account for 12.6%, 14.8%, and 18.7% of disability-adjusted life and 14.5%, 14.6%, and 19.6% of fatalities.

- Therefore the present study will attempt to understand the growth and development and its determinants among rural under five children's in Belagavi city.

Summary:

This chapter deals with why the researcher have been took this study and proved himself that there is a limited studies about determinants of growth and development among under five at rural area, Belagavi and how this study will help full for the under five at rural area have been justified in this chapter.

CHAPTER - III

MATERIAL AND METHODS

Research methodology is to gather and analyses information relevant to research questions. It is a way to solve the research problem systematically and efficiently. It involves a series of procedures in which the researcher starts from the problem identification to final conclusion in a logical way. It involves the systematic way of organizing and gathering valid and reliable data for the problem under investigation.[34]

3.1) RESEARCH APPROACH:

The methodology for performing the study is indicated by the quantitative research approach. Knowing the right format for data collection and analysis aids the researcher. It also makes suggestions for inferences that might be made based on the information.[35]

3.2) RESEARCH DESIGN:

A study's research design outlines the fundamental techniques used by the investigator to provide precise and comprehensible findings. The research design is the blue print to conduct a research study.[36]

The goals of the study, the research strategy, the variables to be examined, and the research approach all influence the design choice. The current study employed a cross-sectional research Design.

3.3) VARIABLES UNDER THE STUDY:

In quantitative study, concepts are usually referred as variables, which are the central building blocks of the study. A variable is any phenomena or characteristic or attribute under study. Variables are the measurable characteristics of a concept and consist of a logical group of attributes. (Polit and Beck)

An independent variable is a distinguishing characteristic or feature that differs or changes over the course of a research project. It is something that does not change over time that is stable, as opposed to something that does change over time.

The variables undertaken in the present study were:

Biological factors: In the present study Assessment of Biological factors are, Pattern of pregnancy . Consanguinity Mode of delivery, Antenatal care, Gestational at birth, Multiple gestation, History of birth asphyxia, Breast feeding, Family size. And socio demographic variables.

Determinants of growth and development: In the present study determinants refers to the factors or variables which determines the condition of growth and development under five children.

3.4) SOCIODEMOGRAPHIC VARIABLE:

Age of mother (in years), Religion, Dwelling, Mother's literacy, Occupation, Monthly income of the family, Type of family, Type of diet.

3.5) RESEARCH SETTING:

Setting means to the more specialzed locations where information is gathered according to the nature of the research topic and the kind of data required to answer it.[37] Kinaye and Vantmuri of rural phcs Belagavi are the planed location for the current investigation.

3.6) ETHICAL CLEARENCE

- The ethical clearance certificate was obtained from institutional ethics committee.
- Institutional Ethics Committee provided approval for the present study (Ref no: KLEU/EC/19-20/290619009

3.7) RESEARCH POPULATION:

A population is the set of people or entitles to which the results of a research are to be generalized.[38] In the present study the population consists of under five children of rural areas of Belagavi.

3.8) SAMPLE:

A sample is a representative subset of the target population that a researcher will examine in the course of their investigation. It is therefore a subset of the elements of the population.[39] The sample selected for this study consists of Belagavi's rural under-5 population.

3.9) SAMPLE SIZE:

Interval, p=prevalence of disease in a population, and e= relative precision (20% of p) Method: Cochran's formula is used to calculate the sample size which is given by,

Where z=1.64 for 90% Confidence

$$n = \frac{z^2 p\,(1-p)}{e^2}$$

Where z=1.64 for 90% Confidence

From the previous study it was found that the prevalence of developmental delay was 7.1% hence the sample size required for the study is

$$n = \frac{1.642 * 0.071 * (1 - 0.071)}{0.00142^2} = 885$$

Hence minimum 885 samples are required for the study. However, we can include larger sample to improve its precision.

3.10) SAMPLING CRITERIA:

The following inclusion and exclusion criteria were used in the sample selection process.

INCLUSION CRITERIA

- Children below 5 years.
- Mothers who gave consent to participate in the study.

EXCLUSION CRITERIA

- Child with known history of chronic diseases: protein energy malnutrition, cretinism, malignancy, Type 1 diabetes mellitus, nephrotic syndrome, congenital heart disease or congenital pulmonary disease, cerebral palsy, down's syndrome, cystic fibrosis etc.
- Orphaned children
- Mothers with known autosomal recessive genetic disorder

3.11) SAMPLING TECHNIQUE / PROCEDURE:

Systematics random sampling was used. In this study rural areas of Belagavi were classified into two PHCS, from each PHCS selected villages samples are drawn based on proportion of under-five population by using simple random sampling technique.

3.12) DEVELOPMENT OF THE TOOL:

A predesigned, pretested and validated tool will be using to study the Determinants and growth and development assessment formulated by ICMR.

3.13) DESCRIPTION OF THE TOOL

The tool consist of

- ➢ Section I: Socio Demographic data of parents
- Age of the mother
- Religion
- Dwelling
- Mother litersy
- Type of diet
- Occupation
- ➢ Section II: Assessment of Biological factors
- Pattern of pregnancy
- Consanguinity
- Mode of delivery
- Antenatal care
- Gestational age at birth
- Multiple gestation
- History of birth asphyxia
- Breast feeding
- Family size
- ➢ Section III: Anthropometric measurements
- Height

- Weight
    - Section IV: Modified Psychosocial developmental screening test developed by ICMR.
- Gross motor
- Vision and fine motor
- Hearing language and concept development
- Social skills
- Self help skills

3.14) OBTAINING ADMINISTRATIVE PERMISSION FROM AUTHORITY:

The institution's ethics committee gave their approval to the research. Formal administrative permission was obtained from KLE Academy of Higher Education & Research. A detailed permission letter was written to District Health officer by explaining in detail about the research study and objectives. After clarifying objectives of project the permission was granted for the study.

MEASUREMENTS

The following measurements were used for the assessment of growth:

Height: The participant is allowed to stand straight without footwear, with heels, Buttocks and back touching the wall and arm hanging by side. The height was Measured from head to heel.

Weight: Body weight was measured without any shoes, heavy clothing, using Standard portable weighing machine with an error of + 100gm.

3.15) VALIDITY OF TOOL

The tool was validated by 7 experts in the field of pediatric nursing. and pediatricians

3.16) RELIABILITY

Reliability of an instrument is a degree of consistency with which an instrument measures the attribute it is supposed to measure. Reliability of the tool was done and was found to be 0.80

Reliability of weighing scale for the anthropometric measurements:

Calibration of the scale was done once a week, and documented on the calibration record form. Ensure that the scale is placed on an even, flat surface. Check whether the scale was level using the bubble on the far right-hand leg of the scale.

3.17) PILOT STUDY

The pilot study was conducted by taking permission of district health officers from Belagavi to find out the feasibility of the tool. Prior to actually beginning the research, the required approval from the governments was obtained. According to the sample parameters, around 85 children's (10%) of the respondents of the overall population of the current survey were chosen the tool was tested for the reliability and the tool was found be reliable 0.80 by split half method.

3.18) DATA COLLECTION PROCEDURE

- After obtaining Ethical permission from Institutional Ethical Committee, Permission was obtained from the DHO.

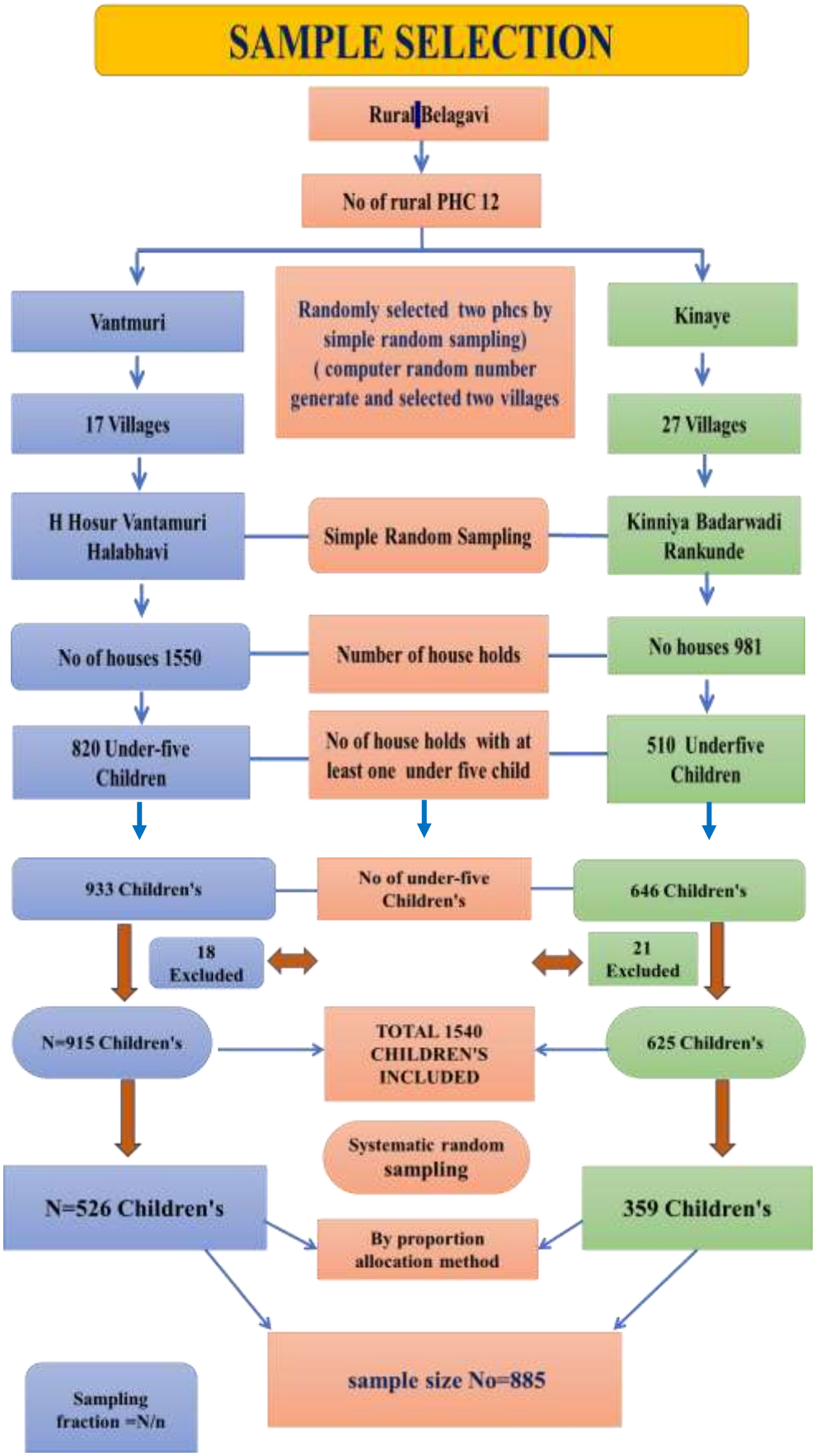
- Before enrolling the participants, they were given full subject information sheet on which material was explained.
- The purpose of the study was explained to mothers and consent was taken from every mother. They were also guaranteed that the information would be kept confidential.
- Anthropometric measurements were taken and predesigned, pretested and validated questionnaires were used to study the Determinants of growth and development of under-five children.
- All the participants were given their genuine responses for each question asked to them and same time their doubts regarding questions were cleared by researcher.
- Data collection process is ended by thanking each participant for their cooperation and interest shown towards the process of the study

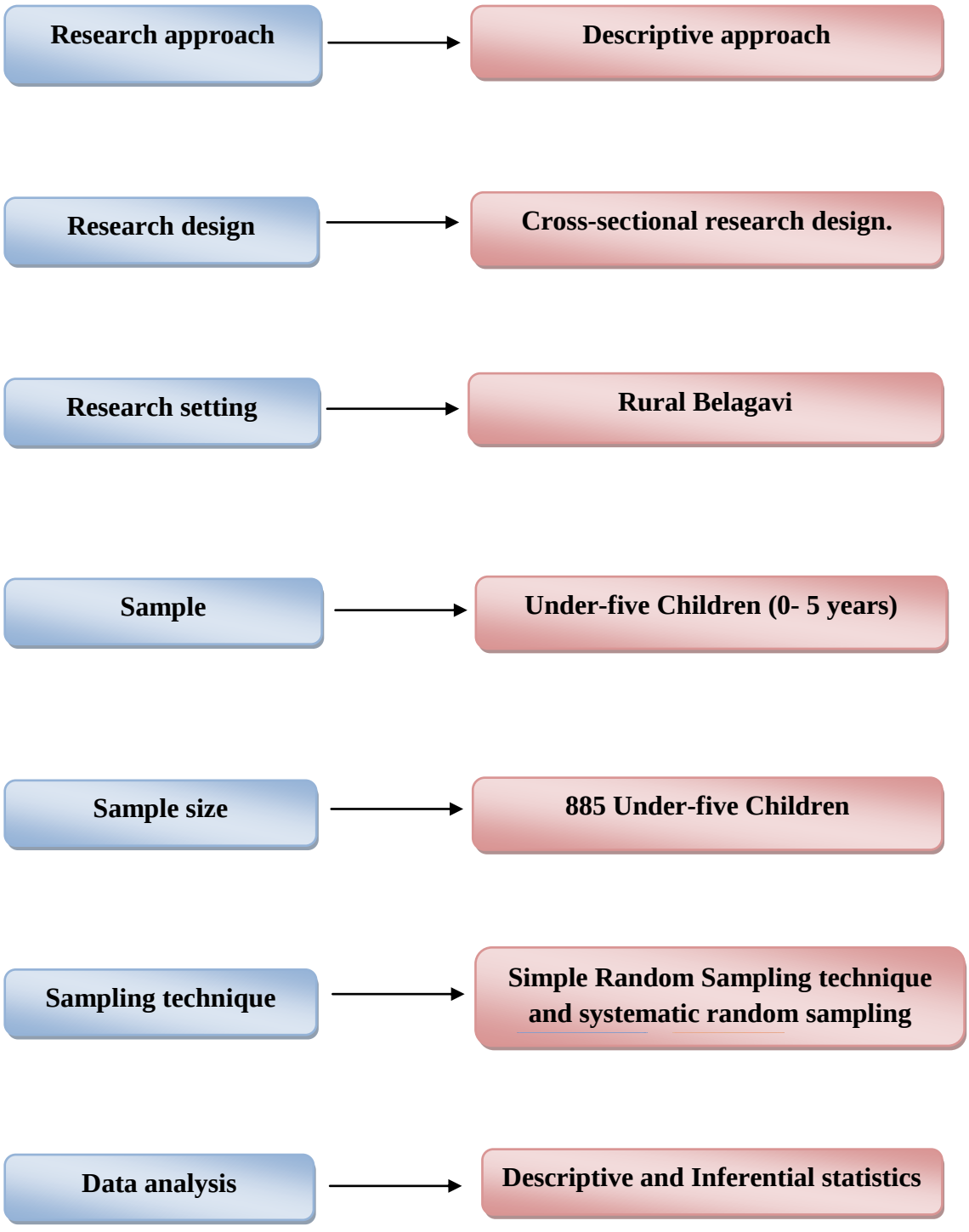
3.19) DATA ANALYSIS:

The following statistical techniques were used to analyze the data: dispersions and measures of central tendency. A tend test for significance was performed in addition to the analysis of variance. We have employed regression models, more specifically multiline and logistic regression models.

CONCLUSION

The research methodology, research design, variables, study setting, population, sample, sampling strategy, Development of the tool, description, data collection method and data analysis have all been covered in this chapter


SAMPLE SELECTION
Rural Belagavi
No of rural PHC 12
Vantmuri
Randomly selected two phcs by simple random sampling) (computer random number generate and selected two villages
Kinaye
17 Villages
27 Villages
H Hosur Vantamuri Halabhavi
Simple Random Sampling
Kinniya Badarwadi Rankunde
No of houses 1550
Number of house holds
No houses 981
820 Under-five Children
No of house holds with at least one under five child
510 Underfive Children
933 Children's
No of under-five Children's
646 Children's
18 Excluded
21 Excluded
N=915 Children's
TOTAL 1540 CHILDREN'S INCLUDED
625 Children's
Systematic random sampling
N=526 Children's
By proportion allocation method
359 Children's
sample size No=885
Sampling fraction =N/n



Flow chart of Research methodology

CHAPTER IV

RESULTS

The previous chapter included a description and analysis of the extensive methodology employed in the research. This chapter presents and analyses the study's observed results using a variety of statistical techniques that are employed in data analysis to determine how the components differ from one another and provide conclusions. The data had been collected on overall growth and development of children, development of gross motor function, vision and fine motor movement, hearing, language and concept, personal skill and social skills among under five year children in rural Belagavi. Then, the data were statistically analyzed with reference to the main objectives an by applied different kinds of statistical methods using chi-square for association with demographic and biological factors. The multiple logistic regression analysis was performed to assess the risk of demographic and biological factors on overall children growth and development, growth and development in gross motor, growth and development in vision and fine motor, development in hearing, language and concept, personal skill development and social skills development among under five year children in rural Belagavi. SPSS 23.00 was the statistical programme utilised. The results obtained by setting the statistical significance at a 5% level of significance ($p<0.05$) have been interpreted.

Table 1. Frequency distribution of the demographic profile of mothers (n=885)

Demographic profile of mothers		f	%
Age of the mother	<21yrs	260	29.38
	21-25yrs	253	28.59
	26-30yrs	227	25.65
	>30yrs	145	16.38
Religion	Hindu	436	49.27
	Muslim	261	29.49
	Christian	188	21.24
Dwelling	Katccha	258	29.15
	Pucca	627	70.85
Mother's literacy	Illiterate	10	1.13
	Primary school	276	31.19
	Higher primary	154	17.4
	SSLC	301	34.01
	Graduate	65	7.34
	Post graduate	79	8.93
Occupation	Housewife	479	54.12
	Daily wages	157	17.74
	Government employee	139	15.71
	Private sector employee	110	12.43
Monthly income	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
Type of family	Nuclear	375	42.37
	Joint	266	30.06
	Extended	244	27.57
Who takes care of child during day	Self	380	42.94
	Father	89	10.06
	Grandparents	237	26.78
	Siblings	117	13.22
	Relatives	62	7.01
Type of diet	Vegetarian	202	22.82
	Non-vegetarian	326	36.84
	Mixed	357	40.34

Table 1 presents a detailed demographic profile of mothers with under-five rural children, shedding light on several key characteristics. The age distribution reveals a substantial portion of young mothers, with 29.38% aged below 21 years, 28.59% between 21-25 years, 25.65% falling within 26-30 years, and 16.38% aged above 30 years. Religious affiliation indicates a majority of Hindu mothers at 49.27%, followed by Muslim mothers at 29.49%, and Christian mothers at 21.24%. Housing conditions show that 70.85% of mothers reside in pucca houses, while 29.15% live in katcha dwellings. Literacy levels vary, with 31.19% having completed primary school, 34.01% attaining SSLC education, and smaller percentages being illiterate at 1.13%, achieving higher primary education at 17.4%, or holding graduate degrees at 7.34% and post-graduate degrees at 8.93%. Regarding occupation, the majority are housewives at 54.12%, followed by those engaged in daily wage labor at 17.74%, government employees at 15.71%, and private sector employees at 12.43%. Monthly income distribution indicates that 21.24% of families earn less than Rs. 2,000, 29.72% earn between Rs. 2,001-4,000, 9.27% earn between Rs. 4,001-6,000, and 39.77% earn more than Rs. 6,000. Family structures primarily consist of nuclear families at 42.37%, followed by joint families at 30.06% and extended families at 27.57%. Primary caregivers during the day are predominantly mothers themselves at 42.94%, followed by grandparents at 26.78%, siblings at 13.22%, fathers at 10.06%, and other relatives at 7.01%. Lastly, dietary practices reveal that mixed diets are most prevalent at 40.34%, followed by non-vegetarian diets at 36.84% and vegetarian diets at 22.82%. This comprehensive overview offers valuable insights into the demographic factors potentially influencing growth and development among under-five rural children.

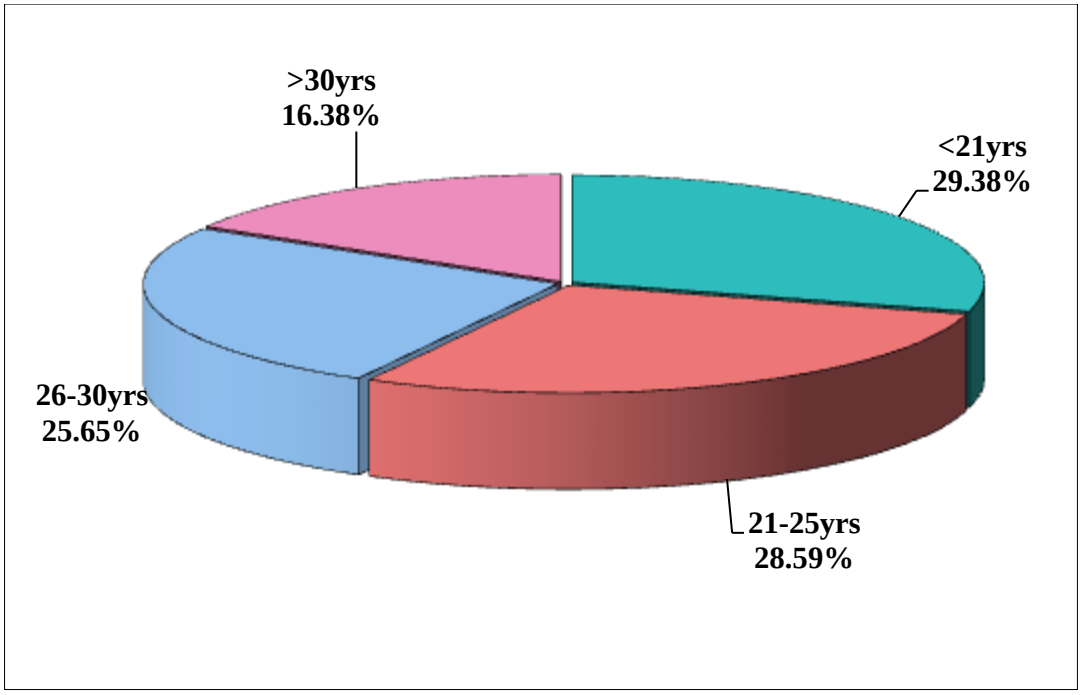


Figure:01 Distribution of respondents (mothers)according age groups n=885

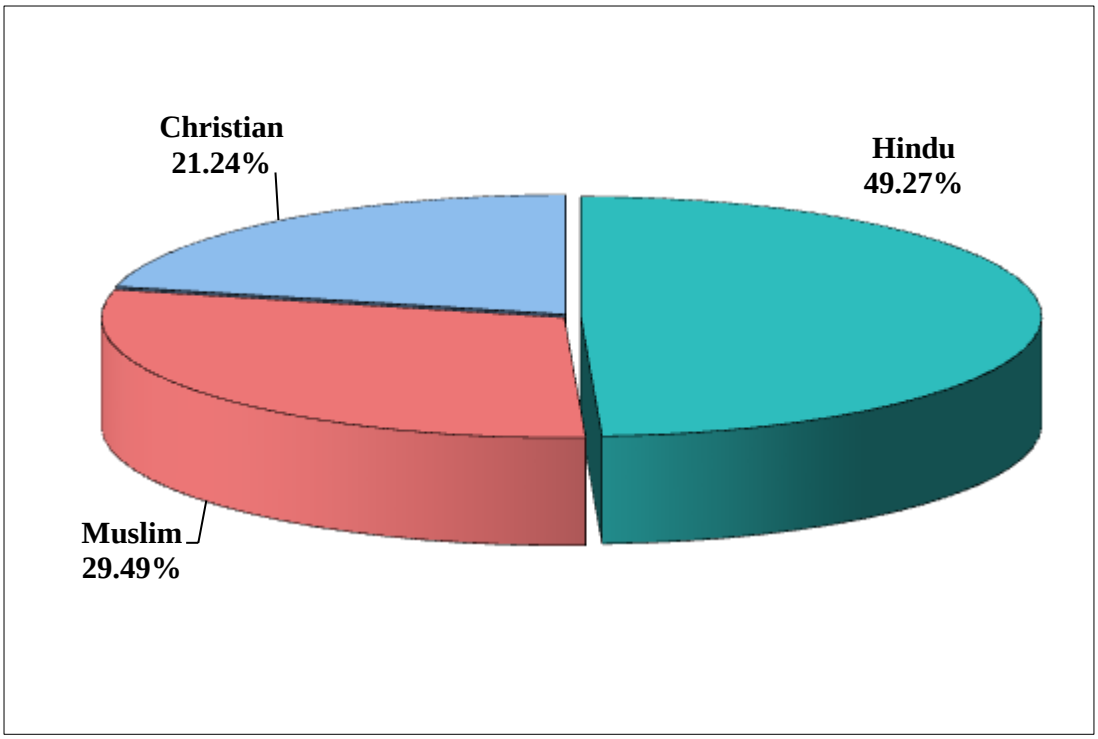


Figure: 02 Distribution of respondents (mothers)according religion.

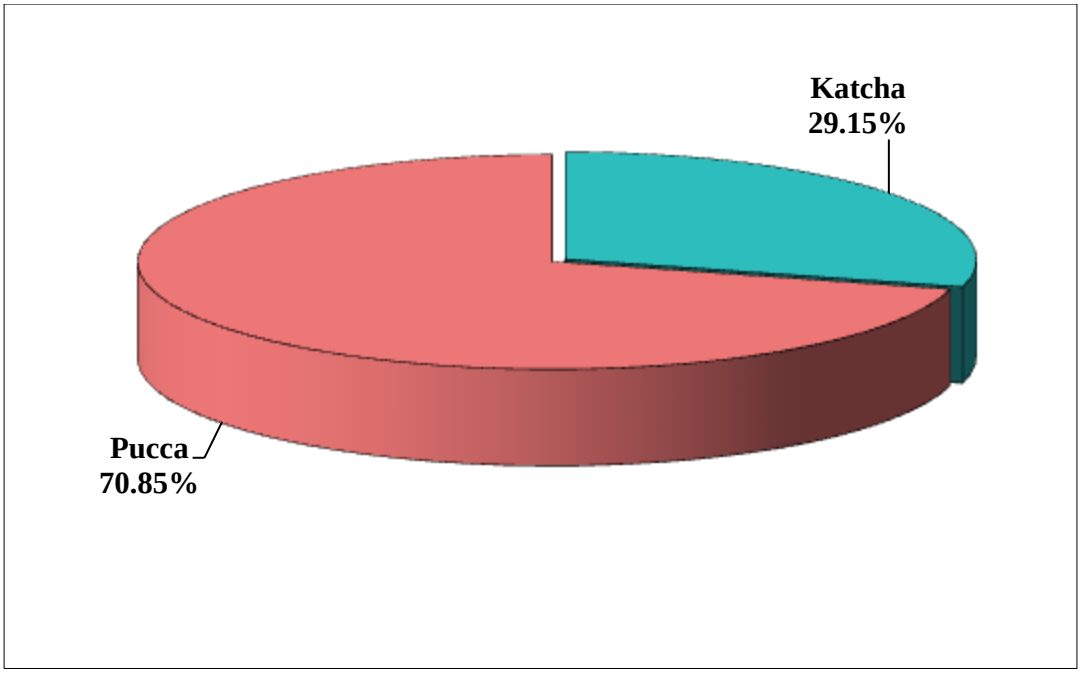


Figure: 03 Distribution of respondents (mothers) as per Residency (Dwelling) n=885

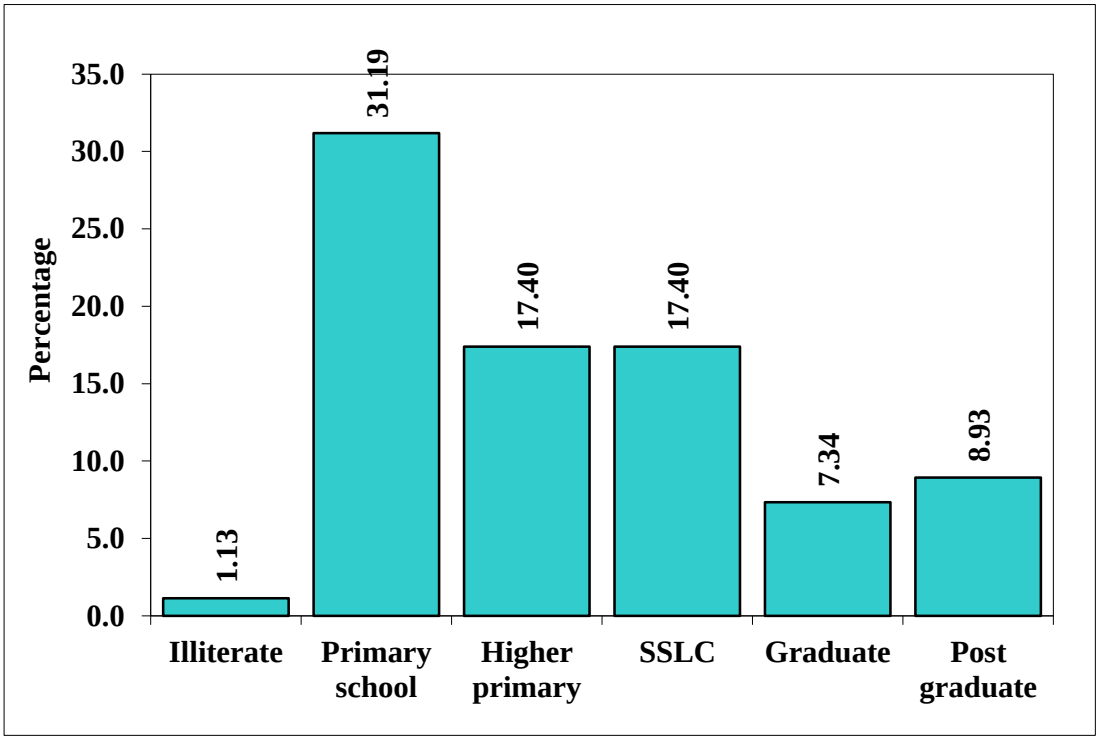


Figure: 04 Distribution of respondents (mothers)according mother literacy

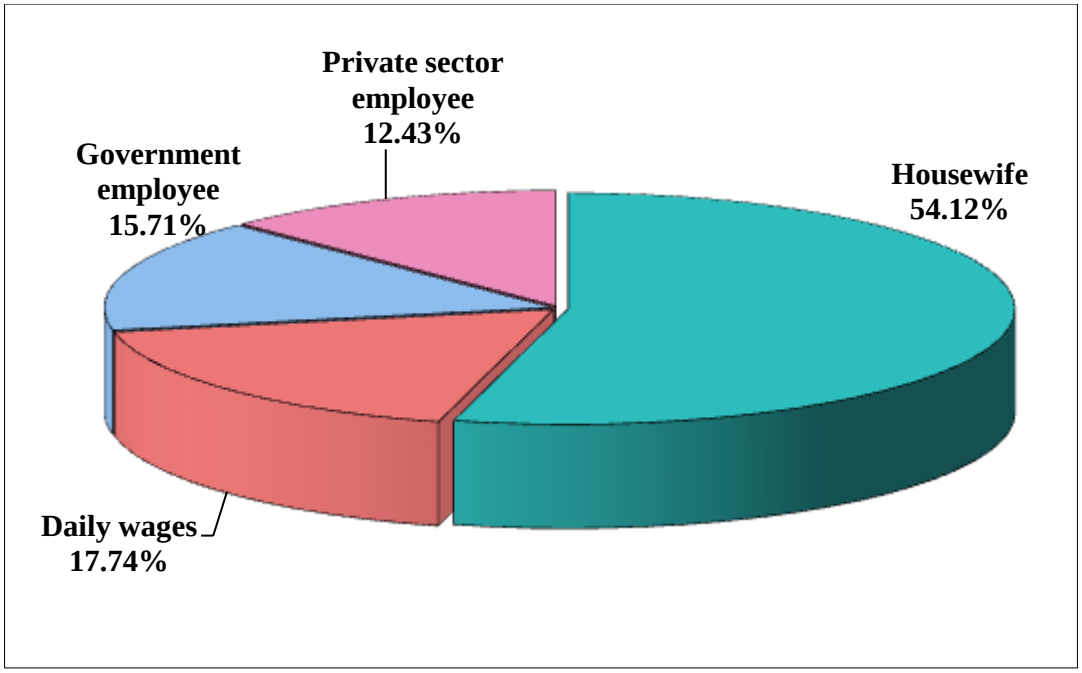


Figure: 05 Distribution of respondents (mothers)as per occupation n=885

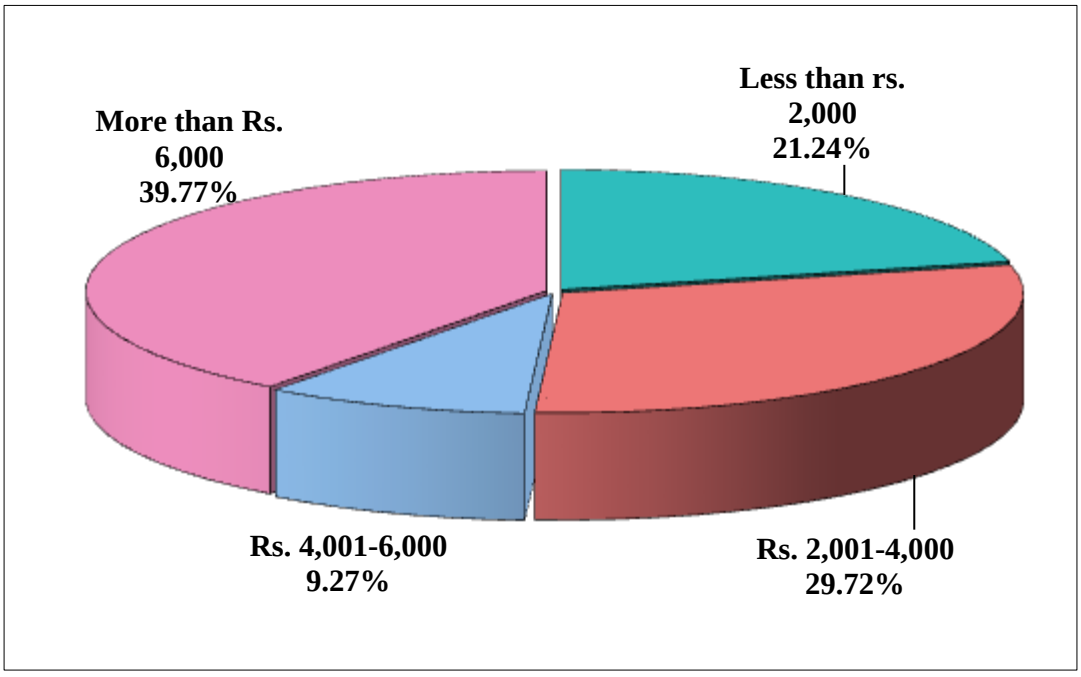


Figure: 06 Distribution of respondents (mothers)according monthly income n=885

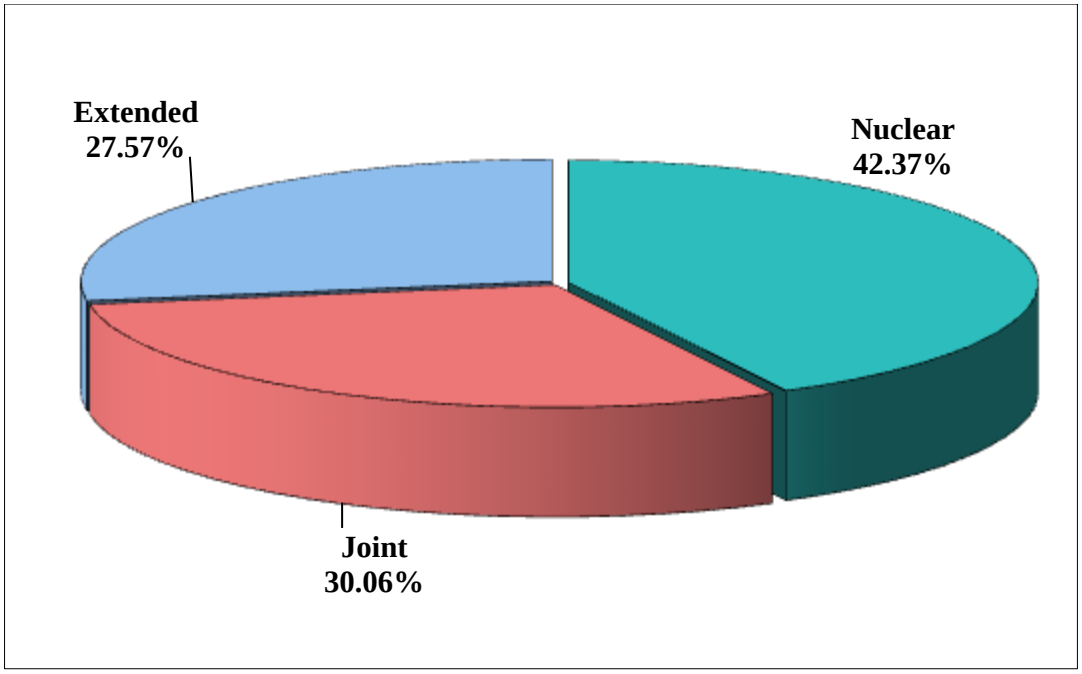


Figure:07 Distribution of respondents (mothers)according type of family n=885

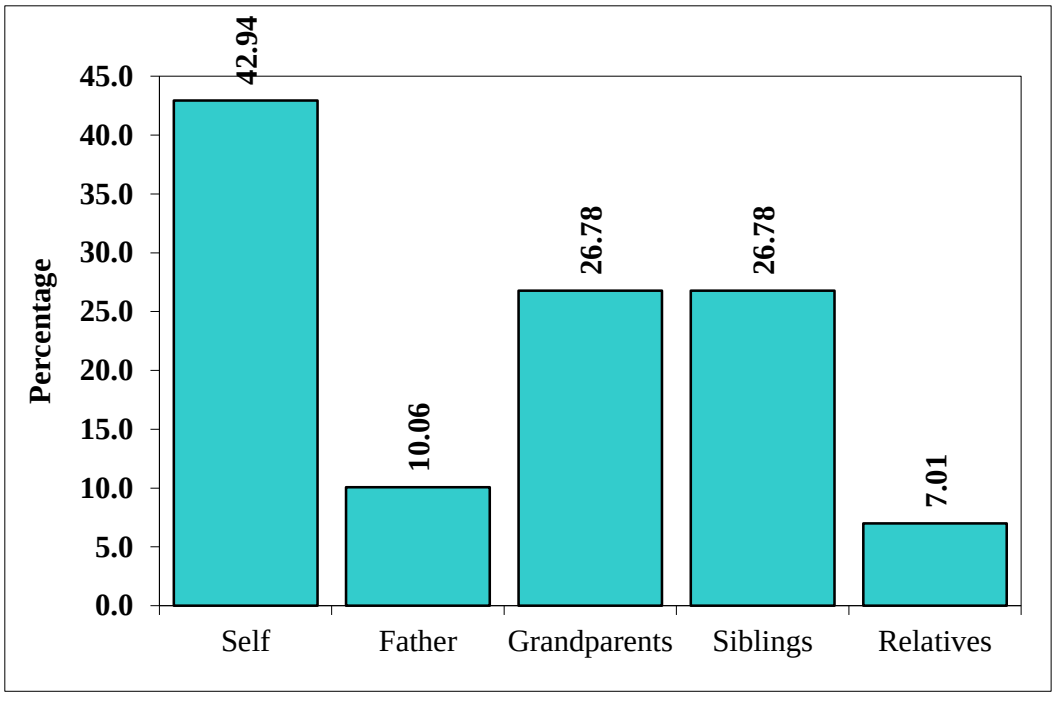


Figure: 08 Distribution of respondents (mothers) as per Who takes care of child during day wise

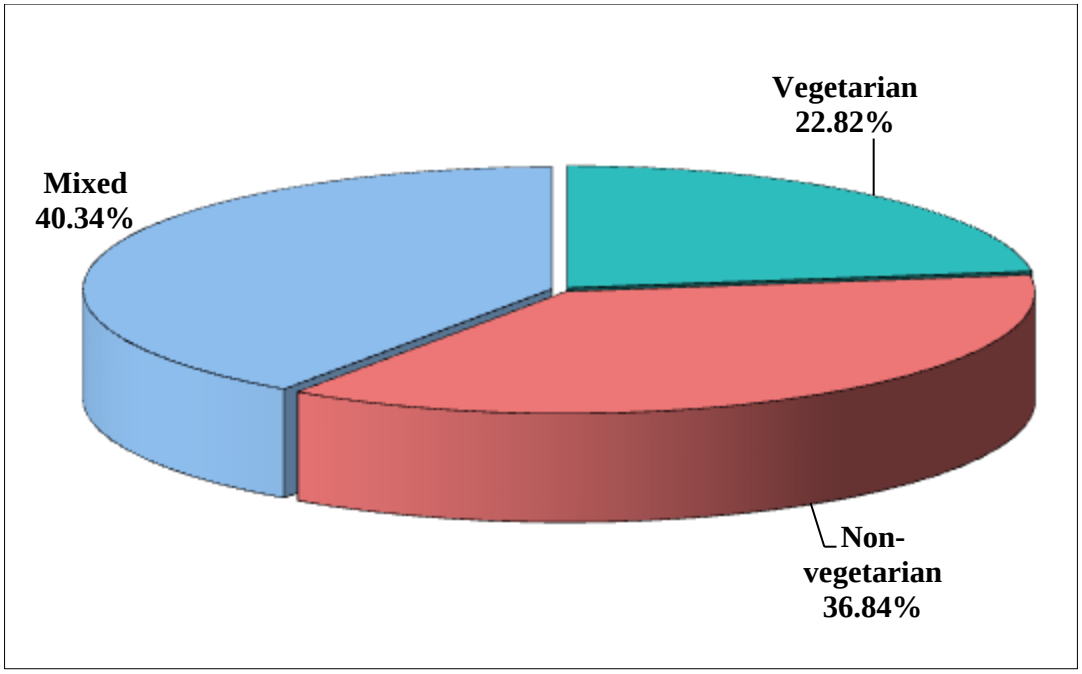


Figure:09 Distribution of respondents (mothers)according to Type of Diet n=885

Table 2. Frequency distribution of the biological factors **n=885**

Biological factors		f	%
Pattern of pregnancy	Repeat adolescent pregnancy	217	24.52
	Adolescent (first) and adult (current) pregnancy	212	23.95
	Repeat adult pregnancy	456	51.53
Consanguinity	Yes	428	48.36
	No	457	51.64
Mode of delivery	Normal vaginal delivery	599	67.68
	Caesarean	286	32.32
Antenatal care	Yes	568	64.18
	No	317	35.82
Gestational age at birth	Pre-term	511	57.74
	Term	374	42.26
Multiple Gestation	Yes	546	61.69
	No	339	38.31
History of birth asphyxia	Yes	371	41.92
	No	514	58.08
Breastfeeding	Appropriate	536	60.56
	Inappropriate	349	39.44
Family Size	1--5	194	21.92
	6--9	473	53.45
	>=10	218	24.63

Table 2 provides a comprehensive breakdown of biological factors concerning mothers and their under-five children in a rural setting. The Pattern of pregnancy reveals that the majority of pregnancies are repeat adult pregnancies, accounting for 51.53% of cases, followed by repeat adolescent pregnancies at 24.52%, and a combination of adolescent (first) and adult (current) pregnancies at 23.95%. In terms of consanguinity, nearly half of the respondents, at 48.36%, reported consanguineous relationships, while the remaining respondents reported no consanguinity, comprising 51.64% of the sample. Regarding the mode of delivery, a significant proportion of deliveries occurred through normal vaginal delivery, constituting 67.68% of cases, while a substantial minority opted for caesarean section, accounting for 32.32% of deliveries. Antenatal care was prevalent among 64.18% of respondents, indicating a proactive approach to prenatal healthcare, while 35.82% reported no antenatal care. Gestational age at birth demonstrates a higher frequency of pre-term births at 57.74% compared to term births at 42.26%. Multiple gestations were reported in 61.69% of cases, indicating a relatively high prevalence of twins or higher-order pregnancies. A history of birth asphyxia was reported in 41.92% of cases, highlighting a significant concern for new-born health. Breastfeeding practices reveal that 60.56% of respondents reported appropriate breastfeeding, while 39.44% reported inappropriate breastfeeding practices. Regarding family size, the majority of respondents, at 53.45%, reported having 6-9 members in their family, followed by those with 1-5 members at 21.92%, and those with 10 or more members at 24.63%. This detailed analysis provides valuable insights into the biological factors that may influence the growth and development of under-five rural children, offering crucial information for designing interventions aimed at improving maternal and child health outcomes in such communities.

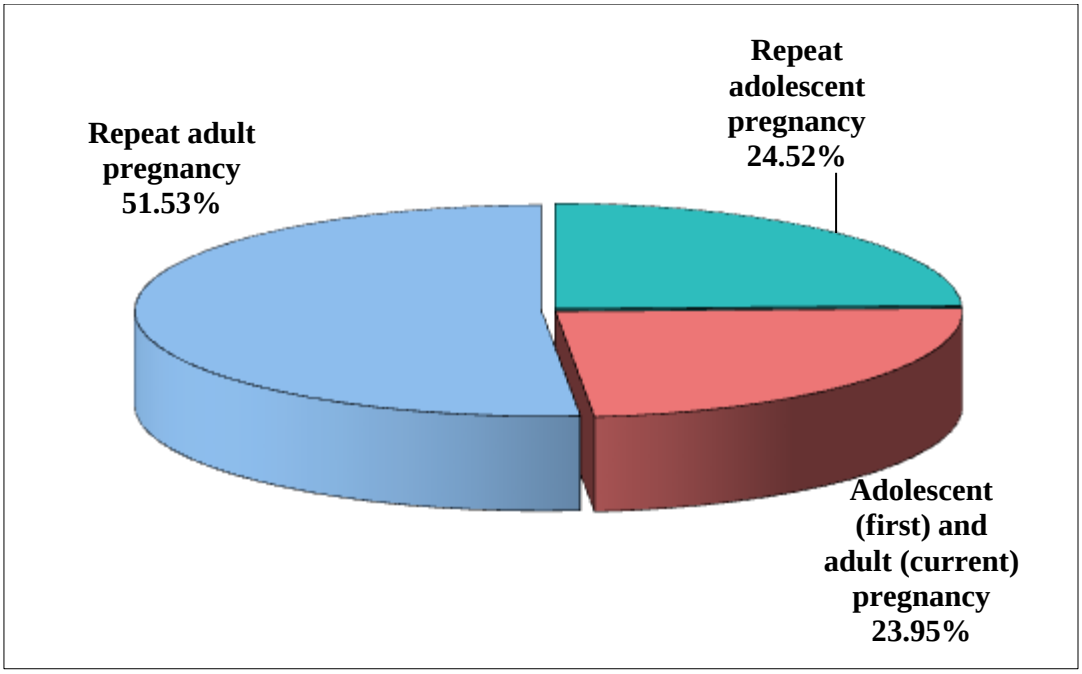


Figure:10 Distribution of respondents (mothers)according Pattern of pregnancy n=885

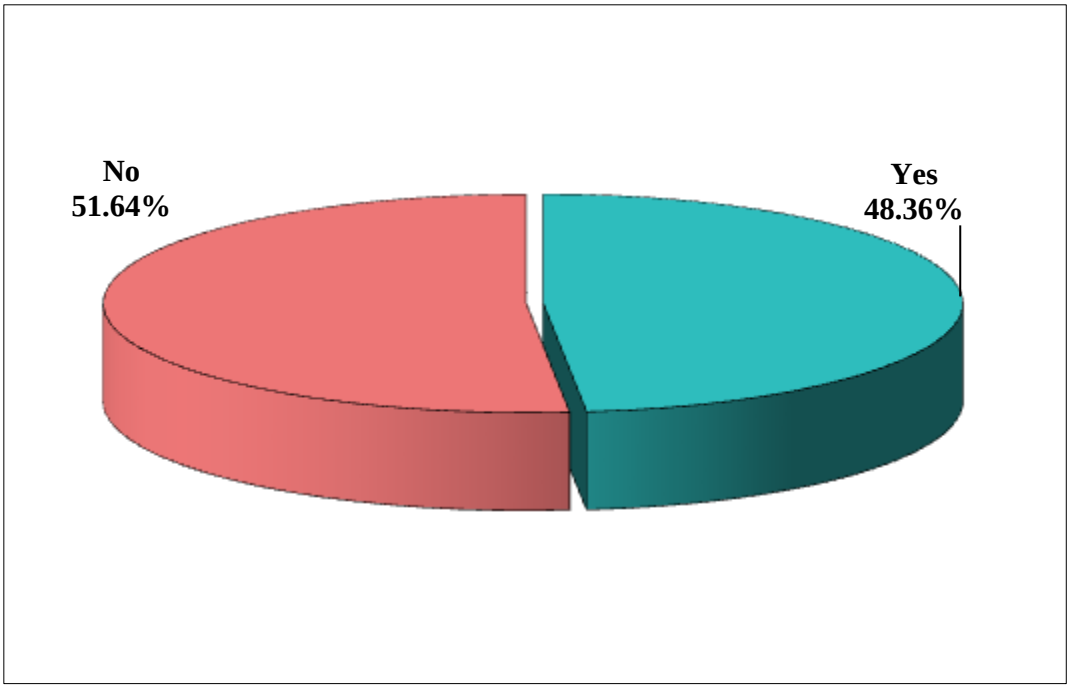


Figure:11 Distribution of respondents (mothers)according to Consanguinity n=885

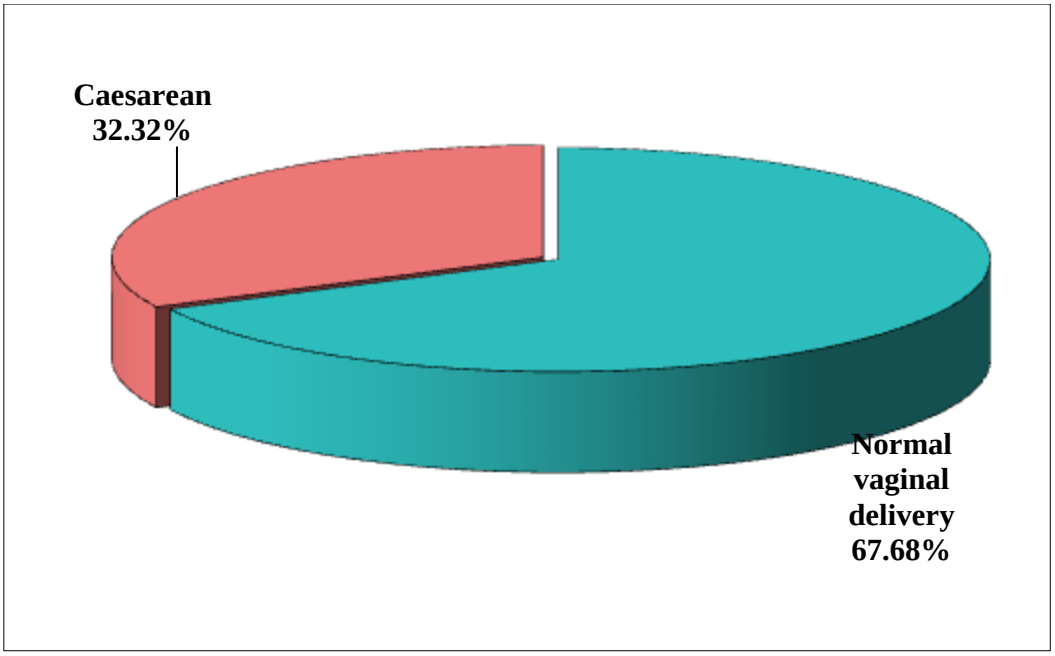


Figure:12 Distribution of respondents (mothers)according to mode of Delivery n=885

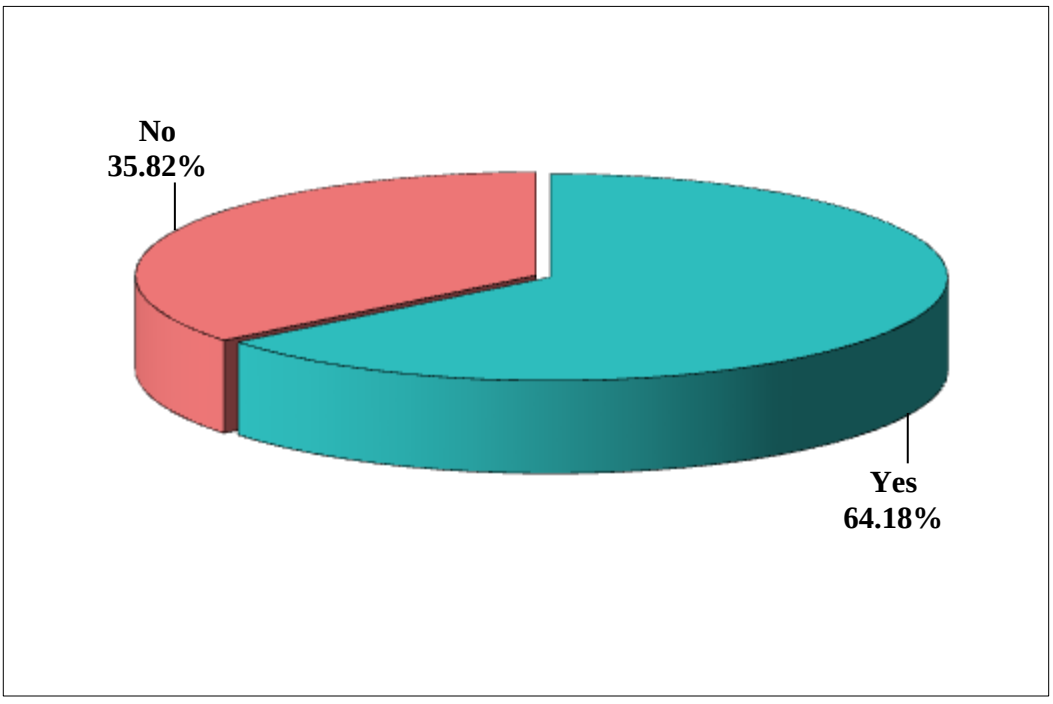


Figure:13 Distribution of respondents (mothers)according Antenatal care n=885

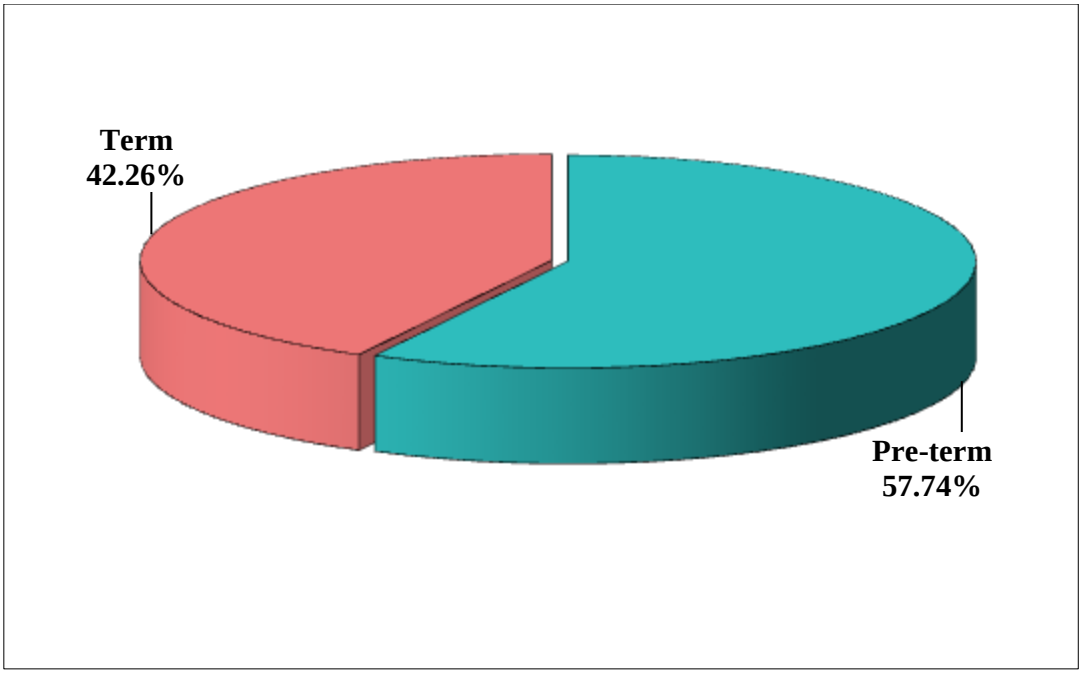


Figure: 14 Distribution of respondents (mothers)as per Gestational age at birth n=885

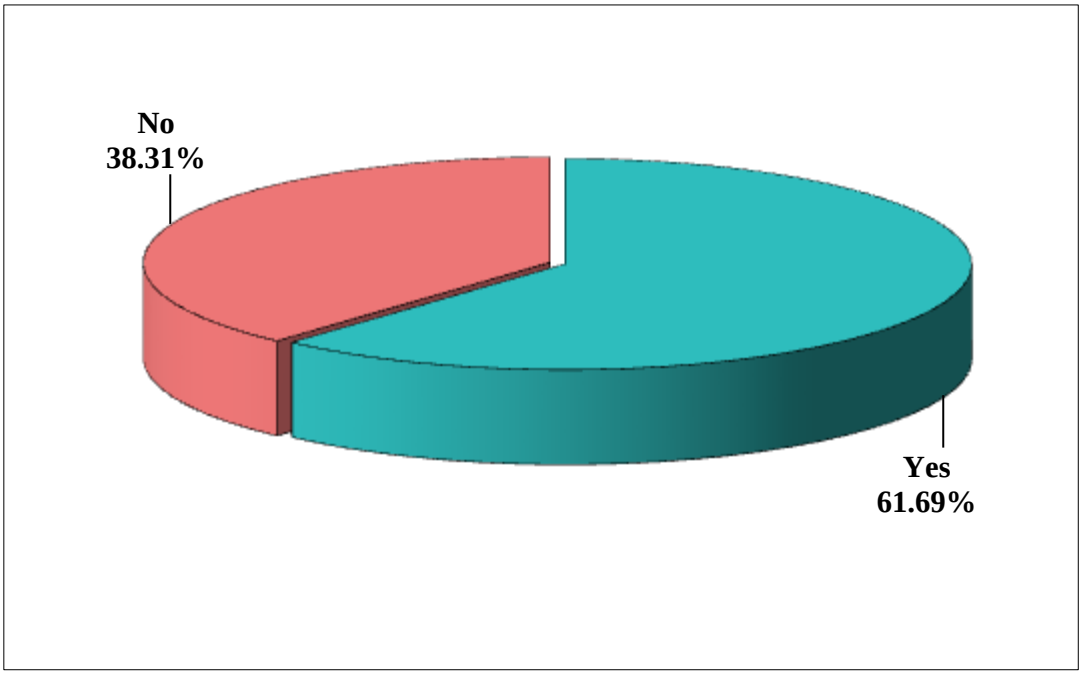


Figure:15 Distribution of respondents (mothers)as per Multiple Gestation (n=885)

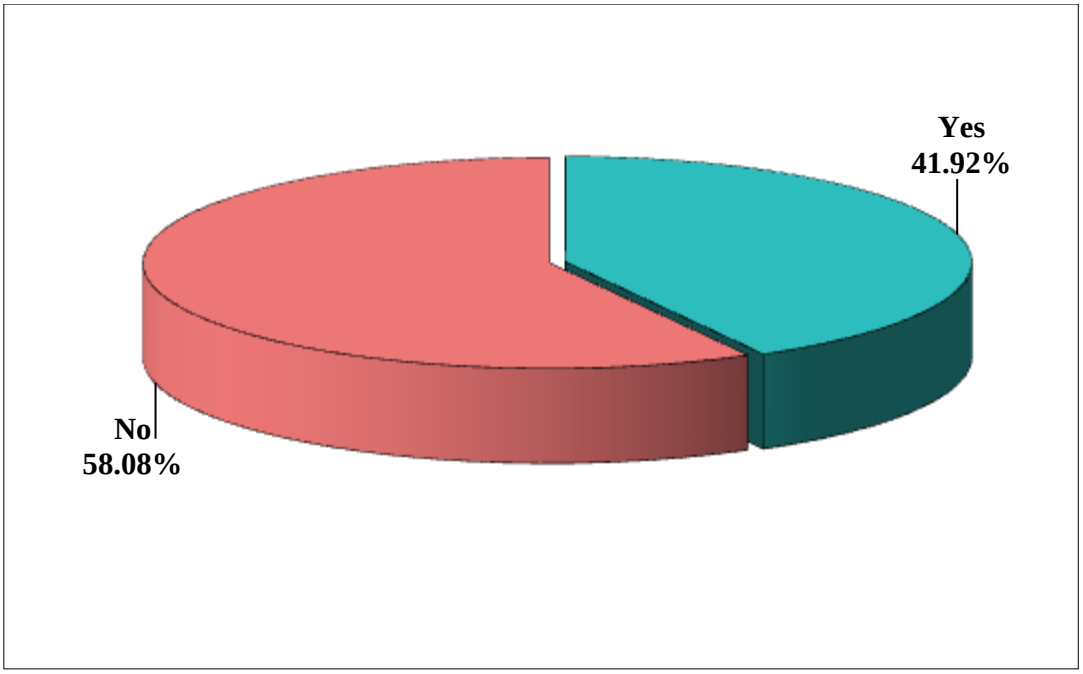


Figure: 16 Distribution of respondents (mothers)as per History of birth asphyxia. n=885

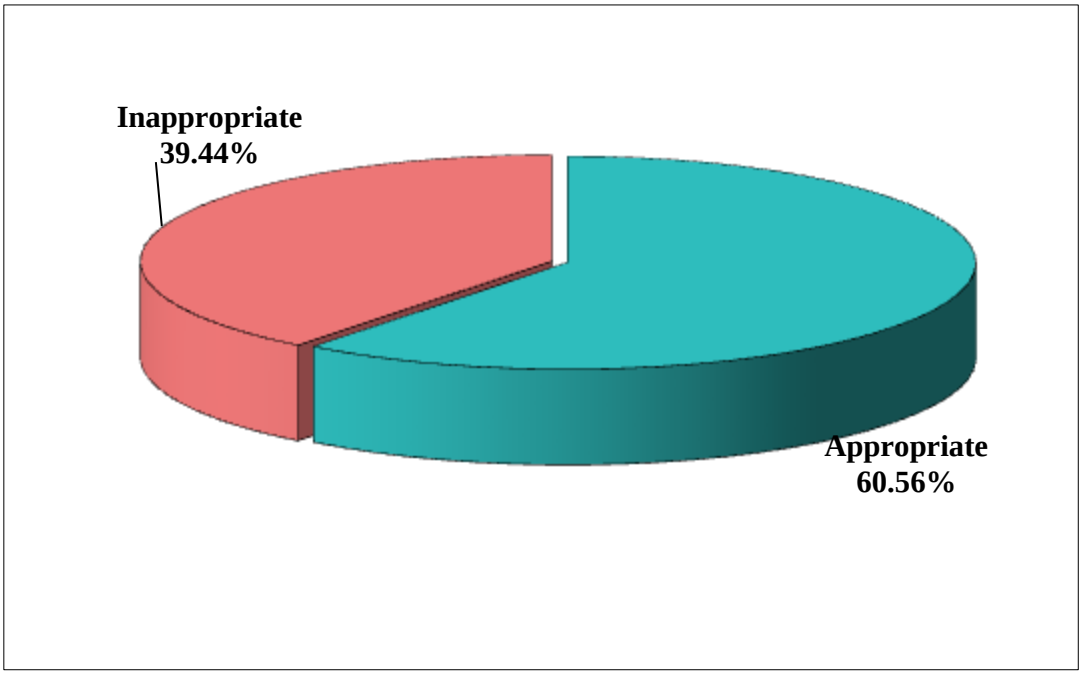


Figure:17 Distribution of respondents (mothers) as per Breastfeeding n=885

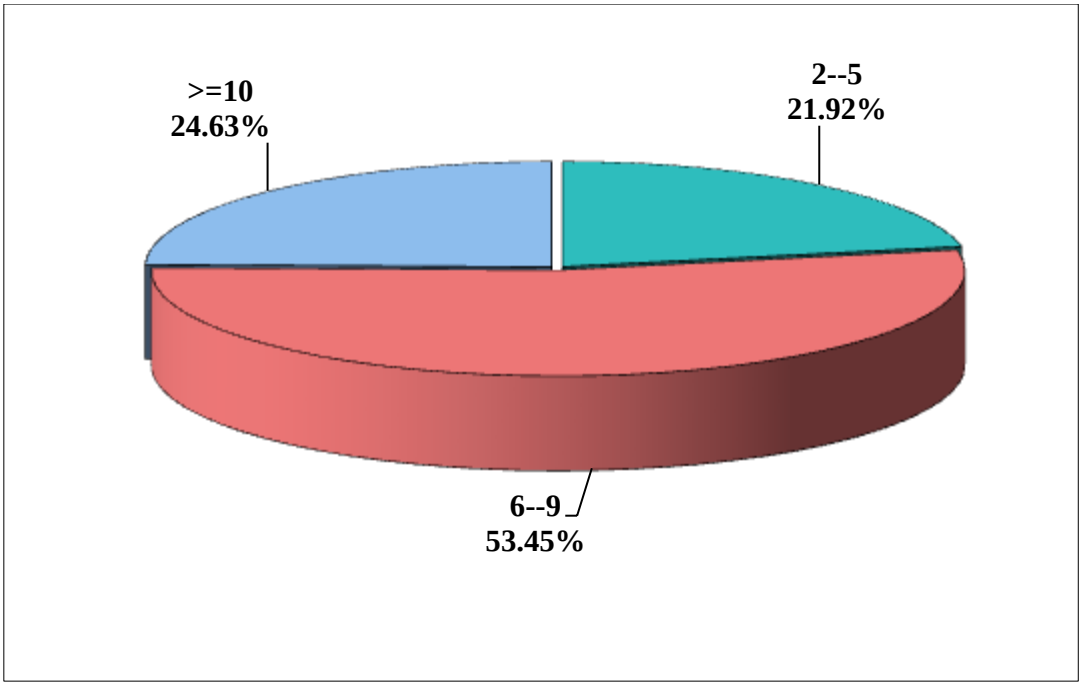


Figure: 18 Distribution of respondents (mothers) as per Family size distribution of respondents n=885

Table 3. Distribution of children by age groups **n=885**

Age in months	No of children	% of children	Cumulative number	Cumulative %
0-3months	169	19.10	169	19.10
4-6months	27	3.05	196	22.15
7-9months	18	2.03	214	24.18
10-12months	41	4.63	255	28.81
13-18months	42	4.75	297	33.56
19-24months	197	22.26	494	55.82
25-30months	57	6.44	551	62.26
31-36months	55	6.21	606	68.47
37-42months	60	6.78	666	75.25
43-48months	57	6.44	723	81.69
49-60months	162	18.31	885	100.00
Total	885	100.00		

Table 3 provides a detailed breakdown of children by age groups in months, offering insights into the age distribution of the sample. The largest age group comprises children aged 19-24 months, accounting for 22.26% of the sample, followed by children aged 0-3 months, which constitute 19.10%. As age increases, the percentage of children decreases gradually, with smaller proportions in older age groups. Cumulatively, over half of the children (55.82%) are aged 24 months and below, while only 18.31% fall into the oldest age group of 49-60 months. This

distribution highlights that the sample predominantly consists of younger children, indicating a need for age-appropriate interventions to support their growth and development effectively. Understanding the age composition of the sample is crucial for tailoring interventions and assessing developmental outcomes accurately.

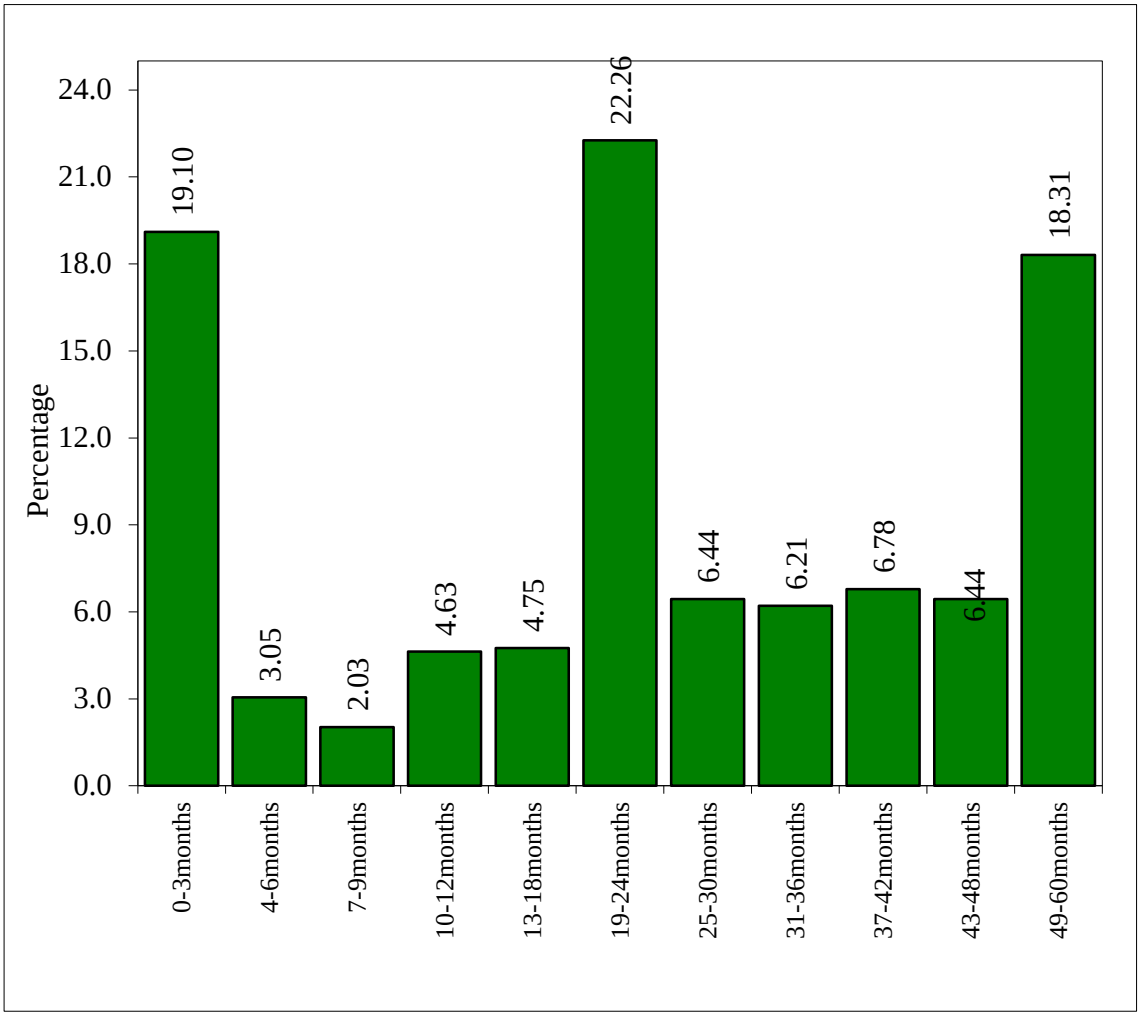


Figure: 19 Distribution of respondents (mothers) as per age groups

Table 4. Descriptive statistics of weight and height of children by age groups n=885

Age in months	Weight				Height			
	Min	Max	Mean	SD	Min	Max	Mean	SD
0-3months	2.40	5.70	3.35	0.62	46.20	59.70	47.93	2.09
4-6months	5.40	6.80	6.08	0.38	54.60	63.00	57.35	1.85
7-9months	5.80	7.40	6.72	0.52	64.20	66.20	64.93	0.58
10-12months	5.90	8.60	7.92	0.64	64.20	69.30	66.91	1.76
13-18months	7.80	9.40	8.54	0.50	64.70	69.30	67.56	1.56
19-24months	7.80	10.60	9.44	0.80	64.70	81.20	73.09	5.51
p25-30months	9.40	11.30	10.36	0.54	74.20	81.20	77.56	2.13
31-36months	9.40	11.50	10.62	0.56	84.10	89.60	86.18	1.59
37-42months	10.20	12.90	12.06	0.57	83.40	88.45	86.33	1.58
43-48months	12.20	14.90	13.48	0.75	83.40	100.20	91.52	5.05
49-60months	13.10	14.90	14.27	0.46	87.60	100.20	95.29	2.96
Total	2.40	14.90	9.46	3.75	46.20	100.20	74.34	16.72

Table 4 presents descriptive statistics of weight and height of children categorized by age groups in months. For weight, the minimum and maximum values, as well as the mean and standard deviation (SD), are provided for each age group.

Similarly, for height, the minimum and maximum values, mean, and standard deviation are given. The data reveal a progressive increase in both weight and height as children age. For instance, in the earliest age group (0-3 months), the mean weight is 3.35 kg with a standard deviation of 0.62 kg, while the mean height is 47.93 cm with a standard deviation of 2.09 cm. As children grow older, both weight and height tend to increase, with higher mean values observed in older age groups. Notably, the variability (as indicated by the standard deviation) tends to increase with age, suggesting greater diversity in weight and height measurements as children mature. For example, in the oldest age group (49-60 months), the standard deviation for weight is 2.96 kg, indicating a wider range of weights among children of this age compared to younger age groups. Overall, the descriptive statistics provide valuable insights into the typical weight and height measurements of children across different age groups. This information is essential for monitoring growth and development, identifying potential outliers or deviations from the norm, and informing healthcare interventions aimed at promoting optimal growth in children.

Table 5. Classification of growth and development based on percentile according to gross motor parameters **n=885**

Gross motor	Developed		Delay		Total
	f	%	f	%	
Lifts head when on stomach	451	55.82	357	44.18	808
No head lag in sitting position	509	71.09	207	28.91	716
Sits alone	406	59.05	283	40.95	696
Crawls	376	53.64	325	46.36	701
Stands alone	402	60.45	263	39.55	689
Stands on one foot with help	362	51.64	339	48.36	701
Hops on one foot (yrs)	465	73.93	165	26.07	630
Walks backwards	416	67.42	201	32.58	617
Takes wooden block on head and walks 5 steps	350	56.73	267	43.27	617
Gets up from squatting position without help	527	83.72	103	16.28	630

Table 5 presents a classification of growth and development based on percentiles according to gross motor parameters in children. The table outlines the number and percentage of children classified as "developed" and "delayed" for various gross motor skills. For example, the majority of children demonstrated developed skills in lifting their head when on their stomach, sitting alone, standing alone, walking backwards, taking wooden block on head and walking 5 steps, and getting up from a squatting position without help. Conversely, a significant proportion of children exhibited delayed skills in certain areas. For instance, 44.18% of children

showed a delay in lifting their head when on their stomach, 28.91% in having no head lag in the sitting position, and 40.95% in sitting alone, among others. Additionally, a notable difference is observed in the skill of hopping on one foot, where a higher percentage of children demonstrated developed skills compared to those showing delay. This classification provides insights into the gross motor development of children, highlighting areas where a significant proportion of children may be experiencing delays. Understanding these developmental milestones is crucial for early intervention and support to ensure optimal growth and development in children.

Table 6. Classification of growth and development based on percentile according to vision and fine motor parameters n=885

Vision and fine motor	Developed		Delay		Total
	f	%	f	%	
Regards objects	420	51.98	388	48.02	808
Sustained attention	459	61.81	285	38.19	744
Reaches for objects	524	73.18	192	26.82	716
Grasps objects	436	61.02	280	38.98	716
Picks up cube/pebble	430	67.34	208	32.66	638
Attempts imitation of scribble	379	59.50	259	40.50	640
Puts 3 or more cubes/pebbles into cup	378	63.00	222	37.00	600
Draws straight line in imitation	207	71.00	174	29.00	600
Draws circle in imitation	207	54.90	143	45.10	350
Draws square in imitation	161	92.06	14	7.94	175
Draws diamond in imitation	109	62.84	66	37.16	175
Movement of thumb	541	77.31	159	22.69	700
Can close one eye lid	105	60.34	70	39.66	175
Threads one bead with nylon wire	208	73.08	77	26.92	285
Makes ball from dough or clay (yrs)	82	46.67	93	53.33	175
Thumb and finger snap test	379	62.97	223	37.03	602

Table 6 presents a classification of growth and development based on percentiles according to vision and fine motor parameters in children. The table provides the number and percentage of children classified as "developed" and "delayed" for various vision and fine motor skills. The majority of children demonstrated developed skills in several areas, including regarding objects, sustained attention, reaching for objects, grasping objects, picking up cube/pebble, attempting imitation of scribble, putting 3 or more cubes/pebbles into a cup, drawing straight line in imitation, drawing square in imitation, movement of thumb, closing one eye lid, threading one bead with nylon wire, and thumb and finger snap test. However, a notable proportion of children exhibited delayed skills in certain areas. For instance, 48.02% of children showed a delay in regarding objects, 38.19% in sustained attention, 26.82% in reaching for objects, and 38.98% in grasping objects. Other areas where delays were observed include drawing circle in imitation, drawing diamond in imitation, and making a ball from dough or clay. This classification offers valuable insights into the vision and fine motor development of children, indicating areas where a significant proportion of children may be experiencing delays. Understanding these developmental milestones is crucial for early identification of potential issues and implementing appropriate interventions to support children's optimal growth and development.

Table 7. Classification of growth and development based on percentile according to hearing, language and concept development parameters n=885

Hearing, language and concept development	Developed		Delay		Total
	f	%	f	%	
Responds to sound	454	61.46	284	38.54	738
Manipulates bell	447	60.23	295	39.77	742
Rings bell	438	64.43	243	35.57	681
Repeats a number or word	355	55.43	287	44.57	642
Says one word	397	59.19	274	40.81	671
Identified one object	379	58.83	266	41.17	645
Names one object	324	50.41	319	49.59	643
Enjoys looking at pictures	387	64.29	216	35.71	603
Points two parts of body	350	54.99	288	45.01	638
Says two words together	369	57.58	272	42.42	641
Names three objects	372	62.00	228	38.00	600
Relates two objects (yrs)	259	64.54	143	35.46	402
Points to 4 parts of body (yrs)	426	70.69	178	29.31	604
Concept of big and little	231	56.17	181	43.83	412
Concept of heavy and light (yrs)	275	78.83	75	21.17	350
Repeats 2 numbers (yrs)	326	93.83	22	6.17	348
Recognizes 3 colours (yrs)	272	77.46	80	22.54	352
Understands prepositions	180	61.88	112	38.12	292
Completes sentence	227	64.63	125	35.37	352
Understands money (yrs)	144	83.89	28	16.11	172
Sings 2 lines of song/folklore (yrs)	142	67.84	68	32.16	210

Table 7 presents a classification of growth and development based on percentiles according to hearing, language, and concept development parameters in children. The table displays the number and percentage of children categorized as "developed" and "delayed" for various skills in these domains. The majority of children demonstrated developed skills in several areas, including responding to sound, manipulating a bell, ringing a bell, saying one word, enjoying looking at pictures, saying two words together, relating two objects, pointing to four parts of the body, understanding the concept of big and little, repeating two numbers, recognizing three colours, understanding prepositions, completing sentences, understanding money, and signing two lines of a song or folklore. However, a notable proportion of children exhibited delayed skills in certain areas. For instance, delays were observed in responding to sound, manipulating a bell, repeating a number or word, naming one object, pointing to two parts of the body, naming three objects, understanding the concept of heavy and light, completing sentences, and understanding money, among others. This classification offers valuable insights into the hearing, language, and concept development of children, highlighting areas where a significant proportion of children may be experiencing delays. Understanding these developmental milestones is crucial for early identification of potential issues and implementing appropriate interventions to support children's optimal growth and development.

Table 8. Classification of growth and development based on percentile according to self-help skill parameters n=885

Self-help skills	Developed		Delay		Total
	f	%	f	%	
Feed's self in any way	406	61.42	255	38.58	661
Drinks from cup or glass	372	54.15	315	45.85	687
Feed's self appropriately	198	50.07	193	49.93	391
Bladder control during day (yrs)	215	75.71	70	24.29	285
Bladder control during night (years)	131	77.51	39	22.49	170
Bowel control during day (years)	277	94.88	16	5.12	293
Bowel control during night .(years)	264	77.31	78	22.69	342
Cleans teeth (years)	256	90.00	29	10.00	285
Washes hand (years)	172	98.25	03	1.75	175
Washes face (years)	321	79.57	83	20.43	404
Dresses self without help (years)	157	87.50	23	12.50	180
Visits key places in villages (years)	116	65.22	62	34.78	178

Table 8 presents a classification of growth and development based on percentiles according to self-help skill parameters in children. The table illustrates the number and percentage of children categorized as "developed" and "delayed" for various self-help skills. The majority of children demonstrated developed skills in several areas, including feeding themselves in any way, drinking from a cup or glass, appropriate self-feeding, bladder control during the day and night, bowel control

during the day and night, teeth cleaning, handwashing, face washing, dressing themselves without help, and visiting key places in villages. However, a notable proportion of children exhibited delayed skills in certain areas. For instance, delays were observed in bladder control during the day and night, bowel control during the day and night, teeth cleaning, face washing, dressing oneself without help, and visiting key places in villages. This classification offers valuable insights into the self-help skills of children, highlighting areas where a significant proportion of children may be experiencing delays. Understanding these developmental milestones is crucial for early identification of potential issues and implementing appropriate interventions to support children's optimal growth and development.

Table 9. Classification of growth and development based on percentile according to social skill parameters **n=885**

Social skills	Developed		Delay		Total
	f	%	f	%	
Smiles in response (weeks)	421	53.33	369	46.67	790
Vocalizes in response	396	54.44	332	45.56	728
Awareness of strangers	410	55.89	325	44.11	735
Can tell his/her name	275	68.64	129	31.36	404
Can tell gender	218	53.24	192	46.76	410
Plays with other children	159	55.92	126	44.08	285
Rules of games understood (yrs)	20	42.55	27	57.45	47

Table 9 presents a classification of growth and development based on percentiles according to social skill parameters in children. The table delineates the number and percentage of children classified as "developed" and "delayed" for various social skills. The majority of children demonstrated developed skills in several areas, including smiling in response, vocalizing in response, awareness of strangers, being able to tell their name and gender, and playing with other children. However, a notable proportion of children exhibited delayed skills in certain areas. For instance, delays were observed in smiling in response, vocalizing in response, awareness of strangers, being able to tell their name and gender, and playing with

other children. Additionally, understanding the rules of games seemed to be delayed in a considerable portion of the sample. This classification offers valuable insights into the social skills of children, indicating areas where a significant proportion of children may be experiencing delays. Understanding these developmental milestones is crucial for early identification of potential issues and implementing appropriate interventions to support children's optimal growth and development.

Table 10. Association between demographic profile and status of growth and development among under five children in rural Belagavi. n=885

Demographic profile of mothers		Status of growth		χ^2 value (Chi-square)	p-value
		Not developed (293)	Developed (592)		
		n (%)	n (%)		
Age of the mother	<21yrs	118 (40.27)	142 (23.99)	61.949	0.0001*
	21-25yrs	98 (33.45)	155 (26.18)		
	26-30yrs	64 (21.84)	163 (27.53)		
	>30yrs	13 (4.44)	132 (22.3)		
Religion	Hindu	59 (20.14)	377 (63.68)	168.652	0.0001*
	Muslim	158 (53.92)	103 (17.4)		
	Christian	76 (25.94)	112 (18.92)		
Dwelling	Katcha	111 (37.88)	147 (24.83)	16.168	0.0001*
	Pucca	182 (62.12)	445 (75.17)		
Mother's literacy	Illiterate	7 (2.39)	3 (0.51)	33.828	0.0001*
	Primary school	107 (36.52)	169 (28.55)		
	Higher primary	57 (19.45)	97 (16.39)		
	SSLC	100 (34.13)	201 (33.95)		
	Graduate	6 (2.05)	59 (9.97)		
	Post graduate	16 (5.46)	63 (10.64)		
Occupation	Housewife	194 (66.21)	285 (48.14)	44.005	0.0001*
	Daily wages	58 (19.8)	99 (16.72)		
	Government employee	23 (7.85)	116 (19.59)		
	Private sector employee	18 (6.14)	92 (15.54)		
Monthly income	Less than rs. 2,000	83 (28.33)	105 (17.74)	45.453	0.0001*
	Rs. 2,001-4,000	97 (33.11)	166 (28.04)		
	Rs. 4,001-6,000	40 (13.65)	42 (7.09)		
	More than Rs. 6,000	73 (24.91)	279 (47.13)		
Type of family	Nuclear	111 (37.88)	264 (44.59)	20.904	0.0001*
	Joint	117 (39.93)	149 (25.17)		
	Extended	65 (22.18)	179 (30.24)		
Who takes care of child during day	Self	83 (28.33)	297 (50.17)	72.778	0.0001*
	Father	17 (5.8)	72 (12.16)		
	Grandparents	118 (40.27)	119 (20.1)		
	Siblings	57 (19.45)	60 (10.14)		
	Relatives	18 (6.14)	44 (7.43)		
Type of diet	Vegetarian	126 (43)	76 (12.84)	135.039	0.0001*
	Non-vegetarian	44 (15.02)	282 (47.64)		
	Mixed	123 (41.98)	234 (39.53)		

Table 10 illustrates the association between the demographic profile of mothers and the status of growth and development among under-five children in rural Belagavi, as indicated by chi-square (χ^2) values and corresponding p-values. The analysis reveals significant associations between various demographic factors and the status of growth and development. Firstly, there is a notable association between the age of the mother and the developmental status of children ($\chi^2 = 61.949$, $p < 0.0001$). Specifically, younger mothers, aged below 21 years, show a higher proportion of children with delayed growth and development compared to older mothers. Similarly, religion demonstrates a significant association with growth and development status ($\chi^2 = 168.652$, $p < 0.0001$), with Hindu mothers having a higher proportion of children with delayed growth compared to Muslim and Christian mothers. Dwelling type also exhibits a significant association ($\chi^2 = 16.168$, $p < 0.0001$), with children from Pucca houses showing a lower proportion of developmental delays compared to those from Katcha houses. Mother's literacy level ($\chi^2 = 33.828$, $p < 0.0001$), occupation ($\chi^2 = 44.005$, $p < 0.0001$), monthly income ($\chi^2 = 45.453$, $p < 0.0001$), type of family ($\chi^2 = 20.904$, $p < 0.0001$), caregiver during the day ($\chi^2 = 72.778$, $p < 0.0001$), and type of diet ($\chi^2 = 135.039$, $p < 0.0001$) all display significant associations with the growth and development status of children. These findings underscore the importance of considering various demographic factors in assessing and addressing the developmental needs of under-five children in rural settings. Understanding these associations can guide targeted interventions aimed at improving overall child well-being and development.

Table 11. Association between biological factors and status of growth and development among under five children in rural Belagavi. (n=885)

Biological factors		Status of growth		χ^2 value (Chi-square)	p-value
		Not developed (293)	Developed (592)		
		n (%)	n (%)		
Pattern of pregnancy	Repeat adolescent pregnancy	106 (36.18)	111 (18.75)	65.43	0.0001*
	Adolescent (first) and adult (current) pregnancy	92 (31.4)	120 (20.27)		
	Repeat adult pregnancy	95 (32.42)	361 (60.98)		
Consanguinity	Yes	151 (51.54)	277 (46.79)	1.767	0.184
	No	142 (48.46)	315 (53.21)		
Mode of delivery	Normal vaginal delivery	166 (56.66)	433 (73.14)	24.356	0.0001*
	Caesarean	127 (43.34)	159 (26.86)		
Antenatal care	Yes	240 (81.91)	328 (55.41)	59.898	0.0001*
	No	53 (18.09)	264 (44.59)		
Gestational age at birth	Pre-term	212 (72.35)	299 (50.51)	38.342	0.0001*
	Term	81 (27.65)	293 (49.49)		
Multiple Gestation	Yes	183 (62.46)	363 (61.32)	0.108	0.743
	No	110 (37.54)	229 (38.68)		
History of birth asphyxia	Yes	133 (45.39)	238 (40.2)	2.168	0.141
	No	160 (54.61)	354 (59.8)		
Breastfeeding	Appropriate	142 (48.46)	394 (66.55)	26.854	0.0001*
	Inappropriate	151 (51.54)	198 (33.45)		
Family Size	1--5	65 (22.18)	129 (21.79)	0.044	0.978
	6--9	157 (53.58)	316 (53.38)		
	>=10	71 (24.23)	147 (24.83)		

Table 11 presents the association between various biological factors and the status of growth and development among under-five children in rural Belagavi, as indicated by chi-square (χ^2) values and corresponding p-values. The analysis reveals several significant associations between biological factors and the status of growth and development. Firstly, the Pattern of pregnancy demonstrates a significant association with growth and development status ($\chi^2 = 65.43$, $p < 0.0001$). Children born from repeat adult pregnancies show a higher proportion of developmental delays compared to those from repeat adolescent pregnancies or adolescent and adult pregnancies. Mode of delivery also displays a significant association ($\chi^2 = 24.356$, $p < 0.0001$), with children delivered through caesarean section exhibiting a higher proportion of developmental delays compared to those born through normal vaginal delivery. Furthermore, antenatal care ($\chi^2 = 59.898$, $p < 0.0001$), gestational age at birth ($\chi^2 = 38.342$, $p < 0.0001$), breastfeeding practices ($\chi^2 = 26.854$, $p < 0.0001$), and family size ($\chi^2 = 0.044$, $p = 0.978$) all demonstrate significant associations with growth and development status. However, factors such as consanguinity ($\chi^2 = 1.767$, $p = 0.184$), multiple gestation ($\chi^2 = 0.108$, $p = 0.743$), and history of birth asphyxia ($\chi^2 = 2.168$, $p = 0.141$) do not show significant associations with growth and development status. These findings highlight the importance of various biological factors in determining the growth and development status of under-five children in rural settings. Understanding these associations can inform targeted interventions aimed at promoting optimal child health and development.

Table 12. Assessment of risk of various demographic profiles on growth and development among under five-year children in rural Belagavi n=885

Demographic factors		Adjusted OR	95% CI for OR		P-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	**Ref**.			
	21-25yrs	0.32	0.15	0.69	0.0030*
	26-30yrs	0.27	0.13	0.59	0.0010*
	>30 yrs	0.63	0.29	1.39	0.251
Religion	Hindu	**Ref.**			
	Muslim	0.1	0.06	0.17	0.0001*
	Christian	0.55	0.34	0.91	0.0190*
Dwelling	Katcha	**Ref**.			
	Pucca	2.97	1.8	4.9	0.0001*
Mother's literacy	Illiterate	0.23	0.04	1.27	0.091
	Primary school	0.66	0.3	1.45	0.3
	Higher Primary school	1.36	0.57	3.27	0.492
	SSLC	1.54	0.69	3.46	0.295
	Graduate	4.77	1.38	16.56	0.0140*
	Post graduate	**Ref.**			
Occupation	Housewife	**Ref.**			
	Daily wages	0.83	0.38	1.83	0.647
	Government employee	0.83	0.38	1.82	0.639
	Private sector employee	1.27	0.5	3.21	0.615
Monthly income	Less than Rs. 2,000	**Ref.**			
	Rs. 2,001-4,000	0.72	0.43	1.19	0.199
	Rs. 4,001-6,000	0.98	0.61	1.57	0.934
	More than Rs. 6,000	0.66	0.35	1.26	0.204
Type of family	Nuclear	0.87	0.52	1.44	0.577
	Joint	2.71	1.51	4.87	0.0010*
	Extended	**Ref.**			
Who takes care of child during day	Self	**Ref.**			
	Father	0.56	0.26	1.17	0.123
	Grandparents	0.41	0.23	0.75	0.0040*
	Siblings	0.23	0.11	0.47	0.0001*
	Relatives	0.67	0.3	1.47	0.314
Type of diet	Vegetarian	0.42	0.24	0.76	0.0040*
	Non-Vegetarian	2.64	1.62	4.32	0.0001*
	Mixed	**Ref.**			

Table 12 presents the assessment of the risk of various demographic profiles on the development of children less than 5 years in rural Belagavi, as indicated by adjusted odds ratios (OR), 95% confidence intervals (CI) for OR, and corresponding p-values. Several demographic factors show significant associations with the risk of delayed growth and development in children. Firstly, younger maternal age (<21 years) is associated with increased risk, with adjusted ORs of 0.32 (95% CI: 0.15-0.69) for mothers aged 21-25 years and 0.27 (95% CI: 0.13-0.59) for those aged 26-30 years, compared to the reference group. Conversely, maternal age over 30 years does not significantly influence the risk. Religion also demonstrates significant associations, with Muslim mothers showing a substantially lower risk (adjusted OR: 0.1, 95% CI: 0.06-0.17) compared to Hindu mothers. Similarly, Christian mothers exhibit a reduced risk (adjusted OR: 0.55, 95% CI: 0.34-0.91). Dwelling type is a significant predictor, with children residing in Pucca houses having a nearly threefold higher risk of delayed growth and development (adjusted OR: 2.97, 95% CI: 1.8-4.9) compared to those in Katcha houses. Maternal literacy level and occupation show varying associations. Higher maternal education levels, particularly graduates, are associated with increased risk (adjusted OR: 4.77, 95% CI: 1.38-16.56), while postgraduates do not significantly influence the risk. Regarding occupation, no significant associations are observed. Monthly income does not exhibit significant associations with the risk of delayed growth and development. However, the type of family structure demonstrates significant associations, with children in joint families having a higher risk (adjusted OR: 2.71, 95% CI: 1.51-4.87) compared to those in nuclear families. The caregiver during the day also significantly influences the risk, with children primarily cared for by siblings (adjusted OR: 0.23, 95% CI: 0.11-0.47) or grandparents (adjusted OR: 0.41, 95% CI: 0.23-0.75) having a lower risk.

Moreover, children on a vegetarian diet exhibit a reduced risk (adjusted OR: 0.42, 95% CI: 0.24-0.76) compared to those on other diets. These findings provide valuable insights into the demographic factors associated with the risk of delayed growth and development among under-five children in rural Belagavi, highlighting the need for targeted interventions to address these risk factors and promote optimal child health and development.

Table 13. Accuracy of demographic characteristics in predicting growth and development of children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.6490	0.0190	0.0001*	0.6120	0.6850
Religion	0.3110	0.0180	0.0001*	0.2750	0.3470
Dwelling	0.5650	0.0210	0.0020*	0.5250	0.6060
Mother's literacy	0.5920	0.0200	0.0001*	0.5530	0.6300
Occupation	0.6140	0.0190	0.0001*	0.5760	0.6510
Monthly income	0.6120	0.0200	0.0001*	0.5730	0.6510
Type of family	0.4990	0.0200	0.9570	0.4600	0.5380
Care of child during day	0.3750	0.0200	0.0001*	0.3370	0.4140
Type of diet	0.5810	0.0220	0.0001*	0.5360	0.6250

Table 13 presents the accuracy of various demographic characteristics in predicting the growth and development of children, measured in terms of the area under the curve (AUC) of the receiver operating characteristic (ROC) curve. The AUC values indicate the discriminative ability of each demographic characteristic in correctly classifying children into developed or delayed growth and development categories. A higher AUC value suggests better predictive performance. Among the demographic characteristics examined, maternal age demonstrates moderate predictive accuracy, with an AUC of 0.6490 ($p < 0.0001$), indicating that maternal age

alone can reasonably discriminate between children with developed and delayed growth and development. Religion, dwelling type, mother's literacy level, occupation, and monthly income also show significant predictive accuracy, with AUC values ranging from 0.3110 to 0.6140 (all $p < 0.0001$), highlighting their varying degrees of influence on growth and development outcomes. Interestingly, the type of family structure does not significantly contribute to predictive accuracy, as indicated by an AUC of 0.4990 ($p = 0.9570$), suggesting that it may not be a strong predictor of growth and development status. Similarly, the caregiver during the day exhibits relatively lower predictive accuracy, with an AUC of 0.3750 ($p < 0.0001$), implying that this factor alone may not reliably distinguish between children with different growth and development outcomes. Type of diet emerges as a significant predictor, with an AUC of 0.5810 ($p < 0.0001$), indicating its importance in predicting growth and development status. Overall, these findings underscore the varying degrees of influence that different demographic characteristics have on the prediction of growth and development outcomes in under-five children, providing valuable insights for targeted interventions and healthcare planning aimed at promoting optimal child health and development in rural settings.

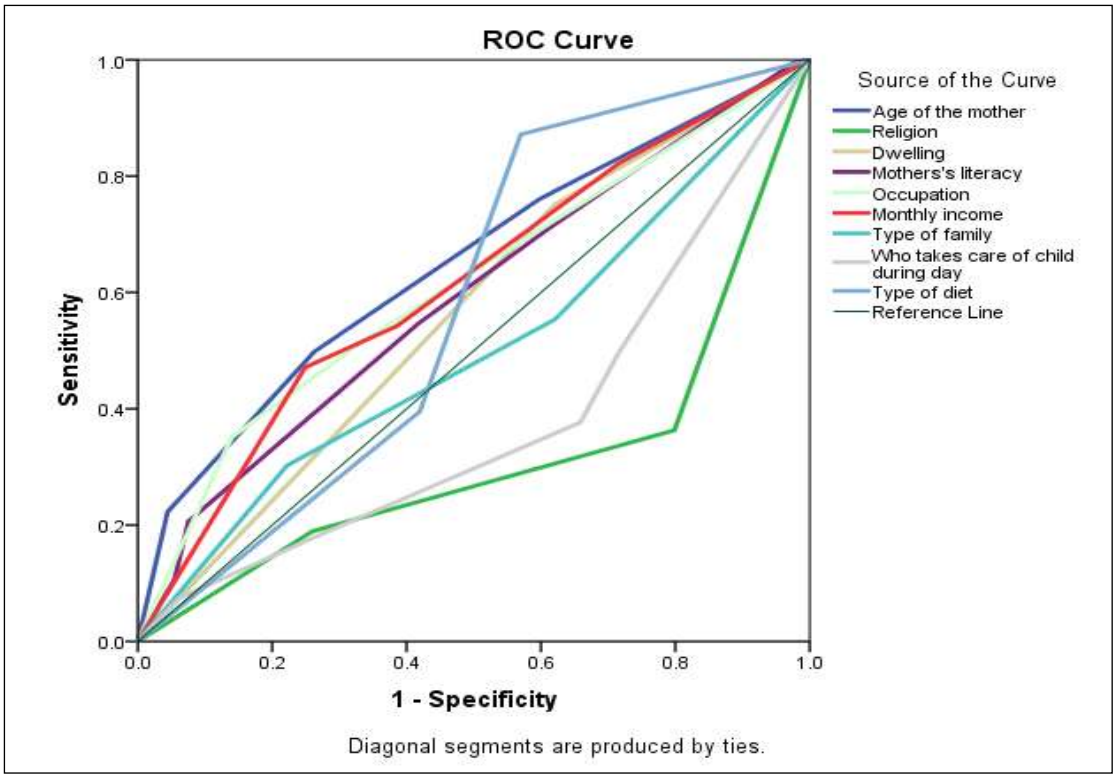


Figure: 20 ROC curve of accuracy of demographic characteristics in predicting growth and development of children

Table 14. Assessment of risk of various biological factors on growth and development among under five-year children in rural Belagavi n=885

Biological factors		Adjusted OR	95% CI for OR		P-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	**Ref.**			
	Adolescent (first) and adult (current) pregnancy	0.52	0.26	1.03	0.061
	Repeat adult pregnancy	12.6	6.75	23.52	0.0001*
Consanguinity	No	**Ref.**			
	Yes	3.5	2.07	5.91	0.0001*
Mode Of Delivery	Normal vaginal delivery	**Ref.**			
	Caesarean	3.52	1.79	6.89	0.0001*
Antenatal Care	No	**Ref.**			
	Yes	0.27	0.16	0.46	0.0001*
Gestational age at birth	Term	**Ref.**			
	Pre-term	0.87	0.53	1.41	0.566
Multiple Gestation	No	**Ref.**			
	Yes	0.14	0.06	0.32	0.0001*
History Of Birth Asphyxia	No	**Ref.**			
	Yes	0.33	0.17	0.63	0.0010*
Breastfeeding	Inappropriate	**Ref.**			
	Appropriate	5.65	3.45	9.25	0.0001*
Family Size	1--5	**Ref.**			
	6--9	1.65	0.76	3.57	0.204
	>=10	2.34	1.16	4.7	0.0180*

Table 14 presents the assessment of the risk associated with various biological factors on the growth and development of children under five years old in rural Belagavi, expressed in terms of adjusted odds ratios (OR) and their corresponding

95% confidence intervals (CI). Among the biological factors examined, several show significant associations with the likelihood of delayed growth and development in children. Repeat adult pregnancy significantly increases the risk, with an adjusted OR of 12.6 (95% CI: 6.75 - 23.52, $p < 0.0001$), indicating that children born from repeat adult pregnancies are substantially more likely to experience delayed growth and development compared to those from other pregnancy patterns. Consanguinity, or blood relation between parents, is also associated with increased risk, as evidenced by an adjusted OR of 3.5 (95% CI: 2.07 - 5.91, $p < 0.0001$). Similarly, babies born via Caesarean section are at a higher risk of delayed growth and development, with an adjusted OR of 3.52 (95% CI: 1.79 - 6.89, $p < 0.0001$) compared to those born through normal vaginal delivery. Conversely, receiving antenatal care significantly reduces the risk of delayed growth and development, with an adjusted OR of 0.27 (95% CI: 0.16 - 0.46, $p < 0.0001$). Furthermore, having multiple gestations (twins, triplets, etc.) significantly decreases the risk, with an adjusted OR of 0.14 (95% CI: 0.06 - 0.32, $p < 0.0001$), indicating a protective effect on growth and development. A history of birth asphyxia also reduces the risk, with an adjusted OR of 0.33 (95% CI: 0.17 - 0.63, $p = 0.0010$), suggesting that children with a history of birth asphyxia are less likely to experience delayed growth and development. Moreover, appropriate breastfeeding practices significantly reduce the risk, with an adjusted OR of 5.65 (95% CI: 3.45 - 9.25, $p < 0.0001$), underscoring the importance of breastfeeding in promoting optimal growth and development in children. Overall, these findings highlight the critical role of various biological factors in influencing the growth and development trajectories of children in rural settings, emphasizing the importance of targeted interventions and healthcare strategies aimed at mitigating risk factors and promoting positive outcomes in child health and development.

Table 15. Accuracy of Biological factors in predicting growth and development of children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.6500	0.0200	0.0001*	0.6110	0.6890
Consanguinity	0.5240	0.0210	0.2500	0.4830	0.5640
Mode of delivery	0.4180	0.0210	0.0001*	0.3770	0.4580
Antenatal care	0.6330	0.0190	0.0001*	0.5950	0.6700
Gestational age at birth	0.6090	0.0200	0.0001*	0.5700	0.6480
Multiple gestation	0.5060	0.0210	0.7820	0.4650	0.5460
History	0.5260	0.0210	0.2080	0.4850	0.5660
Breastfeeding	0.4100	0.0200	0.0001*	0.3690	0.4500
Family Size	0.5040	0.0210	0.8530	0.4630	0.5440

Table 15 presents the accuracy of various biological factors in predicting the growth and development of children under five years old in rural Belagavi, as measured by the area under the curve (AUC) of the receiver operating characteristic (ROC) curve. The AUC values indicate the discriminative ability of each biological factor in distinguishing between children with developed and not developed growth and development. Among the factors examined, Pattern of pregnancy , antenatal care, and gestational age at birth demonstrate relatively higher predictive accuracy, with AUC values of 0.6500, 0.6330, and 0.6090, respectively ($p < 0.0001$). These findings

suggest that these factors are effective in accurately identifying children at risk for delayed growth and development. Conversely, factors such as consanguinity, mode of delivery, multiple gestation, history, breastfeeding, and family size show lower predictive accuracy, with AUC values ranging from 0.4100 to 0.5240 ($p < 0.0001$ for consanguinity, mode of delivery, antenatal care, and breastfeeding). Overall, these results highlight the varying degrees of effectiveness of different biological factors in predicting the growth and development of children in rural settings. Factors such as Pattern of pregnancy , antenatal care, and gestational age at birth appear to be more reliable indicators, emphasizing the importance of addressing these factors in interventions aimed at promoting optimal growth and development outcomes in children.

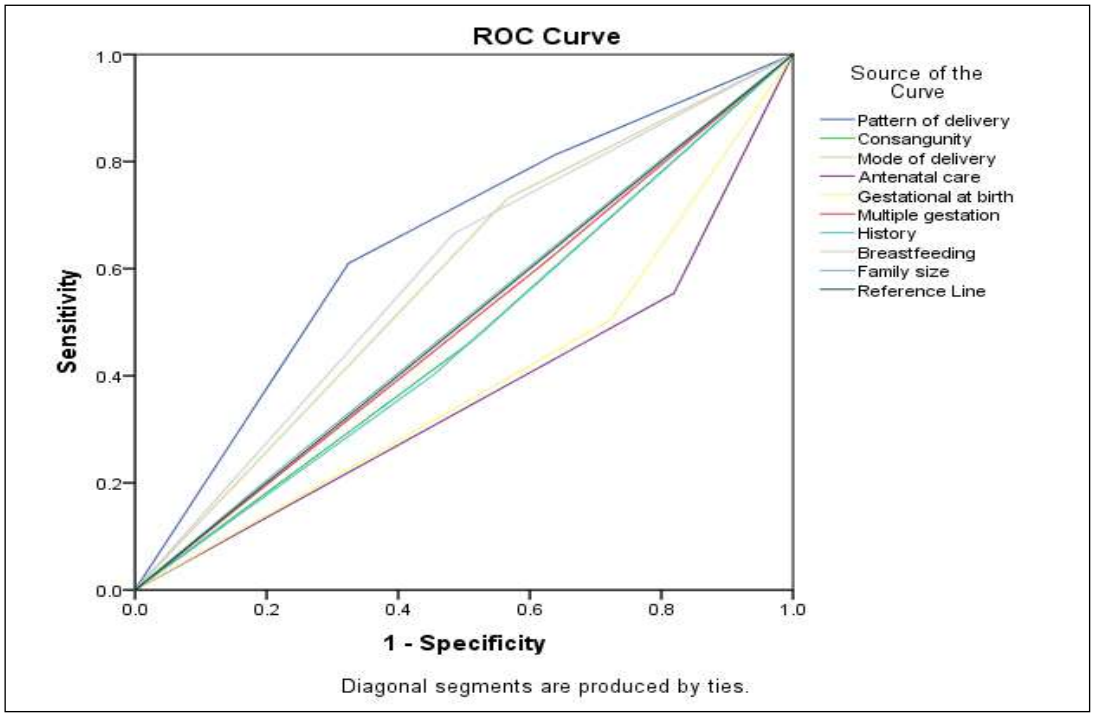


Figure: 21 ROC Curve of accuracy of biological factors in predicting growth and development of children

Table 16. Domain of development by different age groups

n=885

Domain of development	Age groups						
	0-12	**13-24**	**25-36**	**37-48**	**49-60**	**All ages**	**p value**
Gross motor (n = 885)							
n	255	239	112	117	162	885	0.001
Developed	195(76.72)	136(56.96)	69(62.32)	57(49.27)	74(46.27)	534 (60.36)	
Delayed	60 (23.28)	103(43.04)	43(37.68)	60 (50.73)	88(53.73)	351(39.64)	
Vision and Fine motor (n =885)							
n	239	226	124	128	168	885	0.001
Developed	179(75.28)	152(67.42)	65 (52.55)	67(52.46)	68 (40.49)	538(60.89)	
Delayed	60 (24.72)	74(32.58)	59 (47.45)	61(47.54)	100(59.51)	347 (39.11)	
Hearing, Language and concept development (n= 885)							
n	228	128	133	137	169	885	0.068
Developed	158(69.31)	136(62.84)	107(81.19)	105(76.84)	121(72.13)	624(70.58)	
Delayed	70(30.69)	82(37.16)	26(18.81)	32 (23.16)	48 (27.87)	261(29.42)	
Self-help skills (n = 885)							
n	235	223	127	131	169	885	0.09
Developed	126(53.97)	109(49.23)	65(51.72)	89(68.44)	89(52.78)	478 (54.1)	
Delayed	109(46.03)	114(50.77)	62(48.28)	42 (31.56)	80 (47.22)	407 (45.9)	
Social skills (n = 885)							
n	239	226	124	128	168	885	0.469
Developed	126(52.98)	117 (51.9)	76 (61.37)	76(59.86)	100 (59.56)	494(55.87)	
Delayed	113(47.02)	102(48.1)	48 (38.63)	52(40.14)	68(40.44)	391(44.13)	

Table 16 presents the distribution of different domains of development across various age groups among children. The domains of development assessed include gross motor skills, vision and fine motor skills, hearing, language, and concept development, self-help skills, and social skills. In the gross motor domain, there is a

significant difference in the proportion of developed and delayed skills across different age groups ($p = 0.001$). Generally, the percentage of children with developed gross motor skills decreases as age increases, with the highest proportion in the youngest age group (0-12 months) and the lowest in the oldest age group (49-60 months). Similarly, in the vision and fine motor domain, there is a significant difference in the distribution of developed and delayed skills across age groups ($p = 0.001$). The proportion of children with developed skills decreases with age, with the highest percentage observed in the youngest age group and the lowest in the oldest age group. For hearing, language, and concept development, though the difference is not statistically significant ($p = 0.068$), there is a trend of decreasing developed skills with increasing age, particularly after the first two age groups. In self-help skills, while there is no statistically significant difference across age groups ($p = 0.09$), there is a noticeable variation in the proportion of developed and delayed skills, with some fluctuation across different age groups. Lastly, in social skills, there is no significant difference in the distribution of developed and delayed skills across age groups ($p = 0.469$), indicating a relatively consistent pattern across different age groups. Overall, the findings suggest age-related variations in the development of different domains, highlighting the importance of considering age-specific developmental milestones when assessing children's growth and development.

Table 17. Association between demographic factors and status of Gross motor growth & development among under five children in rural Belagavi n=885

Demographic variables	Delayed (468)		Developed (417)		Total	Chi-square	p-value
	n	%	n	%			
Age of the mother							
<21yrs	185	39.64	69	16.67	**254**	81.91	0.001*
21-25yrs	131	27.93	125	30	**256**		
26-30yrs	114	24.32	118	28.21	**232**		
> 30	38	8.11	105	25.13	**143**		
Religion							
Hindu	114	24.32	341	81.79	**455**	291.76	0.001*
Muslim	189	40.32	46	11.03	**235**		
Christian	165	35.36	30	7.18	**195**		
Dwelling							
Katcha	207	44.14	43	10.26	**250**	125.17	0.001*
Pucca	261	55.86	374	89.74	**635**		
Mother's literacy							
Illiterate	8	1.8	1	0.26	**9**	78.09	0.001*
Primary school	177	37.84	94	22.56	**271**		
Higher primary school	84	18.02	70	16.67	**154**		
SSLC	166	35.36	138	33.08	**304**		
Graduate	11	2.25	54	13.08	**65**		
Post graduate	22	4.73	60	14.36	**82**		
Occupation							
Housewife	312	66.66	158	37.95	**470**	126.98	0.001*
Daily wages	93	19.82	59	14.1	**152**		
Government employee	36	7.66	110	26.41	**146**		
Private sector employee	27	5.86	90	21.54	**117**		
Monthly income							
Less than rs. 2,000	122	26.13	60	14.36	**182**	86.11	0.001*
Rs. 2,001-4,000	156	33.33	102	24.36	**258**		
Rs. 4,001-6,000	63	13.51	19	4.62	**82**		
More than rs. 6,000	127	27.03	236	56.67	**363**		
Type of family							
Nuclear	184	39.41	195	46.67	**379**	24.07	0.001*
Joint	171	36.49	90	21.54	**261**		
Extended	113	24.1	132	31.79	**245**		

Who takes care of child during day							
Self	135	28.83	251	60.26	**386**	169.48	0.001*
Father	22	4.73	69	16.41	**91**		
Grandparents	178	38.06	51	12.31	**229**		
Siblings	85	18.24	29	6.92	**114**		
Relatives	48	10.14	17	4.1	**65**		
Type of diet							
Vegetarian	175	37.39	18	4.36	**193**	181.33	0.001*
Non-vegetarian	100	21.4	234	56.15	**334**		
Mixed	193	41.21	165	39.49	**358**		

Table 17 provides a valuable insight into the association between demographic factors and the status of gross motor growth and development among children under five years old in rural Belagavi, supported by chi-square values and p-values. The chi-square test indicates significant associations between these factors and gross motor development (all $p < 0.05$). Specifically, younger maternal age (<21 years) is strongly associated with delayed gross motor skills (Chi-square = 81.91,) $p < 0.0001$). Similarly, religion shows a significant impact, with Hindu children exhibiting higher rates of developed gross motor skills compared to Muslim and Christian children (Chi-square = 291.76), $p < 0.0001$). Additionally, dwelling type shows a notable association, with children in pucca houses displaying better gross motor development than those in katcha houses (Chi-square = 125.17), $p < 0.0001$). Maternal literacy also plays a crucial role, as children of literate mothers, especially those with higher education levels, demonstrate more developed gross motor skills (Chi-square = 78.09, $p < 0.0001$). Furthermore, occupation (Chi-square = 126.98, $p < 0.0001$) and monthly income (Chi-square = 86.11, $p < 0.0001$) of the mothers significantly influence gross motor development, with children of employed mothers and higher-income households exhibiting better outcomes. Family structure and caregiver also play significant roles, as children in nuclear families (Chi-square = 24.07, $p < 0.0001$), especially those cared for by themselves or their fathers during the day (Chi-square =

169.48, $p < 0.0001$), tend to have more developed gross motor skills. Finally, dietary habits show a strong association, with children on non-vegetarian diets demonstrating better gross motor development (Chi-square = 181.33, $p < 0.0001$). These findings underscore the importance of considering various demographic factors in interventions aimed at promoting optimal gross motor growth and development among rural children under five.

Table 18. Assessment of risk of various demographic profiles on Gross motor growth and development among under-five children in rural Belagavi n=885

Demographic factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	Ref.			
	21-25yrs	3.56	1.85	6.82	0.0001*
	26-30yrs	4.26	2.25	8.08	0.0001*
	>30 yrs	2.71	1.34	5.47	0.0060*
Religion	Hindu	Ref.			
	Muslim	0.27	0.16	0.47	0.0001*
	Christian	0.15	0.09	0.27	0.0001*
Dwelling	Katcha	Ref.			
	Pucca	1.81	1.04	3.16	0.0380*
Mother's literacy	Illiterate	0.46	0.04	4.80	0.5140
	Primary school	0.34	0.14	0.81	0.0150*
	Higher Primary school	0.63	0.24	1.62	0.3380
	SSLC	0.57	0.24	1.38	0.2140
	Graduate	2.49	0.74	8.39	0.1410
	Post graduate	Ref.			
Occupation	Housewife	Ref.			
	Daily wages	1.33	0.71	2.48	0.3740
	Government employee	4.82	2.27	10.22	0.0001*
	Private sector employee	1.77	0.82	3.78	0.1440
Monthly income	Less than Rs. 2,000	Ref.			
	Rs. 2,001-4,000	1.27	0.73	2.19	0.3980
	Rs. 4,001-6,000	0.63	0.27	1.44	0.2710
	More than Rs. 6,000	1.16	0.65	2.10	0.6130
Type of family	Nuclear	0.48	0.27	0.85	0.0120*
	Joint	0.53	0.28	0.98	0.0430*
	Extended	Ref.			
Who takes care of child during day	Self	Ref.			
	Father	1.10	0.54	2.23	0.8000
	Grandparents	0.32	0.17	0.61	0.0010*
	Siblings	0.16	0.07	0.35	0.0001*
	Relatives	0.44	0.19	1.02	0.0570
Type of diet	Vegetarian	5.87	2.77	12.42	0.0001*
	Non-Vegetarian	3.00	1.41	6.40	0.0040*
	Mixed	Ref.			

Table 18 depicts the assessment of risk regarding various demographic profiles on gross motor growth and development among under-five children in rural Belagavi reveals significant associations between several factors and the adjusted odds ratios (ORs), supported by p-values and 95% confidence intervals (CIs) for the ORs. Maternal age demonstrates a notable influence, with mothers aged 21-25 years (Adjusted OR = 3.56, $p < 0.0001$), 26-30 years (Adjusted OR = 4.26, $p < 0.0001$), and over 30 years (Adjusted OR = 2.71, $p = 0.006$) showing increased odds of delayed growth compared to those under 21 years. Religion also plays a significant role, with Muslim (Adjusted OR = 0.27, $p < 0.0001$) and Christian (Adjusted OR = 0.15, $p < 0.0001$) children demonstrating lower odds of delayed growth compared to Hindu children. Dwelling type shows a significant association, with children in pucca houses having higher odds of delayed growth (Adjusted OR = 1.81, $p = 0.038$). Additionally, maternal literacy exhibits significance, particularly for those with primary school education (Adjusted OR = 0.34, $p = 0.015$), while occupation, monthly income, type of family, caretaker during the day, and type of diet also demonstrate significant associations with gross motor growth and development. Notably, children in nuclear families (Adjusted OR = 0.48, $p = 0.012$) and those cared for by grandparents (Adjusted OR = 0.32, $p = 0.001$) or siblings (Adjusted OR = 0.16, $p < 0.0001$) during the day show lower odds of delayed growth. Moreover, a vegetarian diet (Adjusted OR = 5.87, $p < 0.0001$) significantly increases the odds of delayed growth compared to a mixed diet. These findings underscore the complex interplay between demographic factors and their impact on gross motor growth and development among under-five children, emphasizing the need for targeted interventions tailored to specific risk profiles to promote optimal development.

Table:19 Accuracy of demographic characteristics in predicting gross motor growth and development of children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.6600	0.0190	0.0001*	0.6230	0.6970
Religion	0.2080	0.0160	0.0001*	0.1760	0.2390
Dwelling	0.6690	0.0190	0.0001*	0.6330	0.7060
Mother's literacy	0.6400	0.0190	0.0001*	0.6030	0.6780
Occupation	0.6820	0.0190	0.0001*	0.6450	0.7190
Monthly income	0.6440	0.0190	0.0001*	0.6060	0.6810
Type of family	0.4960	0.0200	0.8340	0.4560	0.5360
Care of child during day	0.2980	0.0180	0.0001*	0.2620	0.3340
Type of diet	0.5920	0.0200	0.0001*	0.5530	0.6310

*p<0.05

The above table represents the accuracy of demographic characteristics in predicting Gross motor growth and development of children in terms of area under curve (AUC). The accuracy of predicting the Gross motor growth and development of children among under five year children in rural Belagavi by age of mother is 66.00% (p=0.0001), Religion is 20.80% (p=0.0001), Dwelling is 66.90% (p=0.0001), Mother's literacy is 64.00% (p=0.0001), occupation is 68.20% (p=0.0001), monthly income is 64.40% (p=0.0001), Care of child during day is 29.80% (p=0.0001) and types of diet is 59.20% (p=0.0001). The area under curve is also presented in the following figure.

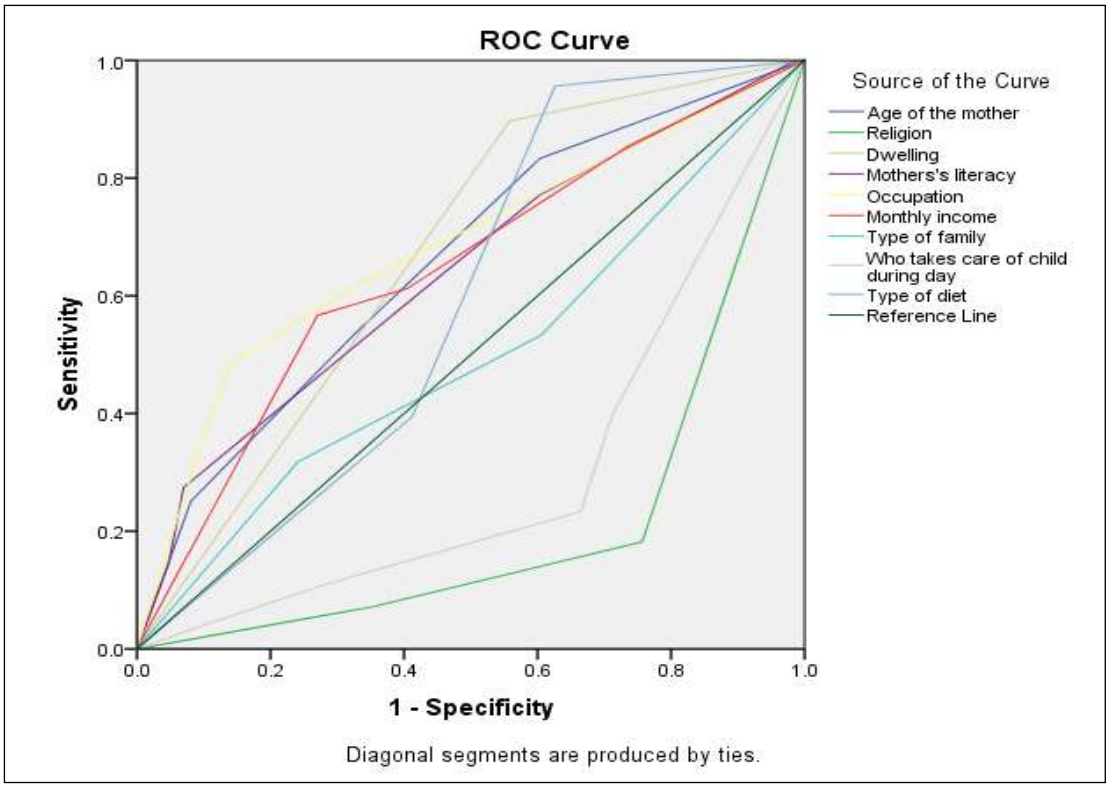


Figure: 22 ROC Curve of accuracy of demographic factors in predicting gross motor growth and development of children n=885

Table 20. Association between biological factors and status of Gross motor growth & development among under-five children in rural Belagavi n=885

Biological factors	Delayed (468)		Developed (417)		Total	Chi-square	p-value
	n	%	n	%			
Pattern of pregnancy							
Repeat adolescent pregnancy	139	29.73	67	16.15	**206**	43.56	0.001*
Adolescent (first) & adult	128	27.25	80	19.23	**208**		
Repeat adult pregnancy	201	43.02	270	64.62	**471**		
Consanguinity							
Yes	277	59.23	147	35.38	**424**	50.63	0.001*
No	191	40.77	270	64.62	**461**		
Mode of delivery							
Normal vaginal delivery	307	65.54	310	74.36	**617**	7.98	0.005*
Caesarean	161	34.46	107	25.64	**268**		
Antenatal care							
Yes	333	71.17	222	53.33	**555**	30.27	0.001*
No	135	28.83	195	46.67	**330**		
Gestational age at birth							
Pre-term	305	65.09	191	45.9	**496**	33.58	0.001*
Term	163	34.91	226	54.1	**389**		
Multiple gestation							
Yes	281	60.14	263	63.08	**544**	0.85	0.356
No	187	39.86	154	36.92	**341**		
History of birth asphyxia							
Yes	211	45.05	157	37.69	**368**	5.02	0.025*
No	257	54.95	260	62.31	**517**		
Breastfeeding							
Appropriate	242	51.8	302	72.31	**544**	39.94	0.001*
Inappropriate	226	48.2	115	27.69	**341**		
Family size							
1--5	101	21.62	92	22.05	**193**	2.02	0.363
6--9	260	55.63	214	51.28	**474**		
>=10	107	22.75	111	26.67	**218**		

The table presents a significant association between various biological factors and the status of gross motor growth and development among children under five years old in rural Belagavi, as evidenced by chi-square values and p-values. The Pattern of pregnancy significantly impacts gross motor development (Chi-square =

43.56, $p < 0.0001$), with children from repeat adolescent pregnancies showing higher rates of delayed development compared to those from adult pregnancies. Consanguinity also plays a significant role (Chi-square = 50.63, $p < 0.0001$), as children from consanguineous unions exhibit higher rates of delayed development. Mode of delivery (Chi-square = 7.98, $p = 0.005$), antenatal care (Chi-square = 30.27, $p < 0.0001$), gestational age at birth (Chi-square =33.58, $p < 0.0001$), history of birth asphyxia (Chi-square = 5.02, $p = 0.025$), and breastfeeding practices (Chi-square = 39.94, $p < 0.0001$) are also significantly associated with gross motor development. Furthermore, while family size shows no significant association (Chi-square = 2.02, $p = 0.363$), other biological factors demonstrate clear impacts on the gross motor development of children, emphasizing the importance of addressing these factors in interventions aimed at promoting optimal growth and development among rural children under five.

Table 21. Assessment of risk of various biological factors on Gross motor growth and development among under-five children in rural Belagavi n=885

Biological factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	Ref.			
	Adolescent (first) and adult (current) pregnancy	1.33	0.62	2.82	0.4660
	Repeat adult pregnancy	6.87	3.53	13.37	0.0001*
Consanguinity	No	Ref.			
	Yes	0.27	0.16	0.45	0.0001*
Mode Of Delivery	Normal vaginal delivery	Ref.			
	Caesarean	0.38	0.18	0.80	0.0100*
Antenatal Care	No	Ref.			
	Yes	0.73	0.44	1.22	0.2320
Gestational age at birth	Term	Ref.			
	Pre-term	1.40	0.85	2.33	0.1900
Multiple Gestation	No	Ref.			
	Yes	0.19	0.08	0.46	0.0001*
History Of Birth Asphyxia	No	Ref.			
	Yes	0.11	0.05	0.24	0.0001*
Breastfeeding	Inappropriate	Ref.			
	Appropriate	7.91	4.49	13.93	0.0001*
Family Size	1--5	Ref.			
	6--9	6.51	2.93	14.47	0.0001*
	>=10	6.13	3.02	12.44	0.0001*

The assessment of biological factors on gross motor growth and development among under-five children in rural Belagavi reveals significant associations between several factors and adjusted odds ratios (ORs), supported by p-values and 95%

confidence intervals (CIs) for the ORs. Repeat adult pregnancies demonstrate substantially increased odds of delayed growth compared to repeat adolescent pregnancies (Adjusted OR = 6.87, $p < 0.0001$), while consanguinity shows a protective effect against delayed growth (Adjusted OR = 0.27, $p < 0.0001$). Furthermore, children delivered via cesarean section exhibit lower odds of delayed growth compared to those delivered vaginally (Adjusted OR = 0.38, $p = 0.010$). Notably, appropriate breastfeeding practices significantly increase the odds of developed growth (Adjusted OR = 7.91, $p < 0.0001$), while a history of birth asphyxia (Adjusted OR = 0.11, $p < 0.0001$) and multiple gestations (Adjusted OR = 0.19, $p < 0.0001$) are associated with reduced odds of delayed growth. Moreover, larger family sizes (6-9 members: Adjusted OR = 6.51, $p < 0.0001$; ≥10 members: Adjusted OR = 6.13, $p < 0.0001$) demonstrate increased odds of delayed growth compared to smaller families (1-5 members). These findings underscore the significant impact of biological factors on gross motor growth and development among rural children under five, highlighting the importance of addressing these factors in interventions aimed at promoting optimal development.

Table 22. Accuracy of Biological factors in predicting Gross motor growth and development of children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.6150	0.0190	0.0001*	0.5760	0.6530
Consanguinty	0.6190	0.0190	0.0001*	0.5810	0.6570
Mode of delivery	0.4560	0.0200	0.0280*	0.4170	0.4950
Antenatal care	0.5890	0.0200	0.0001*	0.5500	0.6280
Gestational age at birth	0.5960	0.0200	0.0001*	0.5570	0.6350
Multiple gestation	0.4850	0.0200	0.4630	0.4460	0.5250
History	0.5370	0.0200	0.0670	0.4980	0.5760
Breastfeeding	0.3970	0.0200	0.0001*	0.3590	0.4360
Family Size	0.5140	0.0200	0.4940	0.4740	0.5530

Table presents the accuracy of various biological factors in predicting gross motor growth and development among children, measured in terms of the area under the curve (AUC). The AUC values indicate the discriminatory power of each biological factor in distinguishing between children with developed and delayed gross motor skills. Among the biological factors examined, Pattern of pregnancy and consanguinity have relatively high AUC values of 0.615 and 0.619, respectively, indicating strong predictive abilities in identifying children's gross motor development status. These factors also have statistically significant p-values ($p < 0.05$), suggesting

a significant association with the outcome. Similarly, antenatal care and gestational age at birth demonstrate strong predictive abilities, with AUC values of 0.589 and 0.596, respectively, and statistically significant p-values. On the other hand, breastfeeding has a lower AUC value of 0.397, indicating less predictive power in determining gross motor development. However, it still has a statistically significant p-value. Mode of delivery, multiple gestation, history, and family size show moderate predictive abilities, with AUC values ranging from 0.456 to 0.537. However, only mode of delivery has a statistically significant p-value. These findings highlight the importance of considering various biological factors, particularly Pattern of pregnancy , consanguinity, antenatal care, and gestational age at birth, in understanding and predicting gross motor growth and development in children. Such insights can inform targeted interventions and support strategies to promote optimal gross motor development among children.

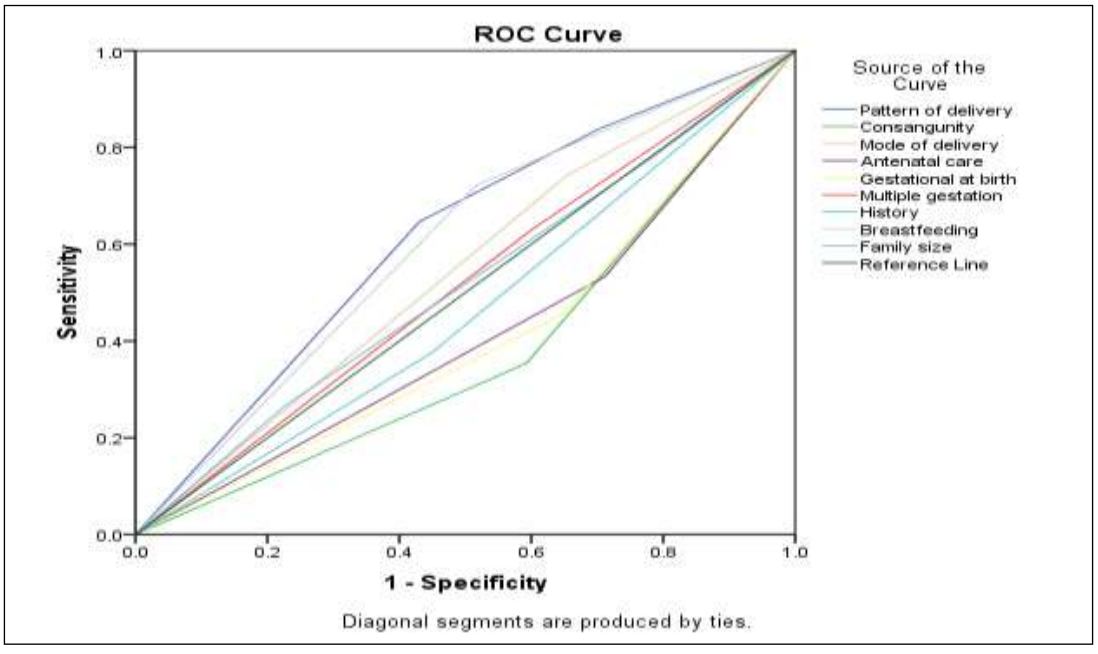


Figure: 23 ROC curve of accuracy of Biological factors in predicting growth and development of children n=885

Table 23. Association between demographic factors and status of Vision and fine motor growth & development among under-five children in rural Belagavi

n=885

Demographic variables	Delayed		Developed		Total	Chi-square	p-value
	n	%	n	%			
Age of the mother							
<21yrs	158	37.9	95	20.22	**253**	89.286	0.0001*
21-25yrs	123	29.58	132	28.26	**255**		
26-30yrs	115	27.63	114	24.35	**229**		
> 30	21	4.89	127	27.17	**148**		
Religion							
Hindu	68	16.38	375	80.22	**443**	366.212	0.0001*
Muslim	215	51.59	40	8.48	**255**		
Christian	134	32.03	53	11.3	**187**		
Dwelling							
Katcha	168	40.34	85	18.26	**253**	52.877	0.0001*
Pucca	249	59.66	383	81.74	**632**		
Mothers's literacy							
Illiterate	7	1.71	3	0.43	**10**	64.735	0.0001*
Primary school	151	36.19	124	26.52	**275**		
Higher primary school	77	18.58	77	16.52	**154**		
Sslc	155	37.16	144	30.87	**299**		
Graduate	8	1.96	59	12.39	**67**		
Post graduate	18	4.4	62	13.26	**80**		
Occupation							
Housewife	272	65.28	205	43.7	**477**	67.088	0.0001*
Daily wages	81	19.32	77	16.52	**158**		
Government employee	39	9.29	100	21.3	**139**		
Private sector employee	25	6.11	86	18.48	**111**		
Monthly income							
Less than rs. 2,000	115	27.63	75	16.09	**190**	74.927	0.0001*
Rs. 2,001-4,000	150	35.94	118	25.22	**268**		
Rs. 4,001-6,000	51	12.22	30	6.3	**81**		
More than rs. 6,000	101	24.21	245	52.39	**346**		
Type of family							
Nuclear	162	38.88	215	45.87	**377**	26.728	0.0001*
Joint	159	38.14	105	22.61	**264**		
Extended	96	22.98	148	31.52	**244**		

Who takes care of child during day							
Self	127	30.56	254	54.35	**381**	103.848	0.0001*
Father	23	5.62	67	14.35	**90**		
Grandparents	156	37.41	76	16.3	**232**		
Siblings	80	19.07	38	8.04	**118**		
Relatives	31	7.33	33	6.96	**64**		
Type of diet							
Vegetarian	157	37.65	42	8.91	**199**	133.897	0.0001*
Non-vegetarian	89	21.27	240	51.3	**329**		
Mixed	171	41.08	186	39.78	**357**		
Total	**417**	**100**	**468**	**100**	**885**		

The table demonstrates significant associations between demographic factors and the status of vision and fine motor growth and development among children under five years old in rural Belagavi, supported by chi-square values and p-values. Maternal age significantly influences development (Chi-square = 89.286, $p < 0.0001$), with younger mothers (<21 years) more likely to have children with delayed vision and fine motor skills. Similarly, religion shows a strong association (Chi-square = 366.212, $p < 0.0001$), with Hindu children exhibiting higher rates of developed skills compared to Muslim and Christian children. Dwelling type also plays a crucial role (Chi-square = 52.877, $p < 0.0001$), as children in pucca houses demonstrate better development than those in katcha houses. Maternal literacy (Chi-square = 64.735, $p < 0.0001$), occupation (Chi-square = 67.088, $p < 0.0001$), and monthly income (Chi-square = 74.927, $p < 0.0001$) significantly impact development, with higher literacy levels, occupation other than housewife, and higher income associated with better outcomes. Moreover, family structure (Chi-square = 26.728, $p < 0.0001$), caregiver during the day (Chi-square = 103.848, $p < 0.0001$), and type of diet (Chi-square = 133.897, $p < 0.0001$) also show significant associations, underscoring the multifaceted influence of demographic factors on the vision and fine motor development of rural children under five.

Table 24. Assessment of risk of various demographic profiles on Vision and fine motor growth and development among under-five children in rural Belagavi

n=885

Demographic factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	Ref.			
	21-25yrs	0.58	0.32	1.08	0.0860
	26-30yrs	0.79	0.43	1.45	0.4490
	>30 yrs	3.33	1.61	6.86	0.0010*
Religion	Hindu	Ref.			
	Muslim	0.03	0.02	0.05	0.0001*
	Christian	0.11	0.07	0.19	0.0001*
Dwelling	Katcha	Ref.			
	Pucca	0.64	0.37	1.09	0.0980
Mother's literacy	Illiterate	0.38	0.05	2.86	0.3500
	Primary school	0.68	0.30	1.54	0.3520
	Higher Primary school	0.87	0.35	2.18	0.7630
	SSLC	0.64	0.28	1.50	0.3050
	Graduate	6.53	1.80	23.76	0.0040*
	Post graduate	Ref.			
Occupation	Housewife	Ref.			
	Daily wages	1.37	0.74	2.54	0.3190
	Government employee	0.83	0.39	1.76	0.6280
	Private sector employee	1.23	0.55	2.75	0.6120
Monthly income	Less than Rs. 2,000	Ref.			
	Rs. 2,001-4,000	1.16	0.69	1.97	0.5780
	Rs. 4,001-6,000	1.00	0.47	2.12	0.9910
	More than Rs. 6,000	1.63	0.93	2.86	0.0880
Type of family	Nuclear	0.39	0.21	0.72	0.0020*
	Joint	0.49	0.26	0.91	0.0230*
	Extended	Ref.			
Who takes care of child during day	Self	Ref.			
	Father	0.82	0.39	1.73	0.5940
	Grandparents	0.45	0.24	0.85	0.0130*
	Siblings	0.22	0.10	0.47	0.0001*
	Relatives	0.87	0.39	1.95	0.7340
Type of diet	Vegetarian	3.03	1.58	5.80	0.0010*
	Non-Vegetarian	2.23	1.16	4.30	0.0160*
	Mixed	Ref.			

The assessment of risk regarding various demographic profiles on vision and fine motor growth and development among under-five children in rural Belagavi reveals significant associations between several factors and adjusted odds ratios (ORs), supported by p-values and 95% confidence intervals (CIs) for the ORs. Maternal age over 30 years shows a significant impact, with children born to mothers in this age group demonstrating increased odds of delayed growth compared to those under 21 years (Adjusted OR = 3.33, p = 0.001). Religion also plays a substantial role, with Muslim (Adjusted OR = 0.03, p < 0.0001) and Christian (Adjusted OR = 0.11, p < 0.0001) children showing significantly lower odds of delayed growth compared to Hindu children. Additionally, children in nuclear families (Adjusted OR = 0.39, p = 0.002) and those cared for by grandparents (Adjusted OR = 0.45, p = 0.013) or siblings (Adjusted OR = 0.22, p < 0.0001) during the day demonstrate lower odds of delayed growth. Furthermore, a vegetarian diet (Adjusted OR = 3.03, p = 0.001) and non-vegetarian diet (Adjusted OR = 2.23, p = 0.016) significantly increase the odds of delayed growth compared to a mixed diet. These findings underscore the significant impact of demographic factors on vision and fine motor growth and development among rural children under five, emphasizing the importance of addressing these factors in interventions aimed at promoting optimal development.

Table 25. Accuracy of demographic characteristics in predicting vision and fine motor growth and development of children in terms of area under curve (AUC)

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.6500	0.0180	0.0001*	0.6140	0.6860
Religion	0.1960	0.0160	0.0001*	0.1650	0.2270
Dwelling	0.6100	0.0190	0.0001*	0.5730	0.6480
Mother's literacy	0.6090	0.0190	0.0001*	0.5720	0.6460
Occupation	0.6360	0.0190	0.0001*	0.5990	0.6720
Monthly income	0.6420	0.0190	0.0001*	0.6050	0.6780
Type of family	0.4990	0.0200	0.9660	0.4610	0.5380
Care of child during day	0.3540	0.0190	0.0001*	0.3170	0.3910
Type of diet	0.5810	0.0200	0.0001*	0.5410	0.6200

Table 18 displays the accuracy of various demographic characteristics in predicting vision and fine motor growth and development among children, measured in terms of the area under the curve (AUC). The AUC values indicate the discriminatory power of each demographic characteristic in distinguishing between children with developed and delayed vision and fine motor skills. Among the demographic characteristics examined, age of the mother, dwelling, mother's literacy, occupation, and monthly income demonstrate relatively high AUC values ranging from 0.609 to 0.650. These values suggest strong predictive abilities in identifying children's vision and fine motor development status. Additionally, all these factors have statistically significant p-values ($p < 0.05$), indicating a significant association

with the outcome. Religion and type of diet also exhibit statistically significant predictive abilities, although with lower AUC values compared to other factors. Conversely, type of family and care of child during the day have lower AUC values of 0.499 and 0.354, respectively, indicating less predictive power in determining vision and fine motor development. Moreover, the p-values for these factors are not statistically significant. Overall, these findings underscore the importance of considering various demographic characteristics, particularly age of the mother, dwelling, mother's literacy, occupation, monthly income, religion, and type of diet, in understanding and predicting vision and fine motor growth and development in children. Such insights can inform targeted interventions and support strategies to promote optimal vision and fine motor development among children.

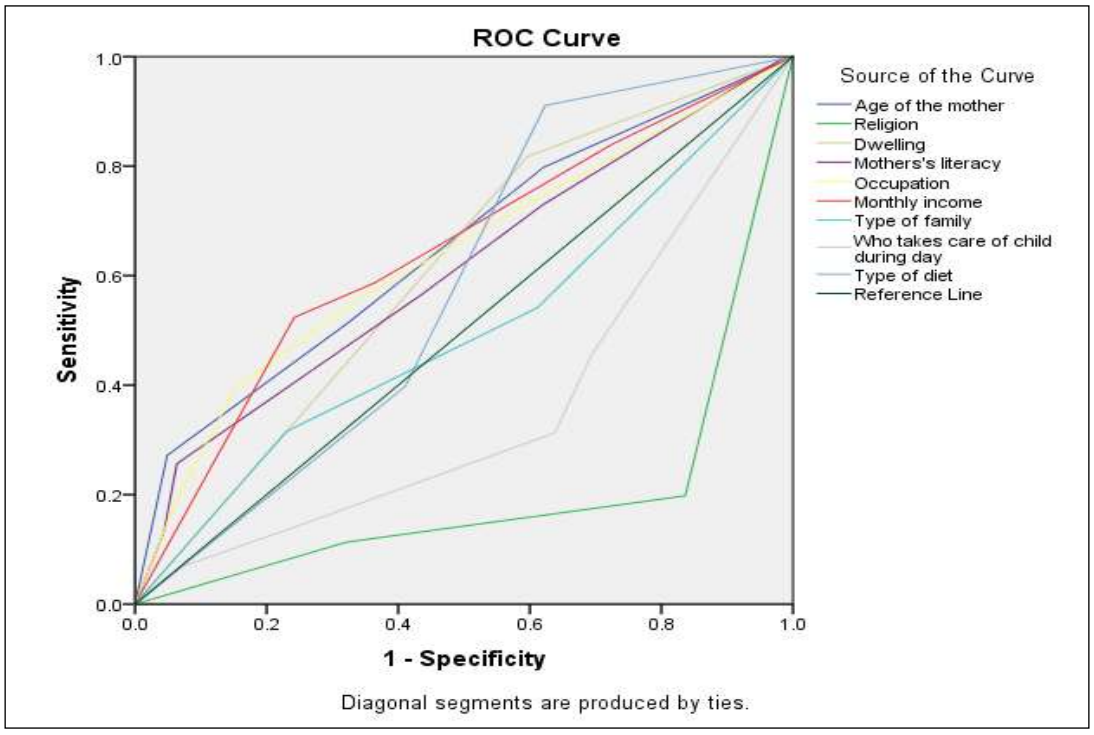


Figure: 24 ROC curve of accuracy of demographic factors in predicting vision and fine motor growth and development of children

Table 26. Association between biological factors and status of Vision and fine motor growth & development among under-five children in rural Belagavi

n=885

Biological factors	Delayed		Developed		Total	Chi-square	p-value
	f	%	f	%			
Pattern of pregnancy							
Repeat adolescent pregnancy	134	32.03	83	17.83	**217**	53.432	0.0001*
Adolescent (first) & adult	122	29.34	90	19.13	**212**		
Repeat adult pregnancy	161	38.63	295	63.04	**456**		
Consanguinity							
Yes	221	53.06	208	44.35	**429**	6.459	0.011*
No	196	46.94	260	55.65	**456**		
Mode of delivery							
Normal vaginal delivery	255	61.12	349	74.57	**604**	18.331	0.006*
Caesarean	162	38.88	119	25.43	**281**		
Antenatal care							
Yes	331	79.46	231	49.35	**562**	85.731	0.0001*
No	86	20.54	237	50.65	**323**		
Gestational age at birth							
Pre-term	299	71.64	211	45	**510**	63.98	0.0001*
Term	118	28.36	257	55	**375**		
Multiple gestations							
Yes	258	61.86	290	61.96	**548**	0.0008	0.977
No	159	38.14	178	38.04	**337**		
History of birth asphyxia							
Yes	188	44.99	183	39.13	**371**	3.24	0.072
No	229	55.01	285	60.87	**514**		
Breastfeeding							
Appropriate	208	49.88	331	70.65	**539**	40.246	0.0001*
Inappropriate	209	50.12	137	29.35	**346**		
Family size							
1--5	94	22.49	101	21.52	**195**	1.862	0.394
6--9	229	55.01	243	51.96	**472**		
>=10	94	22.49	124	26.52	**218**		
Total	**417**	**100**	**468**	**100**	**885**		

The table highlights significant associations between various biological factors and the status of vision and fine motor growth and development among children under five in rural Belagavi, as indicated by chi-square values and p-values. Patterns of delivery significantly influence development (Chi-square = 53.432, $p < 0.0001$), with children from repeat adolescent pregnancies more likely to exhibit delayed skills. Consanguinity also plays a significant role (Chi-square = 6.459, $p = 0.011$), as children from consanguineous unions show higher rates of delayed development. Mode of delivery (Chi-square = 18.331, $p = 0.006$), antenatal care (Chi-square = 85.731, $p < 0.0001$), and gestational age at birth (Chi-square = 63.98, $p < 0.0001$) significantly impact development, with normal vaginal delivery, antenatal care, and term birth associated with better outcomes. While multiple gestations show no significant association (Chi-square = 0.0008, $p = 0.977$), breastfeeding practices significantly influence development (Chi-square = 40.246, $p < 0.0001$), with appropriate breastfeeding linked to better outcomes. History of birth asphyxia shows a borderline significance (Chi-square = 3.24, $p = 0.072$), suggesting a potential impact on development. Family size demonstrates no significant association (Chi-square = 1.862, $p = 0.394$). These findings underscore the diverse biological factors influencing the vision and fine motor development of rural children under five, emphasizing the importance of targeted interventions to support optimal growth and development.

Table 27. Assessment of risk of various biological factors on Vision and fine motor growth and development among under five year children in rural Belagavi n=885

Biological factors	Categories	Adjusted OR	95% CI for OR		P-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	Ref.			
	Adolescent (first) and adult (current) pregnancy	0.52	0.25	1.08	0.0780
	Repeat adult pregnancy	9.23	4.74	17.97	0.0001*
Consanguinity	No	Ref.			
	Yes	2.35	1.42	3.90	0.0010*
Mode of Delivery	Normal vaginal delivery	Ref.			
	Caesarean	2.04	0.98	4.22	0.0560
Antenatal Care	No	Ref.			
	Yes	0.27	0.16	0.46	0.0001*
Gestational age at birth	Term	Ref.			
	Pre-term	1.11	0.68	1.82	0.6820
Multiple Gestation	No	Ref.			
	Yes	0.14	0.06	0.36	0.0001*
History of Birth Asphyxia	No	Ref.			
	Yes	0.14	0.07	0.30	0.0001*
Breastfeeding	Inappropriate	Ref.			
	Appropriate	10.59	6.01	18.65	0.0001*
Family Size	1--5	Ref.			
	6--9	3.76	1.72	8.23	0.0010*
	>=10	6.58	3.19	13.57	0.0001*

The assessment of risk regarding various biological factors on vision and fine motor growth and development among under-five children in rural Belagavi reveals significant associations between several factors and adjusted odds ratios (ORs), supported by p-values and 95% confidence intervals (CIs) for the ORs. Repeat adult pregnancies significantly increase the odds of delayed growth compared to repeat adolescent pregnancies (Adjusted OR = 9.23, $p < 0.0001$), while consanguinity demonstrates a significant impact, with children from consanguineous unions exhibiting higher odds of delayed growth (Adjusted OR = 2.35, $p = 0.001$). Additionally, children delivered via caesarean section show higher odds of delayed growth compared to those delivered vaginally, although the association is borderline significant (Adjusted OR = 2.04, $p = 0.056$). Conversely, antenatal care significantly reduces the odds of delayed growth (Adjusted OR = 0.27, $p < 0.0001$), while a history of birth asphyxia (Adjusted OR = 0.14, $p < 0.0001$), appropriate breastfeeding practices (Adjusted OR = 10.59, $p < 0.0001$), and larger family sizes (6-9 members: Adjusted OR = 3.76, $p = 0.001$; ≥10 members: Adjusted OR = 6.58, $p < 0.0001$) are associated with increased odds of delayed growth. Moreover, multiple gestations significantly reduce the odds of delayed growth (Adjusted OR = 0.14, $p < 0.0001$). These findings underscore the significant impact of biological factors on vision and fine motor growth and development among rural children under five, highlighting the importance of addressing these factors in interventions aimed at promoting optimal development.

Table 28. Accuracy of Biological factors in predicting status of vision and fine motor growth and development of children in terms of area under curve (AUC)

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.6270	0.0190	0.0001*	0.5890	0.6640
Consangunity	0.5440	0.0200	0.0270*	0.5050	0.5820
Mode of delivery	0.4330	0.0200	0.0010*	0.3950	0.4710
Antenatal care	0.6510	0.0190	0.0001*	0.6140	0.6870
Gestational age at birth	0.6330	0.0190	0.0001*	0.5960	0.6700
Multiple gestation	0.5000	0.0200	0.9800	0.4610	0.5380
History	0.5290	0.0200	0.1360	0.4910	0.5680
Breastfeeding	0.3960	0.0190	0.0001*	0.3580	0.4340
Family Size	0.5190	0.0200	0.3240	0.4810	0.5580

*$p<0.05$

The above table represents the accuracy of demographic characteristics in predicting Vision and fine motor growth and development of children in terms of area under curve (AUC). The accuracy of predicting the Vision and fine motor growth and development of children among under-five children in rural Belagavi by Pattern of pregnancy is 62.70% (p=0.0001), pattern Consanguinity is 54.40% (p=0.0270), mode of delivery is 43.30% (p=0.0010), antenatal care is 65.10% (p=0.0001), Gestational age at birth is 63.30% (p=0.0001), Breastfeeding is 39.60% (p=0.0001). The area under curve is also presented in the following figure.

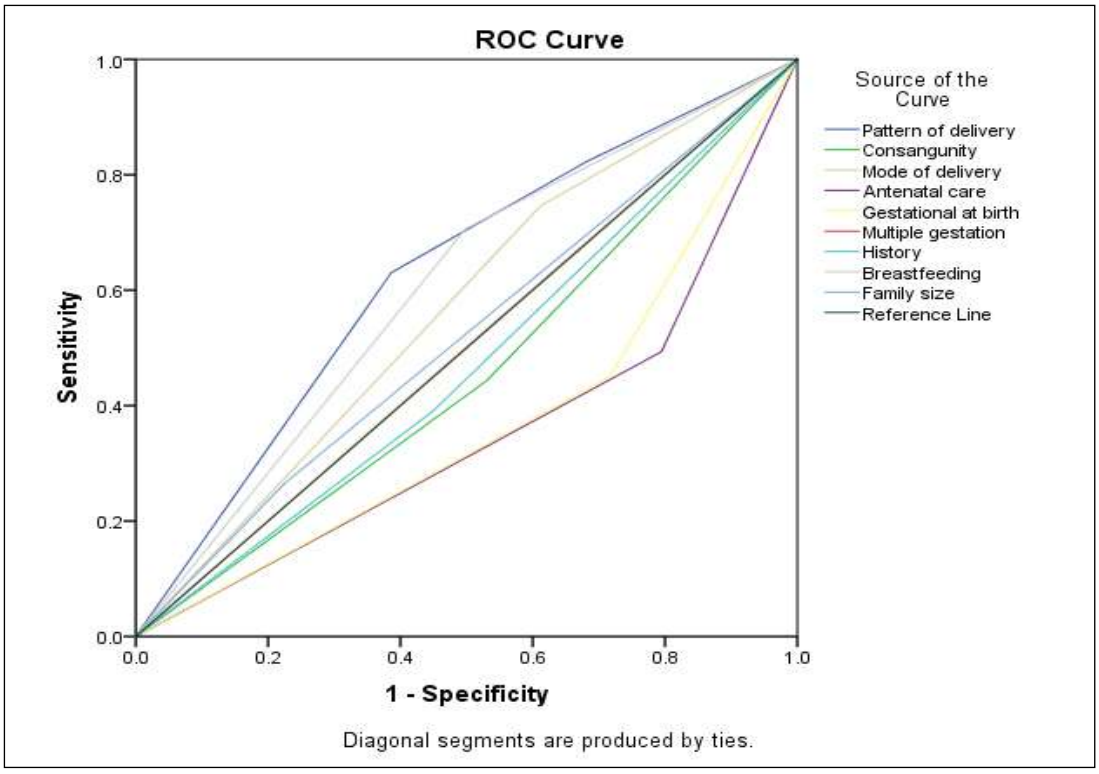


Figure: 25 ROC curve of accuracy of Biological factors in predicting vision and fine motor growth and development

Table 29. Association between demographic factors and status of Hearing, language and concept development among under-five children in rural Belagavi

n=885

Demographic variables	Delayed (522)		Developed (363)		Total	Chi-square	p-value
	f	%	f	%			
Age of the mother							
<21yrs	161	30.82	59	16.15	**220**	57.09	0.001*
21-25yrs	152	29.18	111	30.58	**263**		
26-30yrs	150	28.71	87	24.05	**237**		
> 30	59	11.29	106	29.21	**165**		
Religion							
Hindu	157	30.12	339	93.47	**496**	351.92	0.001*
Muslim	157	30.12	20	5.5	**177**		
Christian	208	39.76	4	1.03	**212**		
Dwelling							
Katcha	202	38.82	17	4.81	**219**	133.02	0.001*
Pucca	320	61.18	346	95.19	**666**		
Mother's literacy							
Illiterate	2	0.47	1	0.34	**3**	80.16	0.001*
Primary school	195	37.41	67	18.56	**262**		
Higher primary school	85	16.24	61	16.84	**146**		
SSLC	188	36	119	32.65	**307**		
Graduate	22	4.24	51	14.09	**73**		
Post graduate	30	5.65	64	17.53	**94**		
Occupation							
Housewife	348	66.59	111	30.58	**459**	144.75	0.001*
Daily wages	86	16.47	60	16.49	**146**		
Government employee	55	10.59	97	26.8	**152**		
Private sector employee	33	6.35	95	26.12	**128**		
Monthly income							
Less than rs. 2,000	136	26.12	42	11.68	**178**	109.57	0.001*
Rs. 2,001-4,000	180	34.59	74	20.27	**254**		
Rs. 4,001-6,000	57	10.82	16	4.47	**73**		
More than rs. 6,000	149	28.47	231	63.57	**380**		
Type of family							
Nuclear	224	42.82	168	46.39	**392**	23.86	0.001*
Joint	173	33.18	70	19.24	**243**		
Extended	125	24	125	34.36	**250**		

Who takes care of child during day							
Self	161	30.82	247	68.04	**408**	236.11	0.001*
Father	28	5.41	71	19.59	**99**		
Grandparents	184	35.29	21	5.84	**205**		
Siblings	86	16.47	16	4.47	**102**		
Relatives	63	12	8	2.06	**71**		
Type of diet							
Vegetarian	167	32	1	0.34	**168**	168.67	0.001*
Non-vegetarian	144	27.53	218	60.14	**362**		
Mixed	211	40.47	144	39.52	**355**		

The association between demographic factors and the status of hearing, language, and concept development among under-five children in rural Belagavi demonstrates significant relationships with adjusted chi-square values and p-values. Maternal age over 30 years shows a notable association with delayed development, with children born to mothers in this age group having higher odds of delayed development compared to younger mothers (<21 years) ($\chi^2 = 57.09$, $p < 0.0001$). Religion also plays a significant role, as Hindu children exhibit higher rates of developed skills compared to Muslim and Christian children, with substantial chi-square values and p-values ($\chi^2 = 351.92$, $p < 0.0001$). Furthermore, dwelling type, mother's literacy level, occupation, monthly income, type of family, caregiver during the day, and type of diet all show significant associations with the developmental status, as evidenced by their respective chi-square values and p-values. For instance, children from nuclear families and those cared for by themselves during the day have higher rates of developed skills compared to children from joint families or those cared for by other family members or relatives. These findings underscore the multifaceted impact of demographic factors on hearing, language, and concept development among rural children under five, emphasizing the importance of considering these factors in interventions aimed at promoting optimal development.

Table 30. Assessment of risk of various demographic profiles on Hearing, language and concept development among under-five children in rural Belagavi

n=885

Demographic factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	Ref.			
	21-25yrs	1.40	0.63	3.13	0.4140
	26-30yrs	0.83	0.35	1.94	0.6640
	>30 yrs	0.92	0.42	2.01	0.8360
Religion	Hindu	Ref.			
	Muslim	0.13	0.06	0.28	0.0001*
	Christian	0.02	0.01	0.08	0.0001*
Dwelling	Katcha	Ref.			
	Pucca	1.90	0.87	4.15	0.1070
Mother's literacy	Illiterate	4.78	0.12	197.38	0.4100
	Primary school	0.47	0.17	1.30	0.1440
	Higher Primary school	0.80	0.27	2.33	0.6800
	SSLC	0.86	0.31	2.35	0.7670
	Graduate	1.75	0.50	6.08	0.3780
	Post graduate	Ref.			
Occupation	Housewife	Ref.			
	Daily wages	5.10	2.05	12.70	0.0001*
	Government employee	2.91	1.35	6.26	0.0060*
	Private sector employee	7.03	2.70	18.35	0.0001*
Monthly income	Less than Rs. 2,000	Ref.			
	Rs. 2,001-4,000	1.26	0.58	2.70	0.5600
	Rs. 4,001-6,000	1.05	0.33	3.30	0.9340
	More than Rs. 6,000	1.13	0.52	2.49	0.7530
Type of family	Nuclear	0.40	0.21	0.77	0.0060*
	Joint	0.47	0.23	0.97	0.0420*
	Extended	Ref.			
Who takes care of child during day	Self	Ref.			
	Father	1.50	0.66	3.39	0.3320
	Grandparents	0.16	0.07	0.36	0.0001*
	Siblings	0.14	0.05	0.36	0.0001*
	Relatives	0.17	0.05	0.55	0.0030*
Type of diet	Vegetarian	24.80	2.89	212.99	0.0030*
	Non-Vegetarian	19.08	2.24	162.80	0.0070*
	Mixed	Ref.			

The assessment of risk associated with various demographic profiles on hearing, language, and concept development among under-five children in rural Belagavi reveals significant associations, as indicated by adjusted odds ratios (OR) and p-values. Specifically, Muslim and Christian children exhibit substantially lower odds of delayed development compared to Hindu children ($p < 0.0001$), highlighting the influence of religion on developmental outcomes. Similarly, children from nuclear families have lower odds of delayed development compared to those from extended families ($p = 0.0060$), suggesting the importance of family structure. Notably, children cared for by grandparents or siblings during the day have significantly lower odds of delayed development compared to those cared for by themselves ($p < 0.0001$), underscoring the impact of caregiver type. Moreover, children consuming a vegetarian or non-vegetarian diet exhibit remarkably higher odds of delayed development compared to those on a mixed diet ($p = 0.0030$, $p = 0.0070$, respectively), emphasizing the potential role of dietary habits in developmental outcomes. Additionally, maternal literacy, occupation, and dwelling type show trends towards significance, suggesting potential influences on developmental outcomes that warrant further investigation.

Table 31. Accuracy of demographic characteristics in predicting status of hearing, language and concept development among children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.6180	0.0210	0.0001*	0.5760	0.6600
Religion	0.1740	0.0150	0.0001*	0.1440	0.2040
Dwelling	0.6700	0.0200	0.0001*	0.6310	0.7090
Mother's literacy	0.6490	0.0210	0.0001*	0.6080	0.6900
Occupation	0.7150	0.0200	0.0001*	0.6760	0.7540
Monthly income	0.6780	0.0210	0.0001*	0.6380	0.7180
Type of family	0.5160	0.0220	0.4650	0.4720	0.5600
Care of child during day	0.2570	0.0190	0.0001*	0.2200	0.2940
Type of diet	0.5910	0.0210	0.0001*	0.5500	0.6320

Table presents the accuracy of various demographic characteristics in predicting the status of hearing, language, and concept development among children, measured in terms of the area under the curve (AUC). The AUC values indicate the discriminatory power of each demographic factor in distinguishing between children with developed and delayed hearing, language, and concept development. Among the demographic factors examined, the mother's occupation has the highest AUC value (0.715), followed by monthly income (0.678), dwelling type (0.670), mother's literacy (0.649), and age of the mother (0.618), all of which have statistically significant p-

values ($p < 0.0001$). These factors demonstrate relatively strong predictive abilities in identifying children's hearing, language, and concept development status. On the other hand, factors such as religion, type of family, and type of diet show lower AUC values (ranging from 0.174 to 0.591) and may have less predictive power in determining the status of hearing, language, and concept development. However, it's important to note that some of these factors still have statistically significant p-values, indicating some level of association with the outcome. The findings suggest that certain demographic characteristics, particularly the mother's occupation, income level, dwelling type, and literacy, may serve as valuable predictors of children's hearing, language, and concept development status. These insights can inform targeted interventions and support strategies to promote optimal development in these domains among children.

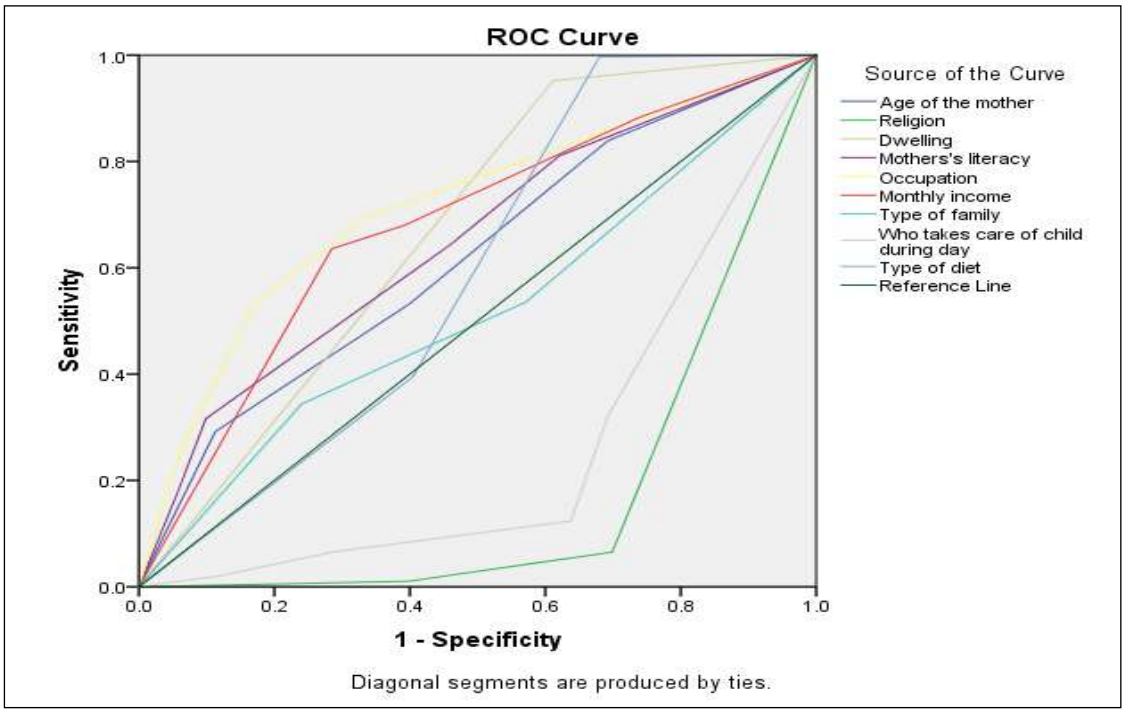


Figure: 26 ROC curve of accuracy of demographic factors in predicting children's hearing, language, and concept development status. n=885

Table 32. Association between biological factors and status of Hearing, language and concept development among under-five children in rural Belagavi n=885

Biological factors	Delayed (522)		Developed (363)		Total	Chi-square	p-value
	f	%	f	%			
Pattern of pregnancy							
Repeat adolescent pregnancy	150	28.71	55	15.12	**205**	44.32	0.001*
Adolescent (first) & adult	141	27.06	66	18.21	**207**		
Repeat adult pregnancy	231	44.24	242	66.67	**473**		
Consanguinity							
Yes	316	60.47	103	28.52	**419**	88.84	0.001*
No	206	39.53	260	71.48	**466**		
Mode of delivery							
Normal vaginal delivery	356	68.24	281	77.32	**637**	9.01	0.003*
Caesarean	166	31.76	82	22.68	**248**		
Antenatal care							
Yes	359	68.71	157	43.3	**516**	57.37	0.001*
No	163	31.29	206	56.7	**369**		
Gestational age at birth							
Pre-term	339	64.94	136	37.46	**475**	65.01	0.001*
Term	183	35.06	227	62.54	**410**		
Multiple gestation							
Yes	319	61.18	227	62.54	**546**	0.18	0.668
No	203	38.82	136	37.46	**339**		
History of birth asphyxia							
Yes	231	44.24	135	37.11	**366**	4.40	0.036*
No	291	55.76	228	62.89	**519**		
Breastfeeding							
Appropriate	281	53.88	279	76.98	**560**	48.86	0.001*
Inappropriate	241	46.12	84	23.02	**325**		
Family size							
1--5	119	22.82	75	20.62	**194**	3.42	0.181
6--9	286	54.82	187	51.55	**473**		
>=10	117	22.35	101	27.84	**218**		

The association between biological factors and the status of hearing, language, and concept development among under-five children in rural Belagavi reveals significant correlations, as demonstrated by the chi-square values and p-values. Children born from repeat adolescent pregnancies or repeat adult pregnancies exhibit significantly higher rates of delayed development compared to those from adolescent (first) and adult pregnancies ($p < 0.0001$). Similarly, children born to consanguineous parents or those delivered via caesarean section are more likely to experience delayed development ($p < 0.0001$, $p = 0.003$, respectively). Lack of antenatal care, pre-term birth, and inappropriate breastfeeding practices also show significant associations with delayed development ($p < 0.0001$for all). Additionally, a history of birth asphyxia is significantly correlated with delayed development ($p = 0.036$). These findings underscore the importance of various biological factors in influencing developmental outcomes among under-five children in rural settings, highlighting potential areas for intervention and support.

Table 33. Assessment of risk of various biological factors on Hearing, language and concept development among under-five children in rural Belagavi n=885

Biological factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	Ref.			
	Adolescent (first) and adult (current) pregnancy	1.37	0.50	3.77	0.5400
	Repeat adult pregnancy	10.98	4.48	26.87	0.0001*
Consanguinity	No	Ref.			
	Yes	0.05	0.02	0.12	0.0001*
Mode of Delivery	Normal vaginal delivery	Ref.			
	Caesarean	0.04	0.01	0.15	0.0001*
Antenatal Care	No	Ref.			
	Yes	0.48	0.21	1.08	0.0760
Gestational age at birth	Term	Ref.			
	Pre-term	1.29	0.58	2.91	0.5340
Multiple Gestation	No	Ref.			
	Yes	0.04	0.01	0.17	0.0001*
History of Birth Asphyxia	No	Ref.			
	Yes	0.02	0.01	0.07	0.0001*
Breastfeeding	Inappropriate	Ref.			
	Appropriate	16.54	7.53	36.30	0.0001*
Family Size	1--5	Ref.			
	6--9	16.58	5.77	47.63	0.0001*
	>=10	15.86	6.20	40.61	0.0001*

The assessment of risk factors on hearing, language, and concept development among under-five children in rural Belagavi indicates significant associations between biological factors and developmental outcomes, as evidenced by the adjusted odds ratios (OR), confidence intervals (CI), and p-values. Children born from repeat adult pregnancies have substantially higher odds of delayed development compared to those from repeat adolescent or adolescent and adult pregnancies ($p < 0.0001$). Additionally, the presence of consanguinity, caesarean delivery, multiple gestations, and a history of birth asphyxia are strongly correlated with decreased odds of delayed development ($p < 0.0001$ for all). Conversely, appropriate breastfeeding practices and smaller family sizes are associated with significantly reduced odds of delayed development ($p < 0.0001$ for both). These findings underscore the importance of addressing various biological factors in promoting optimal developmental outcomes among under-five children in rural areas, highlighting potential targets for intervention and support.

Table 34. Accuracy of Biological factors in predicting hearing, language and concept development of children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.6180	0.0210	0.0001*	0.5760	0.6590
Consangunity	0.6600	0.0210	0.0001*	0.6190	0.7000
Mode of delivery	0.4550	0.0220	0.0390*	0.4120	0.4970
Antenatal care	0.6270	0.0210	0.0001*	0.5850	0.6690
Gestational age at birth	0.6370	0.0210	0.0001*	0.5960	0.6790
Multiple gestation	0.4930	0.0220	0.7560	0.4500	0.5360
History	0.5360	0.0220	0.1050	0.4930	0.5780
Breastfeeding	0.3850	0.0210	0.0001*	0.3430	0.4260
Family Size	0.5300	0.0220	0.1760	0.4870	0.5730

Table illustrates the accuracy of various biological factors in predicting hearing, language, and concept development among children, measured in terms of the area under the curve (AUC). The AUC values represent the discriminatory power of each biological factor in distinguishing between children with developed and delayed hearing, language, and concept development. Among the biological factors examined, consanguinity has the highest AUC value (0.660), followed by gestational age at birth (0.637), antenatal care (0.627), and Pattern of pregnancy (0.618). These factors demonstrate relatively strong predictive abilities in identifying children's hearing, language, and concept development status, and they all have statistically significant p-values ($p < 0.05$), indicating their significant association with the

outcome. On the other hand, factors such as breastfeeding (0.385) and mode of delivery (0.455) exhibit lower AUC values, suggesting less predictive power in determining the status of hearing, language, and concept development. However, they still have statistically significant p-values, indicating some level of association with the outcome. The multiple gestation variable has an AUC value of 0.493 and a non-significant p-value, indicating that it may not be a strong predictor of hearing, language, and concept development. These findings highlight the importance of considering various biological factors, particularly consanguinity, gestational age at birth, and antenatal care, in understanding and predicting the development of hearing, language, and concept skills in children. Such insights can inform targeted interventions and support strategies to promote optimal development in these domains among children.

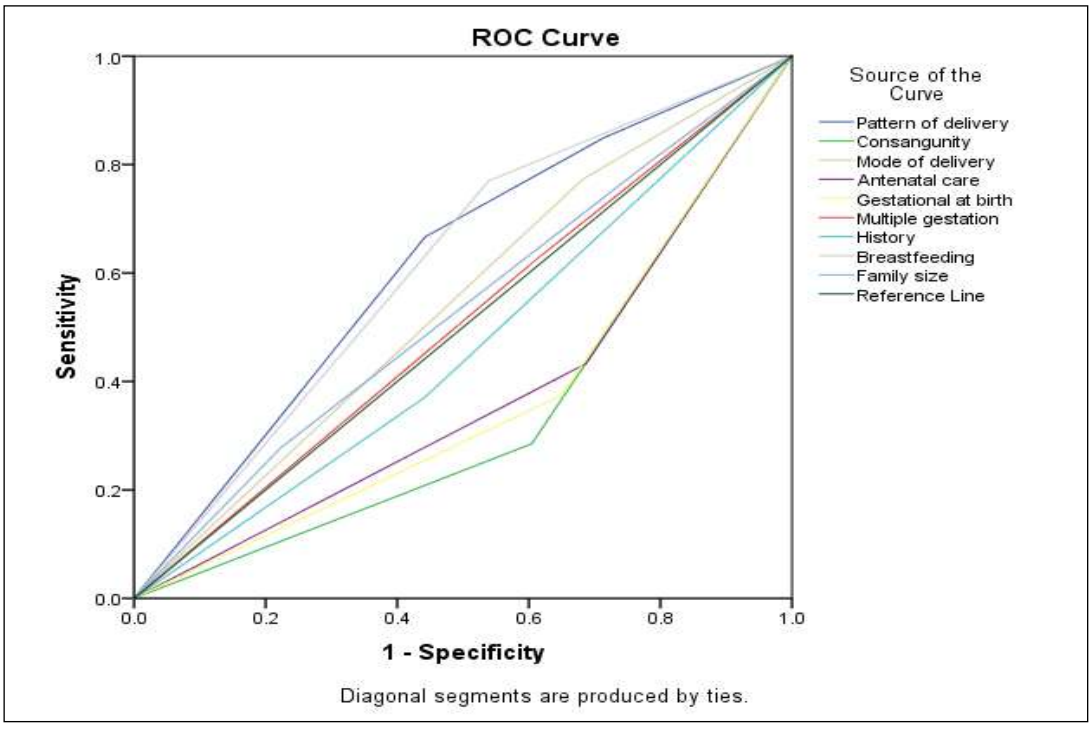


Figure: 27 ROC curve of accuracy of Biological factors in predicting hearing, language and concept development n=885

Table 35. Association between demographic factors and status of Growth and development in Personal skills among under-five children in rural Belagavi

(n=885)

Demographic variables	Delayed (525)		Developed (360)		Total	Chi-square	p-value
	n	%	n	%			
Age of the mother							
<21yrs	130	24.74	88	24.33	**218**	3.74	0.291
21-25yrs	161	30.67	92	25.48	**253**		
26-30yrs	129	24.48	105	29.28	**234**		
> 30	105	20.1	75	20.91	**180**		
Religion							
Hindu	298	56.7	246	68.44	**544**	17.11	0.001*
Muslim	99	18.81	65	17.87	**164**		
Christian	128	24.48	49	13.69	**177**		
Dwelling							
Katcha	141	26.8	78	21.67	**219**	3.09	0.080*
Pucca	384	73.2	282	78.33	**666**		
Mother's literacy							
Illiterate	3	0.52	1	0.38	**4**	7.01	0.22
Primary school	150	28.61	99	27.38	**249**		
Higher primary school	82	15.72	62	17.11	**144**		
SSLC	181	34.54	127	35.36	**308**		
Graduate	41	7.73	40	11.03	**81**		
Post graduate	68	12.89	31	8.75	**99**		
Occupation							
Housewife	272	51.8	175	48.67	**447**	3.09	0.378
Daily wages	88	16.75	52	14.45	**140**		
Government employee	88	16.75	71	19.77	**159**		
Private sector employee	77	14.69	62	17.11	**139**		
Monthly income							
Less than rs. 2,000	126	23.97	48	13.31	**174**	35.13	0.001*
Rs. 2,001-4,000	166	31.7	85	23.57	**251**		
Rs. 4,001-6,000	41	7.73	26	7.22	**67**		
More than rs. 6,000	192	36.6	201	55.89	**393**		
Type of family							
Nuclear	218	41.49	171	47.53	**389**	12.42	0.002*
Joint	164	31.19	74	20.53	**238**		
Extended	143	27.32	115	31.94	**258**		

Who takes care of child during day							
Self	253	48.2	172	47.91	**425**	30.36	0.001*
Father	38	7.22	66	18.25	**104**		
Grandparents	133	25.26	62	17.11	**195**		
Siblings	63	12.11	33	9.13	**96**		
Relatives	38	7.22	27	7.6	**65**		
Type of diet							
Vegetarian	125	23.71	27	7.6	**152**	51.82	0.001*
Non-vegetarian	185	35.31	196	54.37	**381**		
Mixed	215	40.98	137	38.02	**352**		

The analysis of demographic factors influencing the growth and development of personal skills among under-five children in rural Belagavi reveals several significant associations. Specifically, religion ($p = 0.001$) and type of family ($p = 0.002$) show notable chi-square values, indicating an association with developmental outcomes. Hindu children appear to have a higher proportion of delayed development compared to Muslims and Christians. Additionally, children from nuclear families exhibit a higher rate of delayed development compared to those from joint or extended families. Monthly income also shows a significant association ($p < 0.0001$), with children from households earning less than Rs. 2,000 demonstrating a higher prevalence of delayed development. Furthermore, the caregiver during the day ($p < 0.0001$) and type of diet ($p < 0.0001$) exhibit substantial chi-square values, suggesting significant associations with developmental outcomes. Children primarily cared for by themselves and those with a non-vegetarian diet display a higher proportion of developed personal skills. These findings underscore the multifaceted nature of factors influencing the development of personal skills among under-five children, emphasizing the importance of considering various demographic factors in designing interventions aimed at promoting optimal developmental outcomes.

Table 36. Assessment of risk of various demographic profiles on Growth and development in Personal skills among under-five children in rural Belagavi

n=885

Demographic factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	Ref.			
	21-25yrs	0.70	0.40	1.24	0.2250
	26-30yrs	1.37	0.79	2.39	0.2630
	>30 yrs	0.76	0.43	1.32	0.3280
Religion	Hindu	Ref.			
	Muslim	0.94	0.54	1.62	0.8160
	Christian	0.61	0.35	1.05	0.0730
Dwelling	Katcha	Ref.			
	Pucca	0.84	0.50	1.40	0.5000
Mother's literacy	Illiterate	1.45	0.10	22.16	0.7900
	Primary school	2.34	1.16	4.73	0.0180*
	Higher Primary school	2.43	1.15	5.15	0.0200*
	SSLC	2.77	1.37	5.60	0.0050*
	Graduate	2.09	0.92	4.73	0.0780
	Post graduate	Ref.			
Occupation	Housewife	Ref.			
	Daily wages	0.70	0.41	1.18	0.1800
	Government employee	0.55	0.31	0.99	0.0450*
	Private sector employee	0.68	0.36	1.27	0.2280
Monthly income	Less than Rs. 2,000	Ref.			
	Rs. 2,001-4,000	1.31	0.77	2.23	0.3280
	Rs. 4,001-6,000	1.64	0.78	3.43	0.1920
	More than Rs. 6,000	2.55	1.49	4.37	0.0010*
Type of family	Nuclear	0.94	0.61	1.45	0.7850
	Joint	0.59	0.35	0.98	0.0410*
	Extended	Ref.			
Who takes care of child during day	Self	Ref.			
	Father	2.65	1.52	4.62	0.0010*
	Grandparents	1.07	0.60	1.89	0.8230
	Siblings	0.84	0.43	1.63	0.6060
	Relatives	1.10	0.52	2.30	0.8080
Type of diet	Vegetarian	3.03	1.53	5.97	0.0010*
	Non-Vegetarian	2.05	1.04	4.05	0.0390
	Mixed	Ref.			

The analysis of demographic factors influencing the growth and development of personal skills among under-five children in rural Belagavi reveals several significant associations. Notably, primary school education ($p = 0.018$), higher primary school education ($p = 0.020$), and SSLC (Secondary School Leaving Certificate) education ($p = 0.005$) of mothers show significant chi-square values, indicating an association with personal skills development. Moreover, government employee occupation ($p = 0.045$) and monthly income above Rs. 6,000 ($p = 0.001$) exhibit notable associations, suggesting that children of mothers employed in the government sector and those from higher-income households are more likely to have developed personal skills. Additionally, the caregiver during the day shows significant associations ($p = 0.001$), with children primarily cared for by their fathers displaying a higher likelihood of developed personal skills. Furthermore, type of diet also demonstrates significant associations ($p = 0.001$ for vegetarian diet and $p = 0.039$ for non-vegetarian diet), indicating that children with a vegetarian diet have a higher likelihood of developed personal skills compared to those with a non-vegetarian diet. These findings emphasize the importance of various demographic factors in shaping the development of personal skills among under-five children, suggesting potential avenues for targeted interventions to promote optimal developmental outcomes.

Table 37. Accuracy of demographic characteristics in predicting status of growth and development in Personal skills among under five-year children in terms of area under curve (AUC) n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.5180	0.0230	0.4260	0.4730	0.5640
Religion	0.4320	0.0230	0.0030*	0.3880	0.4770
Dwelling	0.5260	0.0230	0.2660	0.4810	0.5710
Mother's literacy	0.4970	0.0230	0.9000	0.4520	0.5420
Occupation	0.5240	0.0230	0.3050	0.4780	0.5690
Monthly income	0.6090	0.0220	0.0001*	0.5660	0.6530
Type of family	0.4920	0.0230	0.7150	0.4460	0.5370
Care of child during day	0.4790	0.0230	0.3600	0.4340	0.5240
Type of diet	0.5360	0.0230	0.1160	0.4920	0.5800

Table presents the accuracy of various demographic characteristics in predicting the status of growth and development in personal skills among children under five years old, measured by the area under the curve (AUC). The AUC values represent the discriminatory power of each demographic characteristic in distinguishing between children with developed and delayed personal skills. Among the demographic characteristics examined, monthly income demonstrates the highest AUC value of 0.609, indicating relatively strong predictive ability in identifying the status of personal skills development. This suggests that monthly income has a significant association with personal skills development status, supported by the

statistically significant p-value ($p < 0.05$). Religion also shows a statistically significant predictive ability with an AUC value of 0.432 and a significant p-value of 0.003, indicating its association with personal skills development. Other demographic factors, including age of the mother, dwelling, occupation, type of family, care of child during the day, and type of diet, exhibit lower AUC values ranging from 0.479 to 0.536. While some of these factors have p-values greater than 0.05, suggesting no significant association with personal skills development, they still contribute to the predictive model. Overall, these findings suggest that monthly income and religion are relatively stronger predictors of personal skills development among children under five years old compared to other demographic characteristics. However, it's essential to consider multiple factors comprehensively to gain a more nuanced understanding of personal skills development and to inform targeted interventions effectively.

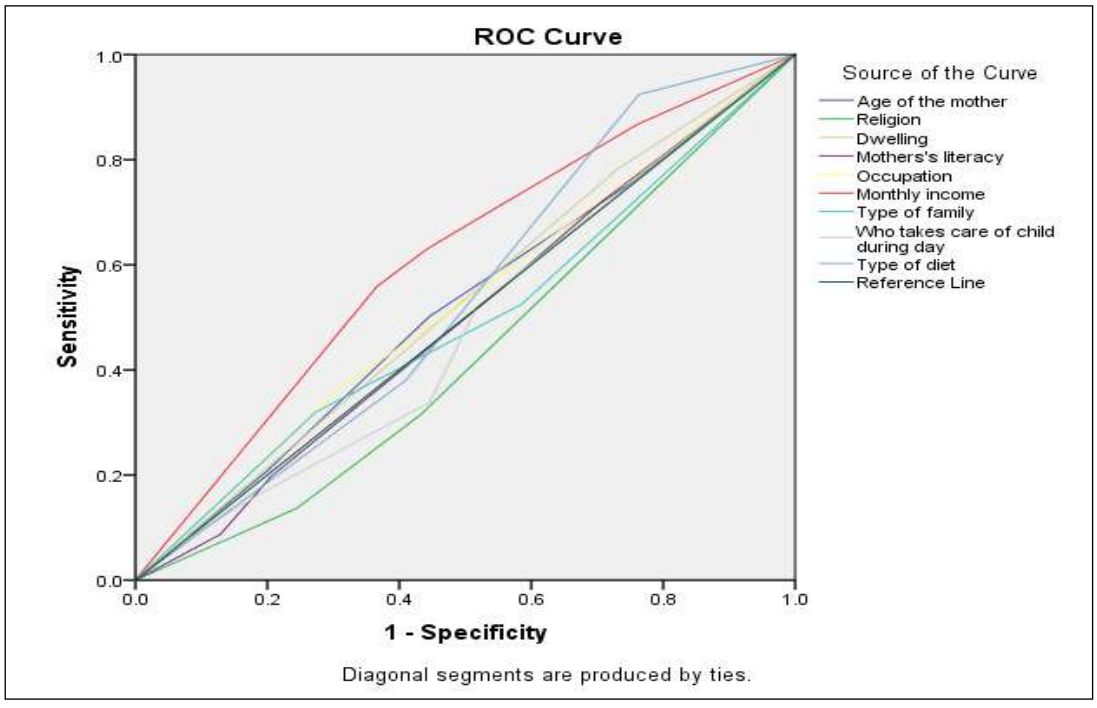


Figure: 28 ROC curve of accuracy of demographic factors in predicting status of growth and development in Personal skills among under five year children

Table 38. Association between biological factors and status of Growth and development in Personal skills among under-five children in rural Belagavi

n=885

Biological factors	Delayed (525)		Developed (360)		Total	Chi-square	p-value
	f	%	f	%			
Pattern of pregnancy							
Repeat adolescent pregnancy	127	24.23	61	17.11	**188**	8.18	0.017*
Adolescent (first) & adult	119	22.68	77	21.29	**196**		
Repeat adult pregnancy	279	53.09	222	61.6	**501**		
Consanguinity							
Yes	283	53.87	135	37.64	**418**	23.06	0.001*
No	242	46.13	225	62.36	**467**		
Mode of delivery							
Normal vaginal delivery	361	68.81	278	77.19	**639**	7.62	0.006*
Caesarean	164	31.19	82	22.81	**246**		
Antenatal care							
Yes	295	56.19	192	53.23	**487**	0.70	0.401
No	230	43.81	168	46.77	**398**		
Gestational age at birth							
Pre-term	264	50.26	192	53.23	**456**	0.79	0.373
Term	261	49.74	168	46.77	**429**		
Multiple gestation							
Yes	326	62.11	218	60.46	**544**	0.21	0.644
No	199	37.89	142	39.54	**341**		
History of birth asphyxia							
Yes	236	44.85	130	36.12	**366**	6.88	0.009*
No	289	55.15	230	63.88	**519**		
Breastfeeding							
Appropriate	330	62.89	252	69.96	**582**	4.84	0.028*
Inappropriate	195	37.11	108	30.04	**303**		
Family size							
1--5	114	21.65	75	20.91	**189**	0.13	0.937
6--9	280	53.35	196	54.37	**476**		
>=10	131	25	89	24.71	**220**		

The analysis of biological factors influencing the growth and development of personal skills among under-five children in rural Belagavi reveals several significant associations. Consanguinity ($p = 0.0001$) and mode of delivery ($p = 0.06$) demonstrate notable chi-square values, indicating significant associations with personal skills development. Specifically, children born to parents with consanguineous relationships and those delivered via normal vaginal delivery show a higher likelihood of developing personal skills. Additionally, a significant association is observed with a history of birth asphyxia ($p = 0.009$), suggesting that children without a history of birth asphyxia are more likely to have developed personal skills. Although not statistically significant, variables such as breastfeeding ($p = 0.028$) show a trend towards association with personal skills development. These findings underscore the importance of biological factors in shaping the developmental outcomes of under-five children, highlighting potential areas for targeted interventions to promote optimal growth and development in personal skills.

Table 39. Assessment of risk of various biological factors on Growth and development in Personal skills among under-five children in rural Belagavi

n=885

Biological factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	Ref.			
	Adolescent (first) and adult (current) pregnancy	1.05	0.44	2.51	0.9090
	Repeat adult pregnancy	3.38	1.69	6.78	0.0010*
Consanguinity	No	Ref.			
	Yes	0.30	0.17	0.53	0.0001*
Mode of Delivery	Normal vaginal delivery	Ref.			
	Caesarean	0.33	0.13	0.85	0.0210*
Antenatal Care	No	Ref.			
	Yes	0.15	0.06	0.38	0.0001*
Gestational age at birth	Term	Ref.			
	Pre-term	0.10	0.04	0.28	0.0001*
Multiple Gestation	No	Ref.			
	Yes	0.25	0.10	0.65	0.0050*
History of Birth Asphyxia	No	Ref.			
	Yes	0.21	0.10	0.45	0.0001*
Breastfeeding	Inappropriate	Ref.			
	Appropriate	2.30	1.38	3.82	0.0010*
Family Size	1--5	Ref.			
	6--9	2.92	1.38	6.19	0.0050*
	>=10	1.87	1.00	3.57	0.0500*

The assessment of biological factors influencing the growth and development of personal skills among under-five children in rural Belagavi reveals significant associations. Consanguinity (p = 0.0001), mode of delivery (p = 0.0210), antenatal care (p = 0.0001), gestational age at birth (p = 0.0001), history of birth asphyxia (p = 0.0001), breastfeeding (p = 0.0010), and family size (p = 0.0050 for 6--9; p = 0.0500 for >=10) demonstrate significant chi-square values, indicating their importance in personal skills development. Specifically, children born from repeat adult pregnancies, those delivered through caesarean, receiving appropriate breastfeeding, and belonging to smaller families (6--9 members) show higher odds of developing personal skills. Conversely, factors such as consanguinity, lack of antenatal care, pre-term birth, and a history of birth asphyxia are associated with lower odds of personal skills development. These findings emphasize the critical role of biological factors in shaping the developmental outcomes of under-five children, underscoring the need for targeted interventions to support optimal growth and development in personal skills.

Table 40. Accuracy of Biological factors in predicting status of growth and development in Personal skills of children in terms of area under curve (AUC)

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.5490	0.0230	0.0340*	0.5040	0.5940
Consanguinity	0.5810	0.0230	0.0001*	0.5370	0.6260
Mode of delivery	0.4580	0.0230	0.0700	0.4130	0.5030
Antenatal care	0.5150	0.0230	0.5220	0.4700	0.5600
Gestational age at birth	0.4850	0.0230	0.5190	0.4400	0.5300
Multiple gestation	0.5080	0.0230	0.7200	0.4630	0.5540
History	0.5440	0.0230	0.0590	0.4990	0.5890
Breastfeeding	0.4650	0.0230	0.1250	0.4200	0.5100
Family Size	0.5020	0.0230	0.9430	0.4560	0.5470

Table presents the accuracy of various biological factors in predicting the status of growth and development in personal skills among children, measured by the area under the curve (AUC). Among the biological factors examined, consanguinity demonstrates the highest AUC value of 0.581, indicating relatively strong predictive ability in identifying the status of personal skills development. This suggests that consanguinity has a significant association with personal skills development status, supported by the statistically significant p-value ($p < 0.05$). Pattern of pregnancy also

shows a statistically significant predictive ability with an AUC value of 0.549 and a significant p-value of 0.034, indicating its association with personal skills development. Other biological factors, including mode of delivery, antenatal care, gestational age at birth, multiple gestation, history, breastfeeding, and family size, exhibit lower AUC values ranging from 0.458 to 0.508. While some of these factors have p-values greater than 0.05, suggesting no significant association with personal skills development, they still contribute to the predictive model. Overall, these findings suggest that consanguinity and Pattern of pregnancy are relatively stronger predictors of personal skills development among children compared to other biological factors. However, it's essential to consider multiple factors comprehensively to gain a more nuanced understanding of personal skills development and to inform targeted interventions effectively.

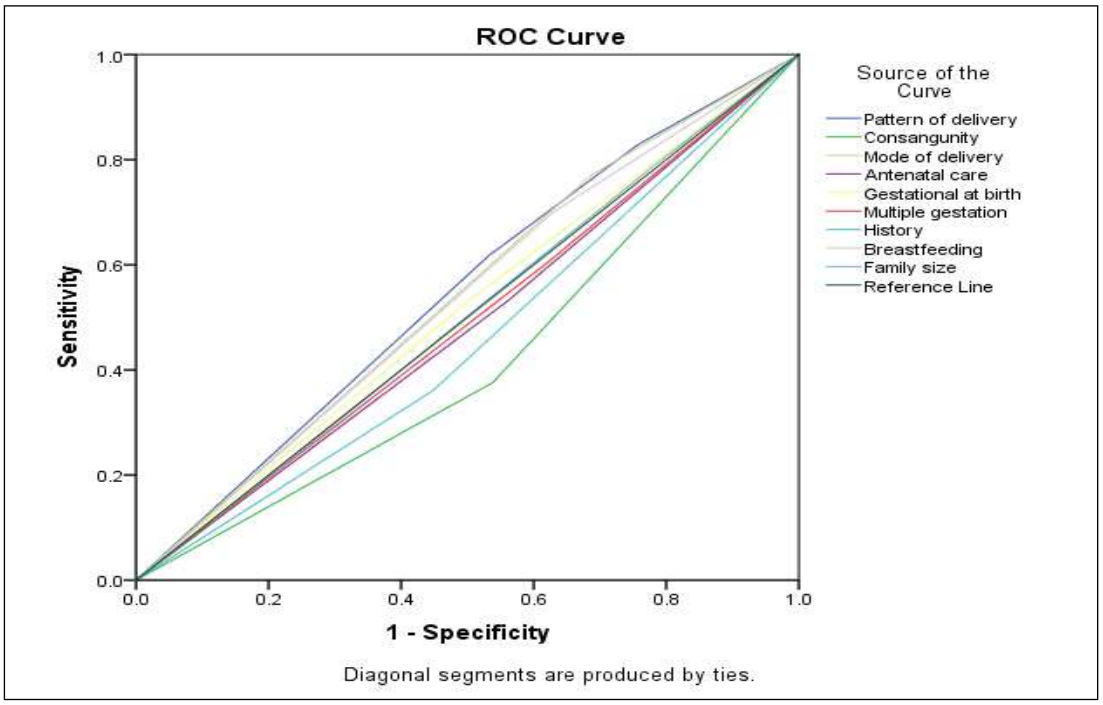


Figure: 29 ROC Curve of accuracy of Biological factors in predicting status of growth and development in Personal skills

Table 41. Association between demographic factors and status of Growth and development in Social skills among under-five children in rural Belagavi (n=885)

Demographic Variables	Delayed (568)		Developed (317)		Total	Chi-square	p-value
	f	%	f	%			
Age of the mother							
<21yrs	221	38.91	39	12.3	**260**	110.78	0.001*
21-25yrs	156	27.46	97	30.6	**253**		
26-30yrs	143	25.18	84	26.5	**227**		
> 30	48	8.45	97	30.6	**145**		
Religion							
Hindu	157	27.64	279	88.01	**436**	299.84	0.001*
Muslim	230	40.49	31	9.78	**261**		
Christian	181	31.87	7	2.21	**188**		
Dwelling							
Katcha	250	44.01	8	2.52	**258**	169.57	0.001*
Pucca	318	55.99	309	97.48	**627**		
Mother's literacy							
Illiterate	9	1.58	1	0.32	**10**	60.98	0.001*
Primary school	207	36.44	69	21.77	**276**		
Higher primary school	103	18.13	51	16.09	**154**		
SSLC	194	34.15	107	33.75	**301**		
Graduate	28	4.93	37	11.67	**65**		
Post graduate	27	4.75	52	16.4	**79**		
Occupation							
Housewife	373	65.67	106	33.44	**479**	138.64	0.001*
Daily wages	109	19.19	48	15.14	**157**		
Government employee	54	9.51	85	26.81	**139**		
Private sector employee	32	5.63	78	24.61	**110**		
Monthly income							
Less than rs. 2,000	147	25.88	41	12.93	**188**	124.93	0.001*
Rs. 2,001-4,000	206	36.27	57	17.98	**263**		
Rs. 4,001-6,000	67	11.8	15	4.73	**82**		
More than rs. 6,000	148	26.06	204	64.35	**352**		
Type of family							
Nuclear	228	40.14	147	46.37	**375**	39.71	0.001*
Joint	210	36.97	56	17.67	**266**		
Extended	130	22.89	114	35.96	**244**		
Who takes care of child during day							
Self	167	29.4	213	67.19	**380**	208.5	0.001*
Father	32	5.63	57	17.98	**89**		
Grandparents	214	37.68	23	7.26	**237**		

Siblings	99	17.43	18	5.68	**117**		
Relatives	56	9.86	6	1.89	**62**		
Type of diet							
Vegetarian	201	35.39	1	0.32	**202**	183.26	0.001*
Non-vegetarian	135	23.77	191	60.25	**326**		
Mixed	232	40.85	125	39.43	**357**		

The association between demographic factors and the status of growth and development in social skills among under-five children in rural Belagavi highlights significant relationships. Chi-square tests indicate significant associations ($p < 0.05$) between social skills development and various demographic variables. Factors such as age of the mother ($p = 0.0001$), religion ($p = 0.0001$), dwelling type ($p = 0.0001$), mother's literacy ($p = 0.0001$), occupation ($p = 0.0001$), monthly income ($p = 0.0001$), type of family ($p = 0.0001$), who takes care of the child during the day ($p = 0.0001$), and type of diet ($p = 0.0001$) demonstrate statistically significant associations. Specifically, children of younger mothers, those from Hindu families, living in pucca houses, with literate mothers, housewife mothers, higher income households, nuclear families, those cared for by themselves during the day, and those consuming vegetarian diets, show higher proportions of developed social skills. Conversely, children from Muslim or Christian families, residing in katcha houses, with illiterate mothers, mothers engaged in daily wages or government jobs, lower-income households, joint or extended families, those cared for by grandparents or relatives during the day, and those consuming non-vegetarian or mixed diets, exhibit higher proportions of delayed social skills development. These findings underscore the multifaceted influence of demographic factors on the social skills development of under-five children, highlighting the importance of targeted interventions to support their holistic growth and development.

Table 42. Assessment of risk of various demographic profiles on Growth and development in Social skills among under-five children in rural Belagavi n=885

Demographic factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Age of the mother	<21yrs	Ref.			
	21-25yrs	8.48	3.75	19.18	0.0001*
	26-30yrs	6.63	2.93	15.03	0.0001*
	>30 yrs	8.47	3.78	19.00	0.0001*
Religion	Hindu	Ref.			
	Muslim	0.52	0.27	0.98	0.0440*
	Christian	0.05	0.02	0.14	0.0001*
Dwelling	Katcha	Ref.			
	Pucca	14.05	5.51	35.88	0.0001*
Mother's literacy	Illiterate	2.13	0.14	32.80	0.5880
	Primary school	0.31	0.11	0.92	0.0340*
	Higher Primary school	0.39	0.12	1.22	0.1050
	SSLC	0.78	0.26	2.35	0.6620
	Graduate	0.25	0.07	0.87	0.0290*
	Post graduate	Ref.			
Occupation	Housewife	Ref.			
	Daily wages	1.65	0.77	3.55	0.1990
	Government employee	2.17	0.98	4.82	0.0560
	Private sector employee	2.19	0.95	5.04	0.0660
Monthly income	Less than Rs. 2,000	Ref.			
	Rs. 2,001-4,000	0.94	0.47	1.90	0.8670
	Rs. 4,001-6,000	0.83	0.30	2.29	0.7220
	More than Rs. 6,000	2.59	1.28	5.27	0.0090*
Type of family	Nuclear	0.29	0.15	0.55	0.0001*
	Joint	0.26	0.13	0.55	0.0001*
	Extended	Ref.			
Who takes care of child during day	Self	Ref.			
	Father	0.99	0.48	2.06	0.9780
	Grandparents	0.27	0.12	0.58	0.0010*
	Siblings	0.20	0.08	0.49	0.0001*
	Relatives	0.34	0.11	1.09	0.0700
Type of diet	Vegetarian	66.82	8.26	540.47	0.0001*
	Non-Vegetarian	30.47	3.74	247.97	0.0010*
	Mixed	Ref.			

The assessment of risk factors on the development of social skills among under-five children in rural Belagavi reveals significant associations between demographic profiles and social skills development. Chi-square tests indicate significant association ($p < 0.05$) between social skills development and various demographic factors. The adjusted odds ratios (ORs) further elucidate these relationships. Children born to mothers aged 21-25 years (OR = 8.48, p = 0.0001*), 26-30 years (OR = 6.63, p = 0.0001*), or older than 30 years (OR = 8.47, p = 0.0001*) demonstrate significantly higher odds of delayed social skills development compared to those born to mothers under 21 years. Hindu religion (OR = 0.52, p = 0.0440*) and being from a pucca dwelling (OR = 14.05, p = 0.0001*) are associated with decreased odds of delayed social skills development. Additionally, children of illiterate mothers or those with primary school education exhibit higher odds of delayed social skills development, while children with graduate mothers show lower odds. Children from nuclear or joint families also have lower odds of delayed social skills development compared to those from extended families. Moreover, children cared for by grandparents (OR = 0.27, p = 0.0010*) or siblings (OR = 0.20, p = 0.0001*) during the day show decreased odds of delayed social skills development. Notably, children consuming vegetarian diets have substantially higher odds of delayed social skills development compared to those with mixed diets (OR = 66.82, p = 0.0001*). Conversely, children consuming non-vegetarian diets also exhibit higher odds (OR = 30.47, p = 0.0010*). These findings underscore the intricate relationship between demographic factors and the development of social skills in under-five children, emphasizing the need for tailored interventions to support their social development.

Table 43. Accuracy of demographic factors in predicting status of growth and development in social skills of children in terms of area under curve (AUC)

n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Age of the mother	0.6870	0.0180	0.0001*	0.6510	0.7230
Religion	0.1870	0.0150	0.0001*	0.1580	0.2160
Dwelling	0.7070	0.0170	0.0001*	0.6740	0.7410
Mother's literacy	0.6350	0.0200	0.0001*	0.5960	0.6730
Occupation	0.7030	0.0190	0.0001*	0.6660	0.7410
Monthly income	0.6880	0.0190	0.0001*	0.6500	0.7250
Type of family	0.5150	0.0210	0.4560	0.4740	0.5570
Care of child during day	0.2600	0.0170	0.0001*	0.2260	0.2940
Type of diet	0.5990	0.0190	0.0001*	0.5630	0.6360

Table provides insights into the predictive accuracy of various demographic factors for determining the status of growth in social skills among children under five years old. The Area Under the Curve (AUC) values range from 0.187 to 0.707, indicating differing levels of predictive ability across factors. Variables such as age of the mother, dwelling, occupation, and monthly income exhibit relatively high AUC values (ranging from 0.635 to 0.707), signifying strong predictive potential. These factors also demonstrate statistically significant p-values (<0.05), reinforcing their

association with social skills development status. Mother's literacy and type of diet display moderately high AUC values (0.599 and 0.687, respectively) with significant p-values, suggesting meaningful predictive capacity. Conversely, religion and type of family exhibit lower AUC values, indicating weaker predictive ability. Despite this, their p-values remain statistically significant, implying some degree of association with social skills development status. Notably, the care of the child during the day shows the lowest AUC value of 0.260, indicating limited predictive ability, although its p-value is still significant. Overall, these findings highlight the varying degrees of predictive power among demographic factors in assessing social skills development in young children, with certain factors showing stronger predictive potential than others.

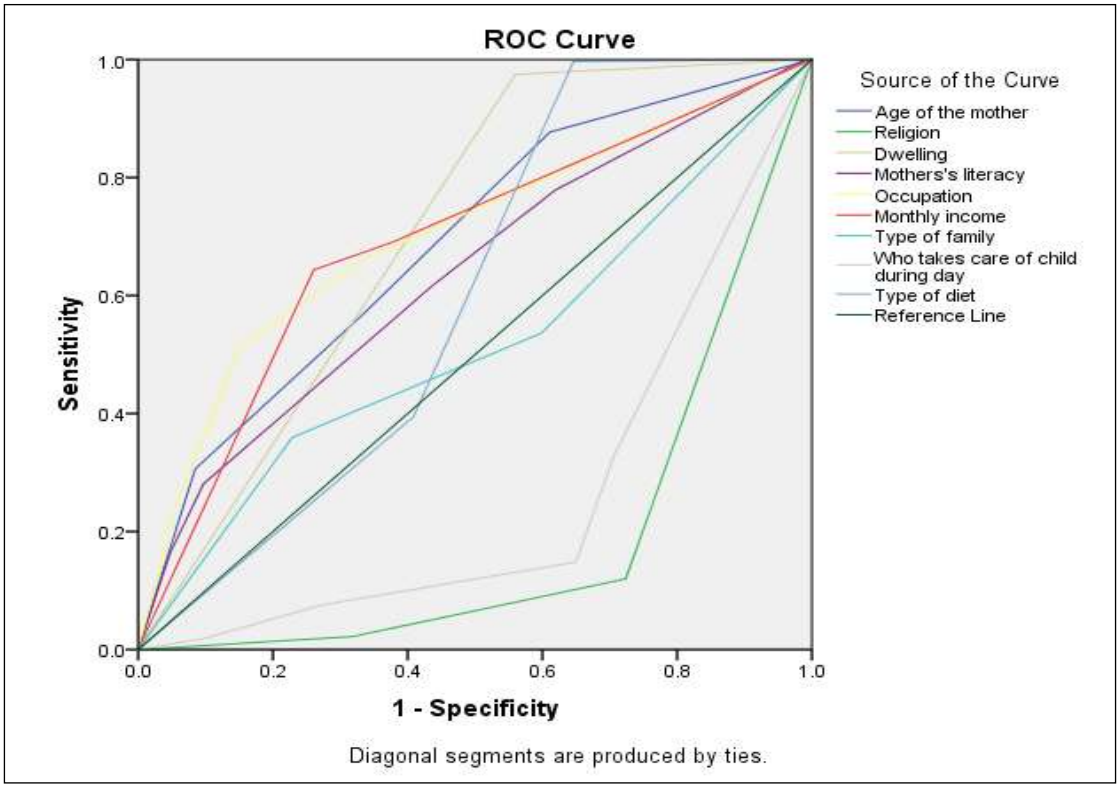


Figure: 30 ROC curve of accuracy of demographic factors in predicting status of growth and development in social skills among under-five children

Table 44. Association between biological factors and status of Growth and development in Social skills among under-five children in rural Belagavi (n=885)

Biological factors	Delayed (568)		Developed (317)		Total	Chi-square	p-value
	f	%	f	%			
Pattern of pregnancy							
Repeat adolescent pregnancy	168	29.58	49	15.46	**217**	35.24	0.001*
Adolescent (first) & adult	148	26.06	64	20.19	**212**		
Repeat adult pregnancy	252	44.37	204	64.35	**456**		
Consanguinity							
Yes	329	57.92	99	31.23	**428**	58.04	0.001*
No	239	42.08	218	68.77	**457**		
Mode of delivery							
Normal vaginal delivery	353	62.15	246	77.6	**599**	22.22	0.001*
Caesarean	215	37.85	71	22.4	**286**		
Antenatal care							
Yes	416	73.24	152	47.95	**568**	56.60	0.001*
No	152	26.76	165	52.05	**317**		
Gestational age at birth							
Pre-term	376	66.2	135	42.59	**511**	46.48	0.001*
Term	192	33.8	182	57.41	**374**		
Multiple gestation							
Yes	352	61.97	194	61.2	**546**	0.05	0.821
No	216	38.03	123	38.8	**339**		
History of birth asphyxia							
Yes	257	45.25	114	35.96	**371**	7.20	0.007*
No	311	54.75	203	64.04	**514**		
Breastfeeding							
Appropriate	298	52.46	238	75.08	**536**	43.56	0.001*
Inappropriate	270	47.54	79	24.92	**349**		
Family size							
1--5	129	22.71	65	20.5	**194**	2.22	0.330
6--9	308	54.23	165	52.05	**473**		
>=10	131	23.06	87	27.44	**218**		

The association between biological factors and the growth and development of social skills among under-five children in rural Belagavi highlights significant relationships between various biological factors and the status of social skills development. Chi-square tests demonstrate significant associations ($p < 0.05$) between social skills development and biological factors. Notably, children born from repeat adolescent pregnancies show higher rates of delayed social skills development compared to those from other pregnancy patterns ($p = 0.0001^*$). Similarly, children from pregnancies with consanguinity ($p = 0.0001^*$), delivered through caesarean section ($p = 0.0001^*$), or born pre-term ($p = 0.0001^*$) exhibit elevated rates of delayed social skills development. Furthermore, children not receiving antenatal care ($p = 0.0001^*$), experiencing birth asphyxia ($p = 0.007^*$), or having inappropriate breastfeeding ($p = 0.0001^*$) are associated with higher rates of delayed social skills development. However, the presence of multiple gestations does not show a significant association with social skills development ($p = 0.828$). These findings emphasize the importance of addressing biological factors during early childhood to promote optimal social skills development and overall well-being.

Table 45. Assessment of risk of various biological factors on Growth and development in social skills among under-five children in rural Belagavi n=885

Biological factors	Categories	Adjusted OR	95% CI for OR		p-value
			Lower bound	Upper bound	
Pattern of pregnancy	Repeat adolescent pregnancy	Ref.			
	Adolescent (first) and adult (current) pregnancy	1.69	0.75	3.81	0.2040
	Repeat adult pregnancy	7.48	3.52	15.91	0.0001*
Consanguinity	No	Ref.			
	Yes	0.23	0.14	0.40	0.0001*
Mode of Delivery	Normal vaginal delivery	Ref.			
	Caesarean	0.72	0.35	1.46	0.3580
Antenatal Care	No	Ref.			
	Yes	0.42	0.24	0.72	0.0020*
Gestational age at birth	Term	Ref.			
	Pre-term	1.08	0.63	1.85	0.7820
Multiple Gestation	No	Ref.			
	Yes	0.26	0.11	0.65	0.0040*
History of Birth Asphyxia	No	Ref.			
	Yes	0.05	0.02	0.13	0.0001*
Breastfeeding	Inappropriate	Ref.			
	Appropriate	26.76	11.22	63.79	0.0001*
Family Size	1--5	Ref.			
	6--9	30.54	10.55	88.39	0.0001*
	>=10	22.85	8.64	60.43	0.0001*

The assessment of various biological factors on the growth and development of social skills among under-five children in rural Belagavi reveals significant associations. Children born from repeat adult pregnancies exhibit a substantially higher risk of delayed social skills development compared to those from repeat adolescent pregnancies (Adjusted OR = 7.48, p = 0.0001*). Additionally, the absence of consanguinity (Adjusted OR = 0.23, p = 0.0001*), receiving antenatal care (Adjusted OR = 0.42, p = 0.002*), and appropriate breastfeeding (Adjusted OR = 26.76, p = 0.0001*) are associated with a decreased risk of delayed social skills development. Moreover, children born from multiple gestations show a lower risk of delayed social skills development (Adjusted OR = 0.26, p = 0.004*). Conversely, a history of birth asphyxia significantly increases the risk of delayed social skills development (Adjusted OR = 0.05, p = 0.0001*). Furthermore, larger family sizes, specifically having 6-9 children (Adjusted OR = 30.54, p = 0.0001*) or 10 or more children (Adjusted OR = 22.85, p = 0.0001*), are associated with elevated risks of delayed social skills development. These findings underscore the critical role of various biological factors in shaping the social skills development of under-five children, highlighting the importance of targeted interventions to mitigate risk factors and promote optimal development.

Table 46. Accuracy of Biological factors in predicting status of growth and development in social skills of children in terms of area under curve (AUC)

n=885

Test Result Variable(s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Pattern of pregnancy	0.6100	0.0190	0.0001*	0.5720	0.6480
Consanguinity	0.6330	0.0190	0.0001*	0.5960	0.6710
Mode of delivery	0.4230	0.0200	0.0001*	0.3840	0.4610
Antenatal care	0.6260	0.0200	0.0001*	0.5870	0.6650
Gestational age at birth	0.6180	0.0200	0.0001*	0.5790	0.6570
Multiple gestation	0.5040	0.0200	0.8490	0.4640	0.5440
History	0.5460	0.0200	0.0220*	0.5070	0.5860
Breastfeeding	0.3870	0.0190	0.0001*	0.3490	0.4250
Family Size	0.5250	0.0200	0.2090	0.4860	0.5650

Table presents the accuracy of various biological factors in predicting the status of growth and development in social skills among children, assessed through the Area Under the Curve (AUC) values. The AUC values range from 0.387 to 0.633, indicating varying levels of predictive capability across different biological factors. Consanguinity, antenatal care, and gestational age at birth exhibit relatively high AUC values (ranging from 0.618 to 0.633), suggesting strong predictive potential and statistically significant p-values (<0.05). Patterns of delivery and mode of delivery

also demonstrate notable predictive ability with AUC values of 0.610 and 0.423, respectively, both accompanied by significant p-values. History, which encompasses factors related to the child's past medical and developmental history, displays a moderate AUC value of 0.546 with a significant p-value, indicating its relevance in predicting social skills development. Conversely, breastfeeding and family size show lower AUC values (0.387 and 0.525, respectively) and have statistically significant p-values, suggesting a less robust predictive capacity. Multiple gestation, however, exhibits a non-significant p-value alongside its AUC value of 0.504, indicating limited predictive ability for social skills development. Overall, these findings underscore the varying degrees of predictive power among biological factors in assessing the status of social skills development in children, with certain factors demonstrating stronger predictive potential than others.

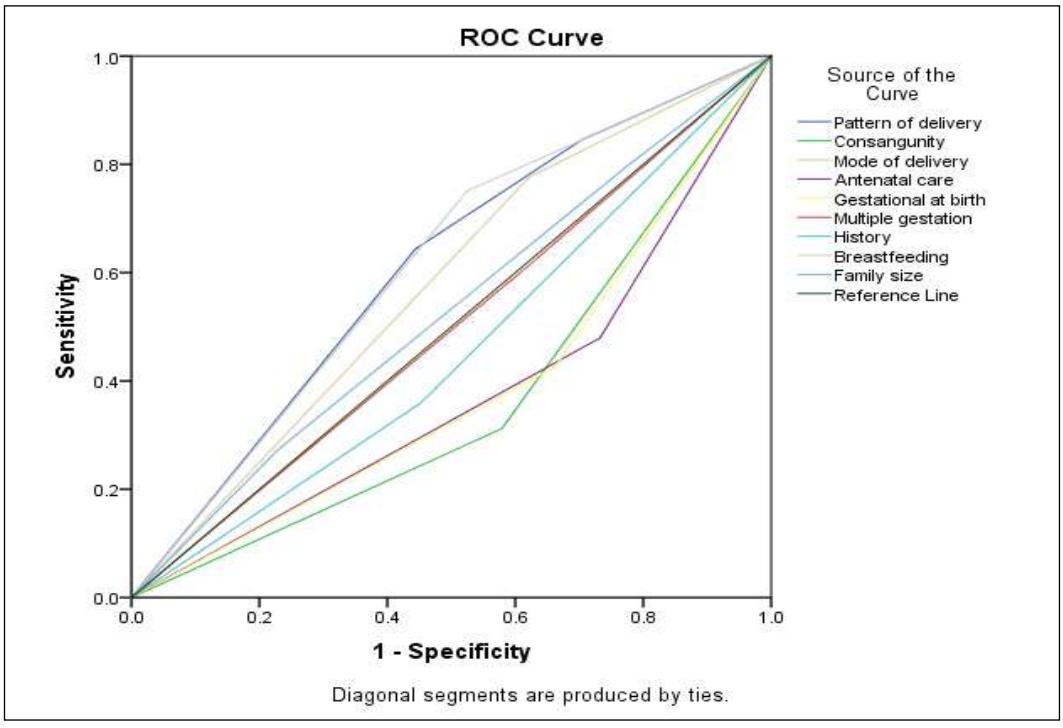


Figure: 31 ROC Curve of accuracy of Biological factors in predicting status of growth and development in social skills

CHAPTER V

DISCUSSION

A child's first five years of life are a golden time for their development because of the quick advancements in their physical and cognitive growth and development, which will support their future learning abilities as well as their social and emotional capacities.[160] Growth pattern and rate of every individual is unique. An individual's development is influenced by the interplay of environment and heredity from the earliest stages of life. Infants' behavioral, cognitive, socioemotional, and psychomotor development are known to be impacted by maternal psychological distress during pregnancy, whereas postpartum psychological discomfort is known to support cognitive and socioemotional development. In the current situation, lifestyle choices have a significant impact on development. Growth before and after birth is determined by a combination of environmental and genetic variables, including lifestyle choices. The nutritional status of a child is determined even before birth; there is a strong correlation between the health of the child and the nutritional status of the mother and fetal growth limitation. Prematurity and small for gestational age (SGA) are caused by maternal malnutrition and underweight.

In our study, younger mothers, aged below 21 years, show a higher proportion of children with delayed growth and development compared to older mothers. Our results showed a significant percentage of young mothers accounting for 28.59% between the ages of 21 and 25, 25.65% being between the ages of 26 and 30, and 16.38% being over the age of 30. The study's findings indicated a connection between the development of the foetus and the mother's age at conception. Adjusted chi-square values and p-values show substantial correlations between the status of hearing,

language, and concept development among under-five children in rural Belagavi and demographic characteristics. There is a significant correlation between delayed development and maternal age over 30 years. Offspring born to mothers in this age group are more likely to experience delayed development than offspring born to younger mothers (<21 years). The assessment of risk associated with various demographic profiles on hearing, language, and concept development among under-five children in rural Belagavi reveals significant associations, as indicated by adjusted odds ratios (OR) and p-values. Specifically, Muslim and Christian children exhibit substantially lower odds of delayed development compared to Hindu children ($p < 0.0001$), highlighting the influence of religion on developmental outcomes. Similarly, children from nuclear families have lower odds of delayed development compared to those from extended families ($p = 0.0060$), suggesting the importance of family structure. Notably, children cared for by grandparents or siblings during the day have significantly lower odds of delayed development compared to those cared for by themselves ($p < 0.0001$), underscoring the impact of caregiver type. The nutritional status of under-ves was shown to be highly influenced by the mother's education in our study. Specifically, the prevalence of undernutrition was found to be 21.2% when the mother's education level above high school, and 60.9% when the mother was illiterate.

The assessment of risk factors on the growth and development of social skills among under-five children in rural Belagavi reveals significant associations between demographic profiles and social skills development. Out of a total of 409 vision and fine motor not developed children, a majority of 39.64% children are not developed in whose mothers are belongs to <21yrsof age groups. However, out of a total of 460 vision and fine motor developed children, a majority of more than 80% of children are

well developed whose mothers are belongs to above 21 yrs of age. The association is found to be statistically significant between Age of the mother with status of Vision and fine motor development among children less than five years in rural Belagavi (Chi-square=89.1760, p=0.0001). It means that, the mothers are belongs to higher age groups associated with development of children. Out of a total of 409 vision and fine motor not developed children, a minimum of 5.62%, 37.41% and 7.33% children are not developed who are taken care of fathers, grandfathers and relatives followed by others. However, out of a total of 460 vision and fine motor developed children, a majority of 54.35% and 16.30% of children are well developed who are taken care by self and grandfathers followed by others. The association is found to be statistically significant between who takes care of child during day with status of Vision and fine motor growth and development among under five year children in rural Belagavi.Out of a total of 425 hearing, language and concept not developed children, a majority of 30.12% children are not developed in Muslim mothers followed by others. However, out of a total of 291 hearing, language and concept developed children, a majority of 93.47% of children are well developed in Hindu mothers followed by others. The association is found to be statistically significant between religion with status of Hearing, language and concept development among under five year children in rural Belagavi. Out of a total of 425 hearing, language and concept not developed children, 38.82% children are not developed who are living in Katcha houses followed by others. However, out of a total of 291 hearing, language and concept developed children, a majority of 95.19% of children are well developed who are living in Pucca houses. The association is found to be statistically significant between dwelling with status of Hearing, language and concept development among under five year children in rural Belagavi.

Vaman V. Khadilkar et al [161] in 2017 in their study concluded that children in the small for gestational age (SGA) group were stunted in comparison to the controls, and that the percentage of stunted children from the lower socioeconomic strata (LSS) was higher than that of the USS. Additionally, there was a difference in the catch-up growth between children in the upper socioeconomic strata (USS) and LSS, with a greater proportion of LSS children being stunted at age five. The diversity in children's height was impacted by birth weight and socioeconomic background. The mother's age and the number of severe sickness episodes were the other important predictors of stunting in SGA offspring.

Conversely, foetal growth restriction has a significant role in the development of stunting and wasting in children; roughly 20% of childhood stunting may have prenatal causes.[162] Increasing child development outcomes and enhancing population well-being need policymakers to simultaneously address a number of interconnected challenges and shortfalls. Research has demonstrated a favorable correlation between the age of the mother at childbirth and a variety of child outcomes, even when taking into consideration maternal confounders including race, income, and education. Through physiological factors including decreased maternal health (especially during conception, gestation, and delivery) or increased rates of genetic abnormalities, biological aging may also have a negative short- and long-term impact on offspring development. Using data from the U.S. Health and Retirement Survey, Myrskylä and Fenelon (2012)[163] showed that children born to mothers between the ages of 25 and 34 had better outcomes than children born to mothers younger than 25 or older than 35 in terms of mortality, self-rated health, height, obesity, and the number of conditions diagnosed.

A research conducted in 2015 by Pieters and Levenstond,[164] which found that the social personalities and fine motor development of children between the ages of 0 and 18 months are influenced by the mother's age. A 2013 study by Julia Morinis et al. suggested that 5% of babies were born to moms who were older than 18. According to their data, children of adolescent moms scored substantially lower on cognitive tests than children of mothers who were between the ages of 25 and 34.The impact of a young mother's age on the mean scores for non-verbal and spatial abilities was lessened once perinatal and sociodemographic characteristics were taken into account. The mean verbal ability scores showed a persistent difference of −3.8 (−6.34 to −1.34, p=0.003), which corresponds to an average delay of 5 months. According to a research by Morinis et al. (2013) [165], children born to teenage moms (≤18 years old) typically face linguistic ability deficits compared to children born to mothers between the ages of 25 and 34.This resulted from a lack of conversational stimulation between mother and child because adolescent women were more prone to depression. According to a study by Rahmawati et al. (2018),[166] the length of the baby's birth determined the impact of the mother's age at pregnancy on the child's development. It has become increasingly important for mothers to be prepared to care for their children in order to ensure optimal growth and development, particularly when it comes to early nurturing. Not only did young marriages involving immature physical and psychological maturity impair the lives of the women involved, but they also had an effect on the lives of their offspring. Maternal (emotional) and cognitive readiness were still seen as immature at a relatively young age (<18 years old).

Religion also has a big impact; Hindu children, for example, have substantially higher rates of developed skills than Muslim and Christian youngsters ($p < 0.0001$). Additionally, as indicated by their corresponding chi-square values and p-

values, the type of habitation, the mother's reading level, the occupation, the monthly income, the family type, the carer during the day, and the diet all exhibit significant relationships with the developmental status. For example, children from joint households or those raised by other family members or relatives have lower rates of developed skills than do children from nuclear families and those raised alone during the day. These results highlight the complex effects of demographic characteristics on the development of hearing, language, and concepts in rural children under five, underscoring the significance of taking these aspects into account in treatments meant to support optimal development.

The investigation's findings indicated a connection between child development and family income. This was consistent with research conducted in 2013 by Morinis et al,[165] which found that low learning achievement and a delay in cognitive development were predicted by poverty.According to Taywade and Pisudde (2017),[167] family income had an impact on the prevalence of LBW. Low birth weight newborns were born into households with low economic position, according to the study's findings. Children that were stunted or wasting also tended to come from low-income homes (Nurliyana et al., 2016).[168]

Children's development will be stimulated more to be better by their parents' greater stimulation. McDonald et al, 2016,[169] concluded that ppremature birth, depression during pregnancy, a lack of "me time," and a parent's lack of play and book reading with their kid were risk factors for developmental delays in the first year of life. According to Santri et al. (2014),[170] parental stimulation has a greater impact on a child's growth than the family's financial situation.

Psychomotor function development progresses in steps along the lines of fine motor capabilities, communication abilities, personal social behaviour, and gross motor abilities. In addition to genetic and sexual characteristics, the developing process is influenced by environmental, social, nutritional, and cultural factors.

Mother's literacy level, occupation, monthly income, type of family, caregiver during the day, and type of diet all display significant associations with the growth and development status of children. There are differences in the numbers of literate people: 31.19% have finished primary school, 34.01% have completed an SSLC, and lesser percentages are illiterate (1.13%), have completed upper primary education (17.4%), have graduate degrees (7.34%), and have post-graduate degrees (8.93%).The association between mother education (but not socioeconomic position) and child development scores at age five was found to be somewhat mediated by growth between birth and age four in the study conducted by W Slemming et al.[171] in 2022 in Africa. The impact of child growth, including linear growth, on the mediating role of mother education and socioeconomic status on cognitive development was investigated in two previous low-income studies. Regarding prenatal care, nutrition, exposure to secondhand smoke, usage of car seats, exercise, and early childhood television viewing, moms with college degrees were more likely to engage in more beneficial health investment behaviors.

The findings of the extensive body of research relating parenting practices and children's academic performance to maternal education were consistent with these findings.Another study by Rahman et al., 2016.[172] also proved that a child's health is always significantly influenced by the education of the mother.

There is a strong correlation between the delivery pattern and the state of growth and development. Compared to children born from adolescent and adult pregnancies or recurrent adolescent pregnancies, children from adult repeat pregnancies had a higher percentage of developmental delays. There is also a noteworthy correlation between the mode of delivery and the number of infants with developmental delays; children delivered by caesarean section had a higher proportion than those delivered vaginally normally. Additionally, there are noteworthy correlations between growth and development status and breastfeeding practices, family size, prenatal care, and gestational age at birth.[173] Consanguinity, numerous gestations, and a history of birth asphyxia, on the other hand, do not significantly correlate with a person's state of growth and development.

Moreover, children consuming a vegetarian or non-vegetarian diet exhibit remarkably higher odds of delayed development compared to those on a mixed diet emphasizing the potential role of dietary habits in developmental outcomes. [174]

Additionally, maternal literacy, occupation, and dwelling type show trends towards significance, suggesting potential influences on developmental outcomes that warrant further investigation. However, lower AUC values indicate less predictive potential in determining the state of hearing, language, and concept development for factors like breastfeeding (0.385) and mode of delivery (0.455). They still have statistically significant p-values, though, which suggests a degree of correlation with the result. The multiple gestation variable may not be a very good predictor of hearing, language, and idea development, as seen by its non-significant p-value and AUC value of 0.493. The aforementioned results underscore the significance of taking into account multiple biological variables, specifically consanguinity, birth weight at

birth, and prenatal care, when comprehending and forecasting the growth of children's auditory, verbal, and cognitive abilities. These insights can guide focused interventions and support plans to help kids develop in these areas to the best of their abilities.

According to a study by Suraj Chawla et al 2020,[175] the rates of underweight, stunting, and wasting in children decreased as mothers' educational status increased. A woman with education is aware of her child's developmental needs and actively seeks out dietary guidance and counselling. Comparing children of mothers with no education to those of mothers with a secondary or higher education, similar research by Hasan et al.,[176] Dabar et al,[177] and Devi et al.[178] have demonstrated that the latter group was less likely to experience childhood malnutrition.

In our study cconsanguinity had the highest AUC value (0.660) of all the biological parameters that were studied. It is followed by gestational age at birth (0.637), prenatal care (0.627), and delivery mode (0.618). All of these characteristics have statistically significant p-values ($p < 0.05$), showing a substantial link with the outcome, and they all show reasonably high predictive capacities in determining children's hearing, language, and concept development status. Many studies have been conducted on consanguineous marriage and its effects on children's health in the literature but few have examined the relationship between consanguineous marriage and undernourishment in children.[179,180,181] Stunting in children is significantly correlated with consanguineous marriages. Propensity score matching data also demonstrate that, in India, child stunting was substantially more common in consanguineous marriages than in non-consanguineous marriages. Furthermore, the data on child stunting in consanguinity shows that, in India, Stunting was more common in male children under five than in female youngsters.

In a research study by Aryastami et al in 2017,[182] consanguinity increases the likelihood that a kid would be stunted if they are smaller or have a lower birth weight. Numerous studies have found a strong correlation between malnutrition and low birth weight or small size. This is because stunting and low birth weight are both examples of child growth failure, which is the leading cause of infant mortality.

In a study performed by Rukmanee Butchon et al in 2017 it was inferred that northeastern Thailand has a high prevalence of stunting, obesity, and developmental delay in children, as well as improper behavior (hyperactivity and displaying rage when upset) in children aged 1 to 5 years. Compared to other age groups and children whose mothers were teenagers, there was a higher prevalence of delayed development in children between the ages of 36 and 62 months, however this difference was not statistically significant. All child age groups showed a significant frequency of overweight, while males showed a higher prevalence of stunting.

Results from several research conducted worldwide support the theory that low-birth-weight babies may have lower cognitive function, which could result in more developmental delays.[183,184,185] Furthermore, it has been observed by Palloto et al,[186] Gutbrod et al.,[187] and Kerstjens et al.[188] that a shorter gestational age at delivery is associated with a higher risk of delayed development. In a study conducted by Sukanya Gupta et al in 2021[189] there was a larger likelihood of developmental delay in kids whose mothers belonged to lower social classes and had less education.

When studying the growth and development of children, there are several potential limitation that researcher might encounter such as sample size, environmental variable, observer bias, measurement tools and self-reporting issues

Similar macroenvironmental factors were also found to be substantially linked in other research to developmental delay.[190] Children living in slums experience poverty, which affects their overall development and contributes to delays.

After the result of the study investigator will come to know the delayed and developed status of the children in various domains, according to which health of the child can be improved and concern will be taken by the particular rural area PHCs.This how the study's practical significance will be achived.

CHAPTER VI

CONCLUSION

Growth standards like the WHO, IAP, and NCH growth references have been used in many studies to assess children under five years old's growth and development. both in a foreign and an Indian setting. The following conclusion is reached by this study's thorough investigation: Mothers are not totally educated about numerous developmental phases. Demographic characteristics did not significantly affect the moms' knowledge score. Based on the aforementioned data, it was concluded that most new moms had a mediocre awareness of developmental stages and need assistance, such as from educational programmes or handouts, among other things.

Determining the development in children less than five years of age involves a combination of observation, measurement, and assessment across various domains. Here are some key methods and indicators used to assess growth and development in young children:

Physical Growth:

Height and Weight: Regular measurements of height and weight marked on the growth charts can track a child's growth trajectory with time and identify any potential concerns.

Head Circumference: Head circumference measurements are particularly important in infancy to monitor brain growth and development.

Motor Development:

Gross Motor Skills: Observing a child's ability to control large muscle movements, such as crawling, walking, jumping, and running.

Fine Motor Skills: Assessing a child's hand-eye coordination and manipulation of small objects, such as grasping, stacking blocks, and drawing.

Cognitive Development:

Cognitive Milestones: Monitoring developmental milestones related to memory, attention, problem-solving, and understanding of cause and effect.

Play Skills: Observing how a child engages with toys, interacts with their environment, and engages in imaginative play.

Language and Communication:

Receptive Language: testing a child's comprehension and understanding of spoken language.

Expressive Language: Observing a child's use of gestures, babbling, and vocabulary to communicate needs and desires.

Social and Emotional Development:

Attachment: Observing the quality of the child's relationships with caregivers and their ability to seek comfort and support.

Emotional Regulation: Assessing how a child responds to different emotions and situations, and their ability to self-soothe.

Social Interactions: seeing how a youngster shares toys, takes turns, behaves with friends and adults, and demonstrates empathy.

Nutritional Status:

Dietary Intake: Monitoring the child's food intake to ensure they are receiving adequate nutrition for growth and development.

Growth Patterns: Assessing weight gain and changes in body composition to identify signs of malnutrition or nutritional deficiencies.

Regular pediatric check-ups, developmental screenings, and consultations with healthcare professionals are essential for monitoring a child's growth and development and identifying any potential concerns early on. Parents and caretakers play a critical role in observing and documenting their child's milestones and behaviors, as they are often the first to notice changes or developmental delays. Early intervention and support can make a significant difference in promoting healthy growth and development in young children.

In conclusion, the research on the determinants of growth and development in under-five rural children has shed light on critical factors influencing the well-being of this vulnerable population. Through comprehensive analysis and exploration, several key determinants have emerged, including socioeconomic status, access to healthcare, nutrition, maternal education, and environmental factors.

It is evident that addressing these determinants is essential for promoting optimal growth outcomes among rural children less than five years of age. Policy interventions aimed at improving access to quality healthcare, enhancing nutritional

support, and investing in maternal education can significantly contribute to mitigating disparities and fostering healthier outcomes.

Furthermore, the findings underscore the interconnectedness of various factors impacting child growth and development, highlighting the need for holistic approaches that address multiple determinants simultaneously. Cooperative initiatives including legislators, medical professionals, educators, and local authorities, and caregivers are imperative to enact sustainable changes and create environments conducive to the healthy growth and development of rural children.

Moving forward, continued research and targeted interventions are essential to further understand the nuanced dynamics at play and implement effective strategies to ensure every child, regardless of their geographic location, has the opportunity to thrive and reach their full potential. By prioritizing the needs of under-five rural children and addressing the determinants outlined in this thesis, we can work towards building healthier, more equitable communities for generations to come.

Implications of study

- **Scope for a society**

The study will contribute to raising awareness of Growth and development among parents and medical professionals. The public, groups, and various healthcare facilities can make use of these findings to support parents and medical authorities in addressing issues connected to and to enhance the Growth and development health of their children. The study also placed a strong emphasis on the causes of Growth and development and the variables that are linked to it.

- **Scope for Nursing Practice**

The findings of the present study can be used in different aspects of the nursing profession as follows-

- As per the results of the study, there is a critical need to avoid Development delay because of its impact on the health of children under five years children, as well as other variables that they confront.
- The primary duty of all health professionals is to prevent health problems related to under-five children's Growth and development. The development, coordination and implementation of a wide range of health awareness programs for all societal groups, with a focus on vulnerable populations such as children under five and their mothers, in order to raise awareness of Growth and development and the factors that contribute to its effects.
- The results of this study can be used by nurses as a point of reference for creating different kinds of health education programs for both community and institutional settings.
- Because nursing practice has a strong theoretical base, community members, particularly families with children under five, can benefit from a variety of educational techniques that educate them about delay in Growth and development and its related factors that impact their physical health and biological development.

- **Scope for Nursing Education**

- Teaching nursing students how to plan, organize, and carry out health education programs on Growth and development and related concerns should be part of their curriculum.
- Every nursing student should receive sufficient instruction in this area because the prevention measures of development delay and awareness about development delay under-five year children to the parents and society Topics including the causes,

treatments, and preventive measures of normal Growth and development to be covered in this workshop.

- The study's conclusions can be used as instructional resources by nursing students and other students studying health professions.

➢ **Nursing Administration**

- It is the duty of nursing administrators to provide staff development opportunities and programs to all nurses and to train them in the management of Growth and development issues, especially those pertaining to the under-five children.
- When it comes to organizing and implementing programs for mothers with children under five, nursing administrators should take the initiative. Additionally, the administrator could notify higher authorities about the need for these programs in the community.

➢ **Nursing Research**

- Growth and developmental delay is highly prevalent in children, especially in the under-five population, which makes this topic crucial. Many factors effect children from not getting the right care when they were young.
- The current study's findings demonstrate the importance of carrying out more research on Determinants of Growth and developmental delay. Without a doubt, the current study will aid in the production of comparable results in future research endeavors.

CHAPTER VII

SUMMARY

The importance of growth in young children less than five years of age cannot be overstated, as this period lays the foundation for their lifelong health, well-being, and potential. Here are several key reasons why growth and development during this crucial stage are so significant:

Critical Brain Development: The brain develops quickly in the early years, at which time neuronal connections emerge at a startling rate. Proper nutrition, stimulation, and caregiving during this time are vital for supporting healthy brain development, which forms the basis for learning, behavior, and emotional regulation throughout life.

Physical Health and Immune Function: Adequate growth and development are essential for building a strong immune system and overall physical health. Proper nutrition, including essential vitamins and minerals, supports the development of healthy bones, muscles, and organs, while also reducing the risk of malnutrition-related diseases and infections.

Cognitive and Language Skills: Early stage of childhood is a critical period for language acquisition, cognitive development, and the development of foundational skills such as literacy and numeracy. Stimulating environments, responsive caregiving, and access to quality early childhood education can greatly enhance the cognitive abilities of the child and future academic success.

Social and Emotional Development: During the early years, children learn to understand and regulate their emotions, form secure attachments with caregivers, and navigate social interactions with peers. Positive social and emotional development lays the groundwork for healthy relationships, self-confidence, and resilience in the face of challenges later in life.

Long-Term Outcomes: Research consistently shows that experiences and exposures during the early years have long-term implications for health, education, and economic outcomes in adulthood. Investing in early childhood development can yield significant returns in terms of improved educational attainment, higher income potential, and reduced rates of chronic disease and crime.

The study on the determinants of growth in rural children less than five years of age investigates the various factors influencing the well-being of this demographic. Through extensive research, several key determinants have been identified, including socioeconomic status, access to healthcare, nutrition, maternal education, and environmental factors.

The findings emphasize the critical importance of addressing these determinants to promote optimal growth and development outcomes among rural children under the age of five. It is evident that interventions targeting improved access to quality healthcare, enhanced nutrition, and increased maternal education can significantly contribute to mitigating disparities and fostering healthier outcomes for these children.

Moreover, the study emphasizes how many drivers are interrelated, underscoring the necessity of comprehensive strategies that address several variables at once. cooperative initiatives combining legislators and medical professionals, educators, community leaders, and caregivers are essential to enact sustainable changes and create environments conducive to the healthy growth and development of rural children.

Overall, the research underscores the urgency of prioritizing the needs of under-five rural children and implementing targeted interventions to ensure they have enough opportunity to thrive and reach their fullest potential. By addressing the determinants outlined in this study, we can work towards building healthier, more equitable communities for generations to come.

In summary, ensuring optimal growth and development in children under five is essential for setting the stage for a healthy, successful, and fulfilling life. By providing nurturing environments, access to quality healthcare, nutritious food, and stimulating learning opportunities, we can give every child the best possible start in life.

CHAPTER VIII

RECOMMENDATIONS

- The findings should contribute to the development of theory in this field.
- The similar study can be done in other parts of Karnataka in a larger scale.
- To provide healthy environment in under-five population which will further promotes the health of under-five children
- A similar study can be conduct using longitudinal research design
- Prevalence and determinants of growth and development study can be done in rural setting
- A comparative study can be done in the rural and urban population
- An intervention study can be conduct in the urban area
- The questionnaire used in this study can be further validated and modified in similar studies.
- The identified factors should be taken into consideration in the development of obesity prevention strategies by policy-makers, mass-media, health professionals and teachers targeting more effectively on both Adolescents and their parents' needs.
- There is a pressing need for cost-effective rural -based strategies and appropriate policy changes in developing countries like India to stem the rising tide of Development Delay among under-five Children.
- To improve nutrition, in rural area can include healthier food offerings in the cafeteria and eliminate marketing of unhealthy foods. To improve activity, rural

area can develop health screening in under-five children, safe walking and biking routes to rural area, and can promote active recess time.

- Parents and guardians should try to be good role models for their kids-eating healthfully, immunizations, staying active, minimizing screen time, and living healthy lifestyles that under-five children can optimum growth and development.

DELIMITATIONS

- The study is limited to under-five years children.
- The study is limited only to rural area of Belagavi.
- The study is limited to the rural population.

LIMITATIONS

- Some of the children and mothers did not responded properly for the data collection
- As study is in rural area ,had some problems with aspects like language, religion belief,community etc.

CHAPTER IX

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ANNEXURE I

ETHICAL CLEARANCE CERTIFICATE

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Formerly known as KLE University)
(Deemed-to-be-University established u/s 3 of the UGC Act, 1956)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JNMC Campus, Nehru Nagar, Belagavi-590 010, Karnataka State, India
☎: 0831-2444444 FAX: 0831-2493777 Web: http://www.kledeemeduniversity.edu.in E-mail: info@kledeemeduniversity.edu.in

Ref.No.KAHER/EC/19-20/ 2906/9009 28th June 2019

To,
Mr. Virupakshapp Savadi
Part-Time Ph.D. Research Scholar,
2018-19 Batch, Faculty of Nursing,
KAHER, Belagavi.

Dear Research Scholar

The KAHER Ethics Committee on Human Subjects for Ph.D. Research Project met on th **14th May 2019** to consider your application for approval of the research project **"Determinants of growth and development in under five rural children: a cross sectional study"**

As there are no ethical issues involved in your proposed research project, the committee has provided approval for this research project.

You are requested to report to Ethical Committee of the following:

1. Any deviation from or change of the protocol.
2. Any changes in study documents.

(Dr. Anita Dalal)
Member-Secretary
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

(Dr. B.C. Kotintot)
Chairman
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

CC to: - The Director Research Foundation, KAHER, Belagavi.
- The Director Academic Affairs, KAHER, Belagavi.
- The Registrar, KAHER, Belagavi.
- Special Officer to Hon. Vice Chancellor, KAHER, Belagavi.

ANNEXURE II

PERMISSION LETTER

KLE

INSTITUTE OF NURSING SCIENCES

A Constituent Unit of
KLE Academy of Higher Education and Research
(Deemed-to-be-University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
NEHRU NAGAR, BELAGAVI – 590010, KARNATAKA, INDIA
Office: 091- 831– 2472303, **Fax:** 091- 831- 2475103, **Email:** principalnursingbgm@yahoo.com
Website: http://klenursingbgm.edu.in
Recognized by : Indian Nursing Council (New Delhi) - Karnataka Nursing Council (Bengaluru, Karnataka)

Ref: No - 2019-20 - D - 1259 Date: 24/02/2020.

To,
District Health and Family Welfare Officer,
Hindu Nagar, Tilakwadi,
Belagavi - 590006

Sub: regarding seeking permission to conduct Ph.D. Research study

Respected sir,

With reference to the above cited subject I, Mr. Virupakshapp Savadi working as Assistant Professor at KAHER, Institute of Nursing Sciences, is persuing Ph.D from KAHER, would like to ask permission to conduct the research study entitled "Determinants of growth and development in under five rural children: a cross sectional study" **cross sectional study"** among the underfive children residing in urban areas of Belagavi city. Kindly permit to conduct the research study and do the needful.

Thanking you,

Yours faithfully,

(Mr. Virupakshapp Savadi)

INSTITUTE OF NURSING SCIENCES BELAGAVI

Signature of Guide

Dean, Faculty of Nursing
Principal, Institute of Nursing Sciences,
Belagavi.

Office of the Dist. Health & Family Welfare Officer BELAGAVI

ANNEXURE III

Data Analysis Certificate

This is to certify that the dissertation entitled **"Determinants Of Growth And Development In Under Five Rural Children: A Cross Sectional Study"** is a bonafied and original research work done by **Mr. VIRUPAKSHAPP SAVADI** for the award of degree of Doctor Of Philosophy In Faculty Of Nursing under the guidance of **Prof. Sumitra L.A** and for the same data analysis is done by me as per the objectives of the study. I wish this investigator grand success in endeavors.

Date: 10/06/23.

Bio-Statistician
Dr. S. B. JAVALI Ph.D.
Sr. Associate Professor in Statistics
Department of Community Medicine
USM KLE International Medical Programme
BELAGAVI-590010.

Language Editing Certificate

This is to certify that the dissertation **entitled "Determinants Of Growth And Development In Under Five Rural Children: A Cross Sectional Study"** is a bonafied and genuine research work done by **Mr. VIRUPAKSHAPP SAVADI** for the award of degree of Doctor Of Philosophy In Faculty Of Nursing under the guidance of **Prof. Sumitra L.A** and the same is edited by me. I wish this investigator grand success in endeavors.

Date: 09/06/24

Name & Designation:

Prof. Sujata Pai

M.A (English)

ANNEXURE IV

CONSENT FORM

INFORMED CONSENT FORM FOR PARENTS OF UNDERFIVE CHILDREN PARTICIPATING IN RESEARCH

Determinants of growth and development in
Under-live children: A rural cross sectional study.

Research Scholar : Mr. Virupakshappan A. Savadi

Supervisor : Prof Sumitra.L.A

Dr. DYANESH D.K

INFORMATION SHEET:

Introduction:

We are requesting you to agree to participate your child in the study entitled Determinants of growth and development in Under-five children: A rural cross sectional study conducted by Mr. Virupakshappa.A.savadi Ph.D Research scholar at KLE University Belagavi, under the guidance of Prof Sumitra.LA Vice principal &HOD, Department of child health nursing KAHER Institute of Nursing Sciences, Belagavi

Explanation of the procedure:

In this study your child will have to answer some questions about assessing achievement of milestones by evaluating psychosocial developmental screening test and correlating sociodemographic and biological factors determing growth and development this entire procedure will take 30-40 minutes

Possible Benefits:

There will be health education provided to your child regarding basics of reproductive system, menstrual cycle, premenstrual syndrome causes, symptoms, coping strategies and self care measures. Your child's participation is likely to help in studying the symptoms suffered by adolescents and their association with baseline data, quality of life of children suffering with PMS and effect of health education on the quality of life of children with PMS.

Possible Risks:

The tools employed for conducting the study is safe and as such are not likely to cause any harm to your child.

Confidentiality:

Your child's identity will not be revealed and all the information will be collected coded so that no one will know your identity.

Withdrawal:

Participation in study is voluntary. If you don't wish that your child should participate in the study you can refuse, which will not impact the child in relation to school matters.

Cost of participation:

The cost of the study will be borne by the researcher. There will be no additional cost to your child for participating in this study.

Payment of participation:

There will be no incentives to your child for participating in this study.

PARENT TO CONSENT

In this research study you will have to answer some standard questions related to growth and development of the child, assessing achievement of milestones by evaluating psychosocial development screening test and correlating socio-demographic and biological factors determining growth and development The time taken to answer these questions will be 30 to 40 minutes. It is your choice that you can stop participating in the study at any time. Questions: If you have any questions related to this study you can contact:

MRS. VIRUPAKSHAPPA.SAVADI
Ph.D Research Scholar,
KAHER Institute of Nursing Sciences,
Nehru Nagar, Belagavi-590010
Mobile No-9964609036
Email id-SVirupakshappa@gmail.com

OR

PROF. SUMITRA.L.A
HOD, Dept. of child Health Nursing
KLEU's Institute of Nursing Sciences,
Nehru Nagar, Belagavi-590010
Mobile No-9845896114

Dr. DYANESH D.K
DR.DNYANESHWAR D.K
PROFESSOR
DEPARTMENT OF PAEDIATERICES
J.N. Medical College Belagavi

Legal Rights:

By signing this consent form you are not waiving any of your legal rights.

Publication Rights:

The results of the study will be used for publication however the identity of the participants will be kept confidential.

CONSENT STATEMENT

I have read the information or it has been read to me in the languages I can understand. I have had the opportunity to ask any questions at any time. I consent voluntarily for my child to participate in the study.

1. Name of the parent _____

   Signature/thumb impression of the parent _____

   Date: _____ Place: _____

2. Signature of the investigator (Person obtaining consent) _____

   Name: _____

   Date: _____ Place: _____

3. Signature of the witness: _____

   Name: _____

   Date: _____ Place: _____

ಐದು ವರ್ಷಕ್ಕೂ ಕಡಿಮೆ ವಯಸ್ಸಿನ ಮಕ್ಕಳ ಬೆಳವಣಿಗೆ ಮತ್ತು ವಿಕಸನದ ನಿರ್ಧಾರಕಗಳು ಗ್ರಾಮೀಣ ಭಾಗದ ಒಂದು ಅಧ್ಯಯನ

ಸಂಶೋಧಕರು : ಶ್ರೀ ವಿರುಪಾಕ್ಷಪ್ಪ ಸವದಿ
ಮಾರ್ಗದರ್ಶಕರು: ಪ್ರೊ.ಸುಮಿತ್ರಾ ಎಲ್.ಎ.
ಡಾ.ದಾನೇಲ್ ಡಿ.ಕೆ

ಮಾಹಿತಿ ಪತ್ರ

ನೀವು ನಿಮ್ಮ ಮಗುವನ್ನು "ಐದು ವರ್ಷಕ್ಕಿಂತು ಕಡಿಮೆ ವಯಸ್ಸಿನ ಮಕ್ಕಳ ಬೆಳವಣಿಗೆ ಮತ್ತು ವಿಕಸನದ ನಿರ್ಧಾರಕಗಳು, ಗ್ರಾಮೀಣ ಭಾಗದ ಒಂದು ಅಧ್ಯಯನ" ಎಂಬ ವಿಷಯದ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಮ್ಮೇಲನೆ ಎಂದು ನಾವು ನಿಮ್ಮನ್ನು ಕೇಳಿಕೊಳ್ಳುತ್ತೇನೆ. ಸದರಿ ಸಂಶೋಧನೆಯನ್ನು ಕೆ.ಎಲ್.ಇ ವಿಶ್ವ ವಿದ್ಯಾಲಯ ಬೆಳಗಾವಿ ಸಂಶೋಧನಾ ವಿದ್ಯಾರ್ಥಿಯಾದ ಶ್ರೀ ವಿರುಪಾಕ್ಷಪ್ಪ ಸವದಿಯವರು ಕೈಗೊಂಡಿದ್ದು, ಕಾಪರ ನರ್ಸಿಗ ಸೈನ್ಸ್ ಬೆಳಗುವಿಯ ಮಕ್ಕಳ ಆರೋಗ್ಯ ಶುಶ್ರೂಷಾ ವಿಭಾಗದ ಮುಖ್ಯಸ್ಥರಾದ ಪ್ರೊ. ಸುಮಿತ್ರಾ ಎಲ್.ಎ. ಅವರ ಮಾರ್ಗದರ್ಶನದಲ್ಲಿ ಕೈಗೊಂಡಿರುತ್ತಾರೆ.

ಪ್ರಕ್ರಿಯೆಯ ವಿವರಣೆ:

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಮಗವು ಕೆಲವು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಬೇಕಾಗುತ್ತದೆ ಪ್ರಶ್ನೆಗಳು ಸಾಧನೆಯ ಮೈಲಿಗಲ್ಲುಗಳನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡುವುದಕ್ಕೆ ಸಾಮಾಜಿಕ ಬೆಳಗಣಿಗೆ, ಪರಾಮರ್ಶನ ಪರೀಕ್ಷೆ ಮತ್ತು ಸಾಮಾಜಿಕ ಜನಾಂಗಿಯ ಹಾಗೂ ದೈಹಿಕ ಅಂಶಗಳ ಸಹಸಂಬಂಧಗಳು ಬೆಳಗಣಿಗೆ ಮತ್ತು ವಿಕಸನದವನ್ನು ಹೇಗೆ ನಿರ್ಧರಿಸುತ್ತದೆ ಎಂಬುದನ್ನು ಮೌಲಿಕರಣ ಮಾಡುತ್ತದೆ.

ಸಂಭಾವನೆಯ ಲಾಭಗಳು:

ಐದು ವರ್ಷಕ್ಕು ಕಡಿಮೆ ವಯಸ್ಸಿನ ಗ್ರಾಮೀಣ ಮಕ್ಕಳ ವಿಕಸನದ ಸಾಧನ ಮತ್ತು ಮೈಲಿಗಲ್ಲುಗಳ ಮೌಲ್ಯ ಮಾಪನ ಮತ್ತು ವಿಕಸನ ಮುಂದುಡಕೆಯ ಪ್ರಮಾಣ ಹೊಂದಿದ ಮಕ್ಕಳ ಗುರುತ್ತಿಸುವಿಕೆ. ಮಕ್ಕಳ ಬೆಳಗಣಿಗೆ ಮತ್ತು ವಿಕಸನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ನಿರ್ದಾರಗಳನ್ನು ಅನ್ವಯಿಸುವುದು.

ಸಂಭವನೆಯ ಉಪಾಯಗಳು:

ಅಧ್ಯಯನಕ್ಕೆ ಬಳಸಿನ ಸಾಧನೆಗಳು ಸುರಕ್ಷಿತವಾಗಿದ್ದರಿಂದ ಯಾವುದೇ ರೀತಿಯ ಹಾಳೆಯು ತಮ್ಮ ಮಗುವಿಗೆ ಆಗುವುದಿಲ್ಲ.

ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ಮಗುವಿನ ಗುರುತನ್ನು ಬಹಿರಂಗ ಪಡಿಸುವದಿಲ್ಲ ಮತ್ತು ಎಲ್ಲ ಮಾಹಿತಿಯನ್ನು ಸಂಕೇತಗಳಲ್ಲಿ ತಲೆಹಾಕುವದರಿಂದ ಯಾರೂ ನಿಮ್ಮನ್ನು ಗುರುತಿಸಲಾಗುವುದು.

ಭಾಗವಹಿಸುವಿಕೆ/ಹಿಂಪಡೆಯುವಿಕೆ:

ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆಯು ಸ್ವ-ಇಚ್ಛೆಯಿದ್ದಾಗಿದೆ. ನೀವು ನಿಮ್ಮ ಮಗುವು ಭಾಗವಹಿಸವಿಕೆಯು ಸ್ವ-ಇಚ್ಛೆ ದಾಗಿದೆ. ನೀವು ನಿಮ್ಮ ಮಗವು ಭಾಗವಹಿಸವು ಇಚ್ಛಿಸದೆ ಹೋದಲ್ಲಿ ನೀವು ನಿರಾಕರಿಸಬಹುದು. ಇದು ನಿಮ್ಮ ಮಗುವಿನ ಮತ್ತು ಶಾಲೆಯ ಸಂಭಂಧಕ್ಕೆ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಭಾಗವಹಿಸುವಿಕೆಯ ವೆಚ್ಚ/ಖರ್ಚು :

ಅಧ್ಯಯನದ ಖರ್ಚನ್ನು ಸಾಂಶೋಧಕರು ಬರಿಸುತ್ತಾರೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದರಿಂದ ನಿಮ್ಮ ಮಗುವಿನ ಮೇಲೆ ಯಾವುದೇ ರೀತಿಯ ಹೊರೆ ಬೀಳುವುದಿಲ್ಲ.

ಭಾಗವಹಿಸುವಿಕೆಯ/ಪಾವತಿ :

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವರಿಂದ ನಿಮ್ಮ ಮಗುವಿಗೆ ಯಾವುದೇ ರೀತಿಯ ಪ್ರೋತ್ಸಾಹ ಧನ ಇರುವದಿಲ್ಲ.

ಪಾಲಕರ ಸಮ್ಮತಿ

ಈ ಸಂಶೋಧನ ಅಧ್ಯಾಯನದಲ್ಲಿ ನೀವು ನಿಮ್ಮ ಮಗುವ ಸರಿಬಂದಿಸಿದ್ದ ಬೆಳವಣಿಗೆ ಹಾಗೂ ವಿಕಸನದ ಕೆಲವು ಮಾನದಂಡ ನಿರ್ಧರಿಸಿ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸ ಬೇಕು ಅವು ಮನೋಸಾಮಾಜಿಕ ಬೆಳಗಳಿಗೆ ಪರಮಾರ್ಶನ ಪರಿಕ್ಷೆ ಮತ್ತು ಸಾಮಾಜಿಕ ಜನಾಂಗಿಯ ಹಾಗೂ ಚೌಎಕ ಅಂಶಗಳ ಸಹ-ಸಬಂಧಗಳು ಬೆಳೆಗಳಿಗೆ ಮತ್ತು ವಿಕಸನವನ್ನು ಹೇಗೆ ನಿರ್ಧರಿಸುತ್ತವೆ ಎಂಬುವದನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡುತ್ತದೆ. ಈ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಲು ತಗಲುವ ಸಮಯ 30–40 ನಿಮಿಷಗಳು. ನೀವು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಭಾಗವಹಿಸುವದನ್ನು ನಿಲ್ಲಿಸುವ ಅಯ್ಕೆಯುವ ನಿಮ್ಮದಾಗಿರುತ್ತದೆ. ಈ ಅಧ್ಯಯನಕೆ ಸಂಬಂಧಿಸುತ್ತದೆ ಯಾವುದೇ ಪ್ರಶ್ನೆಗಳಿಗೆ ನೀವು ಈ ಕೆಳಗಿನವು ಸಂಪರ್ಕಿಸಬಹುದು.

ಶ್ರೀ. ವಿರುಪಾಕ್ಷಪ್ಪ ಸವದಿ
ಪಿ.ಎಚ್.ಡಿ ಸಂಶೋಧಕರು
ಕಾಪೇರ ನರ್ಸಿಂಗ ಸಾಯನ್ಸ
ನೆಹರು ನಗರ ಬೆಳಗಾವಿ – 590010
ಮೋ.ನಂ.996469036
Email id- virupaxappa@gmail.com

ಪ್ರೋ. ಸುಮಿತ್ರಾ ಎಲ್.ಎ.
ಮುಖ್ಯಸ್ಥರು ಮಕ್ಕಳ ಶುಶೂಷಾ ವಿಭಾಗ
ಕೆ.ಎಲ್.ಇ.ನರ್ಸಿಂಗ ಸಾಯನ್ಸ
ನೆಹರು ನಗರ ಬೆಳಗಾವಿ– 590010
ಮೋ.ನಂ 9845896114

ಸಹ ಮಾರ್ಗದರ್ಶಕರು
ಡಾ.ದಾನೇಶ್ ಡಿ.ಕೆ
ಚಿಕ್ಕಮಕಳ ವಿಭಾಗ ಜೆ.ಎನ್.ಎಮ್.ಸಿ.
ಮೇಡಿಕಲ್ ಕಾಲೇಜ, ಬೆಳಗಾವಿ.

ಶಾಸನಬದ್ಧ ಹಕ್ಕುಗಳು:

ಈ ಸಮಸ್ಯೆಗೆ ನೀವು ಒಪ್ಪಿಗೆ ಸೂಚನೆ ಸಹಿ ಮಾಡುವುದರಿಂದ ನೀವು ನಿಮ್ಮ ಯಾವುದೇ ಶಾಸನಬದ್ಧ ಹಕ್ಕುಗಳನ್ನು ಕಳೆದುಕೊಳ್ಳುವುದಿಲ್ಲ.

ಪ್ರಕಟನೆಯ ಹಕ್ಕುಗಳು:

ಈ ಅಧ್ಯಯನದ ಫಲಿತಾಂಶಗಳನ್ನು ಪ್ರಕಟನಿಗೆ ಬಳಸಲಾಗುವುದು ಆದರೆ ಭಾಗವಹಿಸಿದವರ ಗುರುತನ್ನು ಗೌಪ್ಯವಾಗುತ್ತದೆ ಇಡಲಾಗುವದು.

ಸಮ್ಮತಿ ಪತ್ರ

ನಾನು ಮಾಹಿತಿಯನ್ನು ಓದಿದ್ದೇನೆ ಅಥವಾ ನನಗೆ ತಿಳಿದಿರುವ ಭಾಷೆಯಲ್ಲಿ ಓದಿ ನನಗೆ ತಿಳಿಸಲಾಗಿದೆ. ನನಗೆ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳುವ ಅವಕಾಶವನ್ನು ನೀಡಲಾಗಿದೆ. ನಾನು ಸ್ವ ಇಚ್ಛೆಯಿಂದ ನನ್ನ ಮಗುವಿನ ಭಾಗವಹಿಸುವಿಕೆಗೆ ಸಮತ್ತಿಸುತ್ತೇನೆ.

1) ಪಾಲಕರ ಹೆಸರು _____

ಪಾಲಕರ ಸಹಿ / ಹೆಬ್ಬರಳಿನ ಗುರುತು : _____

ದಿನಾಂಕ : _____ ಸ್ಥಳ _____

2) ಸಂಶೋಧಕರ ಸಹಿ (ಯಾರು ಸಮ್ಮತಿಯನ್ನು ಪಡೆಯುತ್ತಾರೆ)

ಹೆಸರು : _____

ದಿನಾಂಕ : _____ ಸ್ಥಳ _____

3) ಸಾಕ್ಷಿಯ ಸಹಿ : _____

ಹೆಸರು : _____

ದಿನಾಂಕ : _____ ಸ್ಥಳ _____

पाचवर्षा पेक्षा खालील मुलांची वाढ व सुधारणा ग्रामीण भागातून जाऊन विभागाचा अभ्यास

संशोधक स्कॉलर /प्राध्यापक :

सुपरवायझर / देखरेखकर्ता : प्रा. सुमित्रा एल.ए.

डॉ. ज्ञानेश्वर डी. के.

माहिती पत्र

इंटरॉडिक्शन / परिचय :

आम्ही तुम्हाला आपल्या पाचवर्षाखालील मुलाला या पाच वर्षाखालील मुलांची वाढ व सुधारणा ठरवणाऱ्या अभ्यासात भाग घेण्यास विनंती करतो. माननीय श्री. विरुपाक्षप्पा अ. सवदी पी.एचडी संशोधन स्कॉलर, के. एल.ई. विश्वविद्यालय, बेळगावी, पो. सुमित्रा एल.ए. उप- प्राध्यापिका व एच.ओ.डी चिल्ड्रन हेल्थ / तबीयत सेवा "काहेर" संस्था नर्सिंग सायन्स बेळगांवी डॉ. ज्ञानेश्वर डी. के. प्रोफेसर, बालरोग वैद्यकिय विभाग, जे.एन. मेडीकल कॉलेज, बेळगांवी, यांच्या गायडन्स (देखरेखीखाली) ग्रामीण भागातून जाऊन अभ्यास करत आहेत.

पध्दतीचे वर्णन :

या अभ्यासामध्ये तुमच्या मुलाला काही प्रश्नांची उत्तरे जी सायकोसोशियल डेवलपमेंट/ सामाजिक मानसिकता वाढविणे, स्क्रिनीग टेस्ट व त्याच्याशी सलंग्न सोशियो डेमॉग्राफीक व जीव शास्त्रीय गोष्टी जी वाढ व सुधारणा ठरविते. जी मैलाचा दगड (माईल स्टोन) प्राप्त करण्यासाठी मदत करते. ही सपूर्ण कार्यपध्दत्त 30-40 मिनीटात पूर्ण होते.

फायद्याची शक्यता :

ग्रामीण भागातील पाच वर्षाखालील मुलांना ज्यांच्यात वाढ थांबलेली आहे (डेवलपमेंटल अडजरमेंट) आहे त्यांच्यात सुधारीत मैलाचा दगड (डेवलपमेंटल माईल स्टोन) चे उपलब्धताचे मूल्यांकन करणे व किती मुलांची वाढ थांबली आहे याचे आकडेवारी ओळखणे. मुलांची वाढ व सुधारणाची एकमताने निर्णायक शोध करणे.

संभावीत धोके :

जी शस्त्रे अभ्यासासाठी वापरली जातील ती अगदी सुरक्षित असतील जी की तुमच्या मुलाला कोणत्याही प्रकारची इजा पोहचवणारी नसतील

गोपनियता :

तुमच्या मुलाची ओळखही गुप्त असेल व कोणालाही कळू दिली जाणार नाही. व सर्व जमा केलेली माहिती ही कोड मध्ये ठेवली जाईल. ज्याने करुन कोणालाही तुमची ओळख पटणार नाही.

मागे घेणे, काढून घेणे (विथड्रावल) :

यात भाग घेणे हे मर्जी प्रमाणे असेल. जर तुम्हाला तुमच्या मुलाला यात भाग घेण्याचे नरोल तर तुम्ही नाही म्हणू शकता. ज्याच्याने तुमच्या मुलाच्या शाळेवर कोणता परिणाम होणार नाही.

भाग घेण्याचा खर्च :

या अभ्यासाचा खर्च हा संशोधक करतील. यात भाग घेण्यास तुमच्या मुलाला जास्तींचा खर्च करावा लागणार नाही.

भाग घेण्यासाठी पैसे :

या अभ्यासात भाग घेण्यासाठी तुमच्या मुलाला कोणती आर्थिक मदत केली जाणार नाही.

ANNEXURE V

DESCRIPTION OF THE TOOL

SECTION I, A: **SOCIO-DEMOGRAPHIC PROFORMA OF PARENTS.**

Sectional Study N=885

Study title: Determinants of growth and development in under five rural children: a cross sectional study

Investigator: Mr. Virupakshappa. Savadi

(Note: all the personal information provided during the study will be keptconfidential)

1. IDENTIFICATION DATA

1. Code no:
2. Age of the mother:
3. Mother name
4. Father name
5. Gender of the child:

Sl. No	Parameters	Determinants
1)	Age of mother (in years)	a) Less than 21 b) b)21-25 c) 26-30 d) More than 30
2)	Religion	a) Hindu b) Muslim c) Christian d) Others, specify
3)	Dwelling	a) Katcha b) Pucca
4)	Mother's literacy	a) Illiterate b) Primary school c) Higher primary d) SSLC e) Graduate f) Post graduate
5)	Occupation	a) Housewife b) Daily wages c) Government employee d) Private sector employee
6)	Monthly income of the family	a) Less than Rs. 2,000 b) Rs. 2,001-4,000 c) Rs. 4,001-6,000 a) More than Rs. 6,000
7)	Type of family	a) Nuclear b) Joint c) Extended
8)	Who takes care of your children most during the day?	a) Self b) Father c) Grandparents d) Siblings e) Relatives f) Neighbors
9)	Type of diet	a) Vegetarian b) Non-vegetarian c) Mixed

Section I, B: **ASSESSMENT OF BIOLOGICAL.**

N=885

SL.NO.	Biological	DETERMINANTS
1)	Pattern of pregnancy	a) Repeat adolescent pregnancy b) Adolescent (first) and adult (current) pregnancy c) Repeat adult pregnancy
2)	Consanguinity	a) Yes b) No
3)	Mode of delivery	a) Normal vaginal delivery b) Caesarean: Indications
4)	Antenatal care and history of eventful pregnancy	a) Yes (minimum 3 visits) b) No
5)	Gestation at birth	a) Pre-term b) Term
6)	Multiple gestation	a) Yes b) No
7)	History of Birth asphyxia Neonatal jaundice Seizures	a) Yes b) No
8)	Breastfeeding	a) Appropriate b) Inappropriate
9)	Family size	a) 2-5 b) 6-9 c) ≥10

SECTION II,A: ANTHROPOMETRIC MEASUREMENTS

N=885

SL. NO	PARAMETERS	DETERMINANTS THRESHOLDS (%)				
		Very Low (a)	Low (b)	Medium (c)	High (d)	Very High(e)
1)	Weight					
2)	Height					

Section II, B:

Psychosocial developmental screening test developed by ICMR

N=885

SL. No.	Developmental areas	Mile stone achievement
I	**Gross motor**	
1)	Lifts head when on stomach	
2)	No head lag in sitting position	
3)	Sit's alone	
4)	Crawls	
5)	Stands alone	
6)	Stands on one foot with help	
7)	Hops on one foot	
8)	Walks backwards	
9)	Takes wooden block on head and walks 5 steps	
10)	Gets up from squatting position without help	
II	**vision and fine motor**	
11)	Regards objects	
12)	Sustained attention	
13)	Reaches for objects	
14)	Grasps objects	
15)	Picks up cube/pebble	
16)	Attempts imitation of scribble	
17)	Puts 3 or more cubes/pebbles into cup	
18)	Draws straight line in Imitation	
19)	Draws circle in imitation	
20)	Draws square in imitation	
21)	Draws diamond in imitation	
22)	Movement of thumb	
23)	Can close one eye lid	
24)	Threads one bead with nylon Wire	
25)	Makes ball from dough or Clay	
26)	Thumb and finger snap test	
III	**hearing, language and concept development**	**Mile stone achievement**
27)	Responds to sound	
28)	Manipulates bell	
29)	Rings bell	
30)	Repeats a number or word	
31	Says one word	

32	Identified one object	
33	Names one object	
34	Enjoys looking at pictures	
35	Points two parts of body	
36	Says two words together	
37	Names three objects	
38	Relates two objects	
39	Points to 4 parts of body	
40	Concept of big and little	
41	Concept of heavy and light	
42	Repeats 2 numbers	
43	Recognizes 3 colors	
44	Understands prepositions	
45	Completes sentence	
46	Understands money	
47	Signs 2 lines of song/folklore	
IV	**Personal skills**	
48)	Feeds self in any way	
49	Drinks from cup or glass	
50	Feeds self appropriately	
51	Bladder control during day	
52	Bladder control during night	
53	Bowel control during day	
54	Bowel control during night.	
55	Cleans teeth	
56	Washes hand	
57	Washes face	
58	Dresses self without help	
59	Visits key places in villages	
V	**Social skills**	
60	Smiles in response	
61	Vocalizes in response	
62	Awareness of strangers	
63	Can tell his/her name	
64	Can tell gender	
65	Plays with other children	
66	Rules of game understood	

ANNEXURE VI

CERTIFICATES

B.L.D.E. ASSOCIATION'S

SHRI B. M. PATIL INSTITUTE OF NURSING SCIENCES, VIJAYAPUR

In Association With

Rajiv Gandhi University of Health Sciences, Bengaluru

Organizes

NATIONAL CONFERENCE

CERTIFICATE OF PARTICIPATION

This is to certify that

VIRUPAKSHAPPA. A. SAVADI

Has participated as a Resource Person/Chairperson/Delegate/Organizer in the National Conference on "Evidence Based Practice in Pediatric and Neonatal Care: Challenges in Current Research, Opportunities, and the Role of Research Scholars"

Held on 23rd June 2023, Friday

KSNC Credit Points Awarded 08

Dr. Kavitha K
Organizing Secretary

Prof. Jayashree Itti
KSNC Observer

Dr. Shalmon S Chopade
Principal / Organizing Chairperson

GOVERNMENT COLLEGE OF NURSING, HUBBALLI

KARNATAKA INSTITUTE OF MEDICAL SCIENCES

Certificate

This to certify that VIRUPAKSHAPPA A SAVADI

has participated in Paper *presentation in National level workshop on*

"Current innovations in administration of Nursing services and education"

Organized by Government College of nursing KIMS, Hubballi on 30th September 2023.

"Determinants of Growth & development in under 5 Rural children A Cross Sectional Study."

Dr. Ramalingappa Antartani	Prof. Annapurna G.G	Prof. Jyoshnna. B
Director	Organizing chairperson	Organizing secretary

B.L.D.E. ASSOCIATION'S

SHRI B. M. PATIL INSTITUTE OF NURSING SCIENCES, VIJAYAPUR

In Association With

Rajiv Gandhi University of Health Sciences, Bengaluru

Organizes

NATIONAL CONFERENCE

CERTIFICATE OF APPRECIATION

This is to certify that

VIRUPAKSHAPPA . A . SAVADI.

Has presented Paper / Poster in the National Conference on

"Evidence Based Practice in Pediatric and Neonatal Care: Challenges in Current Research, Opportunities, and the Role of Research Scholars"

Held on 23rd June 2023, Friday

KSNC Credit Points Awarded 8

Dr. Kavitha R
Organizing Secretary

Prof. Jayashree Itti
KSNC Observer

Dr. Shalmon S Chopade
Principal / Organizing Chairperson

ANNEXURE VII

PUBLICATIONS

Journal of Data Acquisition and Processing
ISSN: 1004-9037
https://sjcjycl.cn/
DOI: 10.5281/zenodo.7778546

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

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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 was 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.[1] 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.[2]

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.[3] The early identification of growth or developmental failure facilitates the efficient management of a children's problem and it is crucial.[4]

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.[5-6]

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)
Religion	
Hindu	436(49.27)
Muslim	261(29.49)
Christian	188(21.24)
Total	885(100.00)
Dwelling	
Katcha	258(29.15)
Pucca	627(70.85)
Mother's literacy	
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)
Occupation	
Housewife	479(54.12)
Daily wages	157(17.74)

Government employee	139(15.71)
Private sector employee	110(12.43)
Monthly income	
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)
Type of family	
Nuclear	375(42.37)
Joint	266(30.06)
Extended	244(27.57)
Who takes care of child during day	
Self	380(42.94)
Father	89(10.06)
Grandparents	237(26.78)
Siblings	117(13.22)
Relatives	62(7.01)
Total	885(100.00)
Type of diet	
Vegetarian	202(22.82)
Non-vegetarian	326(36.84)
Mixed	357(40.34)
Status of growth and development	
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 foud 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
Age of the mother				
<21yrs	118(40.27)	142(23.99)	260(29.38)	**0.0001***
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)	
Religion				

Hindu	59(20.14)	377(63.68)	436(49.27)	
Muslim	158(53.92)	103(17.40)	261(29.49)	**0.0001***
Christian	76(25.94)	112(18.92)	188(21.24)	
Dwelling				
Katcha	111(37.88)	147(24.83)	258(29.15)	
Pucca	182(62.12)	445(75.17)	627(70.85)	**0.0001***
Mother's literacy				
Illiterate	7(2.39)	3(0.51)	10(1.13)	
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)	**0.0001***
Post graduate	16(5.46)	63(10.64)	79(8.93)	
Occupation				
Housewife	194(66.21)	285(48.14)	479(54.12)	
Daily wages	58(19.80)	99(16.72)	157(17.74)	
Government employee	23(7.85)	116(19.59)	139(15.71)	**0.0001***
Private sector employee	18(6.14)	92(15.54)	110(12.43)	
Monthly income				
Less than rs. 2,000	83(28.33)	105(17.74)	188(21.24)	
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)	**0.0001***
Type of family				
Nuclear	111(37.88)	264(44.59)	375(42.37)	
Joint	117(39.93)	149(25.17)	266(30.06)	**0.0001***
Extended	65(22.18)	179(30.24)	244(27.57)	
Who takes care of child during day				
Self	83(28.33)	297(50.17)	380(42.94)	
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)	**0.0001***
Relatives	18(6.14)	44(7.43)	62(7.01)	
Type of diet				
Vegetarian	126(43.00)	76(12.84)	202(22.82)	
Non-vegetarian	44(15.02)	282(47.64)	326(36.84)	
Mixed	123(41.98)	234(39.53)	357(40.34)	**0.0001***

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 etal who found the similar relationship.[7] 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.[8] 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.[9]

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 etal who found that parental education plays a crucial role in influencing the timely achievement of developmental milestones in children.[9] 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.[10]

More than half of the under developed babies were born from mothers who were housewives. This was supported by the study conducted by Torabi etal where they found that about 80% of the babies were born from housewives.[11] 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.[12] 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 etal[13] and Gunardi etal[14]. 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 etal 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.[15] 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 etal found that more than half of the study participants who were development delay hailed from nuclear families.[16] 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.

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"Biological Predictors Of Gross Motor Development In Under-Five Year Children In Rural Belagavi: A Cross Sectional Study"

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Abstract:

Background: *Optimal development of children in their early months and years has a bearing on their achievement levels later in life.* Growth is the most important biological process in the first two decades or so of a person's life, including the nine months of prenatal development. Growth is the enlargement of the entire body or of specific body parts. It is a fundamental characteristic of all living organisms. Continual interactions among genes, hormonal changes, nutrients, and other factors are largely responsible for the integrated nature of growth and maturation. Children aged one to five account for 16.5% of the total population, while their mortality rate records 40% of all deaths in the nation. The epidemiological transition from communicable to non-communicable diseases, or a combination of both, poses a substantial threat to the health of the entire population or large groups.
Objectives: *To assess the biological predictors of growth and development among under five children in rural belagavi*
Methodology: *A cross-sectional study was carried out in 855 under 5 children's in rural belagavi by using simple random sampling. Growth and Development was assessed using the Indian Council for Medical Research (ICMR) Development Screening Test.*
Results: Looking into Biological factors of mothers in which Pattern of delivery shows that Repeat adult pregnancy contributed about 51.53% where as Adolescent (first) and adult (current) pregnancy contributed about 23.95% response. Consanguinity wise distribution of respondents. Out of a total of 885, maximum of 457 (51.64%) have not have Consanguinity as compared to 457 (48.36%) have consanguinity. Mode of delivery wise distribution of respondents. Out of a total of 885, maximum of 599 (67.68%) mother got a children by normal vaginal delivery by as compared to 286 (32.32%) mother got a children by caesarean delivery. Antenatal Care wise distribution of respondents. Out of a total of 885, maximum of 568 (67.68%) mothers are taken antenatal care as compared to 317 (35.82%) mothers are not taken antenatal care. Gestational at birth wise distribution of respondents. Out of a total of 885, maximum of 511 (57.74%) mothers have pre term as gestational at birth as compared to 374 (42.26%) mothers have term as gestational at birth. Multiple Gestation wise distribution of respondents. Out of a total of 885, maximum of 546 (61.69%) mothers have multiple gestation as compared to 339 (38.31%) mothers have no multiple gestation. History of birth asphyxia wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have no history of birth asphyxia as compared to 371 (41.92%) mothers have history of birth asphyxia. Breastfeeding wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have appropriate breastfeeding practice as compared to 371 (41.92%) mothers have inappropriate breastfeeding practice. family size wise distribution of respondents. Out of a total of 885, maximum of 473 (53.45%) are living family with 6-9 membersas compared to 194 (21.92%) living family with 2-5 members followed by 218 (24.63%) living family with >=10 members.
Conclusion: Biological predictors of gross motor development have influence among under-five children's however normal vaginal delivery and breastfeeding have big impact for the complete growth and development among under five children. Additional research is required to understand complex interactions among these factors and their long-term effects on children's well-being.

Keywords: Biological predictors, gross motor development, breastfeeding, under-five children.

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INTRODUCTION:

Growth is the most important biological process in the first two decades or so of a person's life, including the nine months of prenatal development[1]. Growth is the enlargement of the entire body or of specific body parts. It is a fundamental characteristic of all living organisms. Continual interactions among genes, hormonal changes, nutrients, and other factors are largely responsible for the integrated nature of growth and maturation. Children aged one to five account for 16.5% of the total population, while their mortality rate records 40% of all deaths in the nation[2]. The epidemiological transition from communicable to non-communicable diseases, or a combination of both, poses a substantial threat to the health of the entire population or large groups.

Child development is the gradual emergence of traits and characteristics determined by biology as the child gains experience. In developing countries, more than 200 million children under five fail to reach their cognitive and social development potential due to poverty, poor health, malnutrition, and inadequate care[3]. The majority of these children reside in South Asia and Sub-Saharan Africa, and many are exposed to multiple developmental risks, such as poverty, malnutrition, poor health, and an unstimulating home environment. The health effects of poverty, malnutrition, and social factors hinder an individual's ability to reach their full developmental potential. Parental behaviour, nutritional deficiencies, chronic infections, exclusive breastfeeding, inadequate feeding practices, and a lack of stimulation are additional factors that impede development during pregnancy and after birth[4]. pregnancy and childbirth ensures both mother and child's health. In addition, it promotes, protects, and maintains the health of the mother during pregnancy, reduces maternal and child complications and morbidity, and raises awareness of personal hygiene, environmental sanitation, child care, and mothercraft education[6].

This study aims to identify the factors that influence growth and development by biological factors with BMI, height for age, weight for age, gross motor, fine motor skills, hearing language, and personal and social skills. Future detection and management planning will benefit from identifying the severity of problems and their associated factors.

Materials and methods

The research design: 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 underfive years children residing in the rural areas of Belagavi.

The sample selection criteria: 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 arelativeprecision (e)of20%ofp.The calculated minimumsamplesizeis885, but a larger sample may be included to improve precision.

Sampling Technique/Procedure: Stratified cluster sampling was used. The rural areas of Belagavi were 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 Permission: Ethical clearance was obtained before data collection.

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. Analysed data presented into table and graphs.

Results:

Table: 01Pattern of delivery wise distribution of respondents

Pattern of delivery	No of respondents	% of respondents
Repeat adolescent pregnancy	217	24.52
Adolescent (first) and adult (current) pregnancy	212	23.95
Repeat adult pregnancy	456	51.53
Total	885	100.00

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The above table represents the Pattern of delivery wise distribution of respondents. Out of a total of 885, maximum of 456 (51.53%) of mothers repeat adult pregnancy type of delivery and minimum of 212 (23.95%) of mothers have adolescent (first) and adult (current) pregnancy type of delivery followed by Repeat adolescent pregnancy type of delivery. The type of delivery wise distribution of respondents is also presented in the following figure.

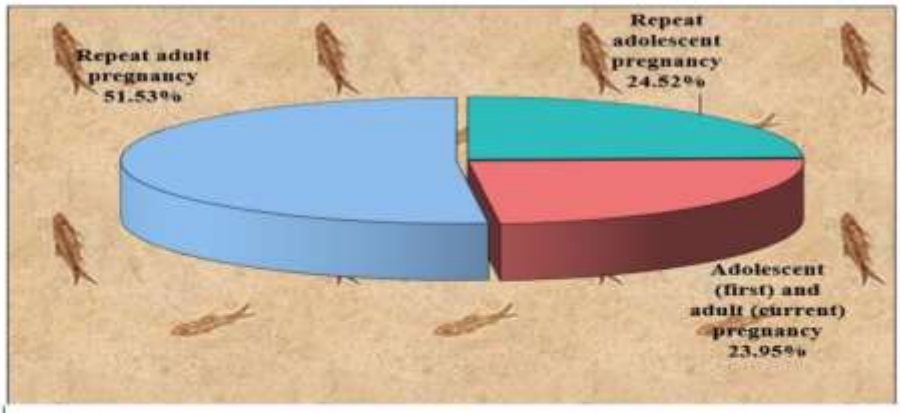

Figure: 1Pattern of delivery wise distribution of respondents

Table:2 Consanguinity wise distribution of respondents

Consanguinity	No of respondents	% of respondents
Yes	428	48.36
No	457	51.64
Total	885	100.00

The above table represents the Consanguinity wise distribution of respondents. Out of a total of 885, maximum of 457 (51.64%) have not have Consanguinity as compared to 457 (48.36%) have consanguinity. The Consanguinity wise distribution of respondents is also presented in the following figure.

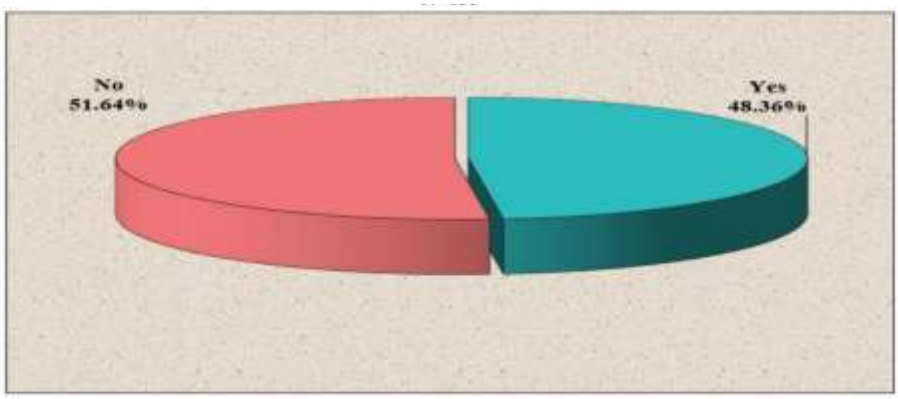

Figure:2 Consanguinity wise distribution of respondents

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Table:3 Mode of delivery wise distribution of respondents
N=855

Mode of delivery	No of respondents	% of respondents
Normal vaginal delivery	599	67.68
Caesarean	286	32.32
Total	885	100.00

The above table represents the Mode of delivery wise distribution of respondents. Out of a total of 885, maximum of 599 (67.68%) mother got a children by normal vaginal delivery by as compared to 286 (32.32%) mother got a children by caesarean delivery. The Mode of delivery wise distribution of respondents is also presented in the following figure.

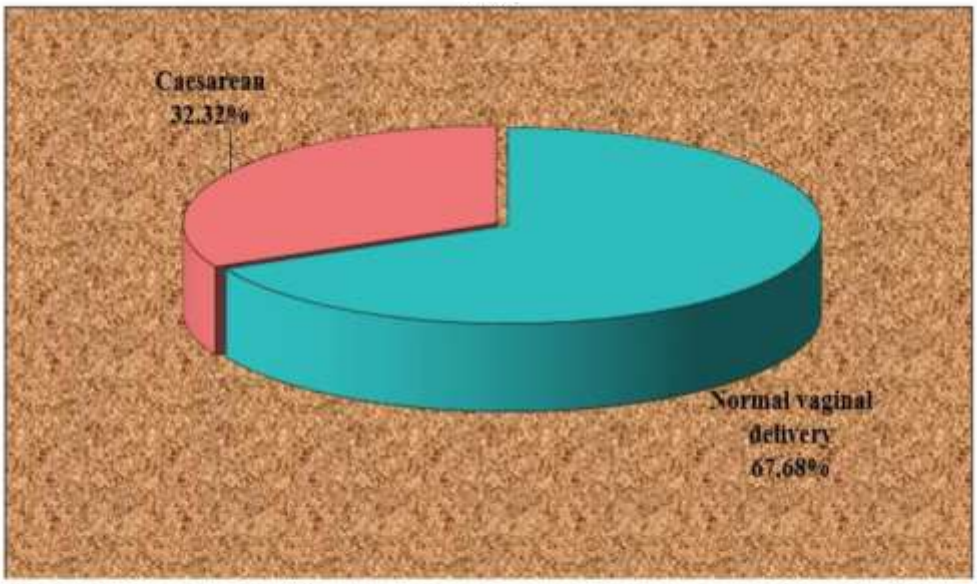

Figure:3 Mode of delivery wise distribution of respondents

Table: 4Antenatal care wise distribution of respondents

Antenatal care	No of respondents	% of respondents
Yes	568	64.18
No	317	35.82
Total	885	100.00

The above table represents the Antenatal Care wise distribution of respondents. Out of a total of 885, maximum of 568 (67.68%) mothers are taken antenatal care as compared to 317 (35.82%) mothers are not taken antenatal care. The Antenatal care wise distribution of respondents is also presented in the following figure.

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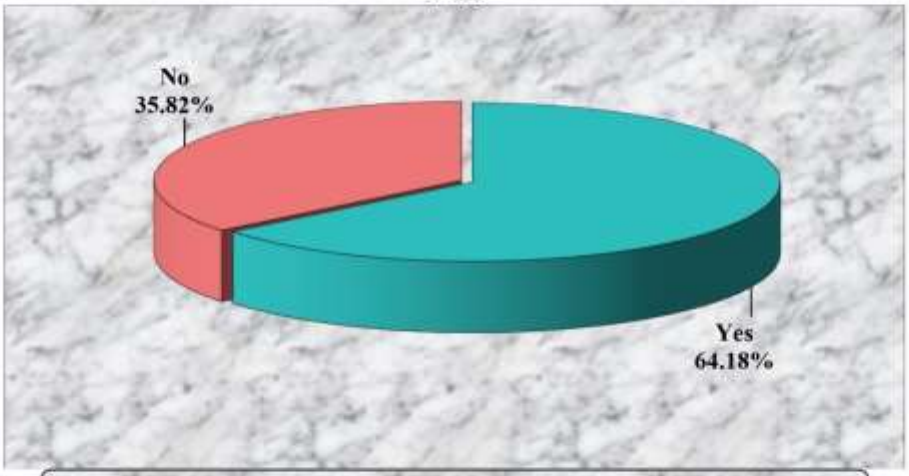

Figure:5 Antenatal care wise distribution of respondents

Table: 6 Gestational at birth wise distribution of respondents

Gestational at birth	No of respondents	% of respondents
Pre-term	511	57.74
Term	374	42.26
Total	885	100.00

The above table represents the Gestational at birth wise distribution of respondents. Out of a total of 885, maximum of 511 (57.74%) mothers have pre term as gestational at birth as compared to 374 (42.26%) mothers have term as gestational at birth. The Gestational at birth wise distribution of respondents is also presented in the following figure.

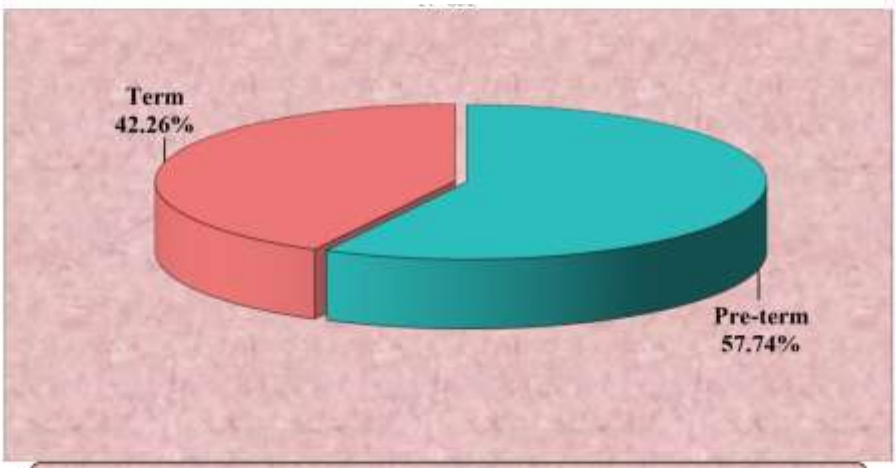

Figure: 6 Gestational at birth wise distribution of respondents

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Table: 7Multiple Gestation wise distribution of respondents

Multiple Gestation	No of respondents	% of respondents
Yes	546	61.69
No	339	38.31
Total	885	100.00

The above table represents the Multiple Gestation wise distribution of respondents. Out of a total of 885, maximum of 546 (61.69%) mothers have multiple gestation as compared to 339 (38.31%) mothers have no multiple gestation. The Multiple Gestation wise distribution of respondents is also presented in the following figure.

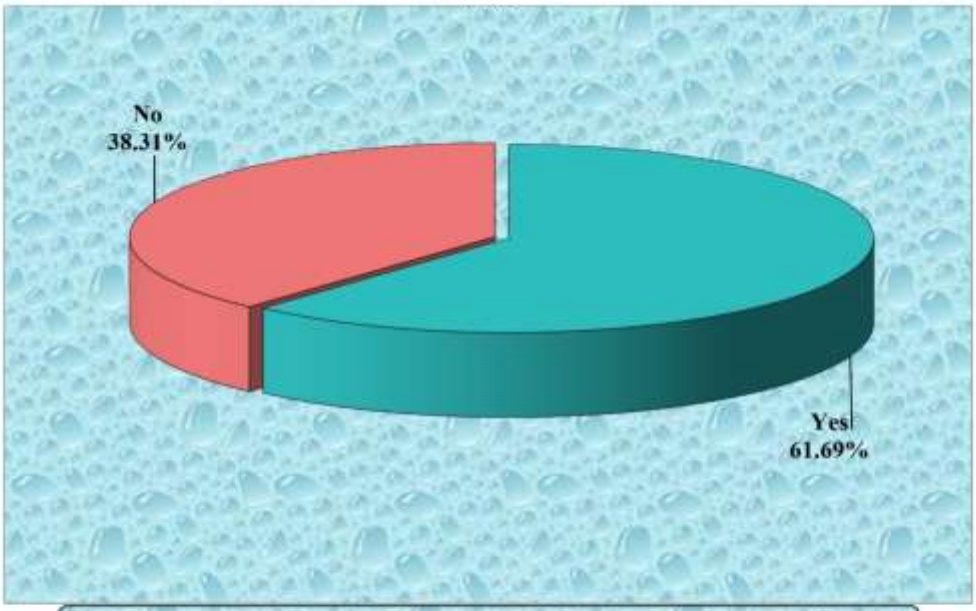

Figure:7 Multiple Gestation wise distribution of respondents

Table:8 History of birth asphyxia wise distribution of respondents

History of birth asphyxia	No of respondents	% of respondents
Yes	371	41.92
No	514	58.08
Total	885	100.00

The above table represents the History of birth asphyxia wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have no history of birth asphyxia as compared to 371 (41.92%) mothers have history of birth asphyxia. The History of birth asphyxia wise distribution of respondents is also presented in the following figure.

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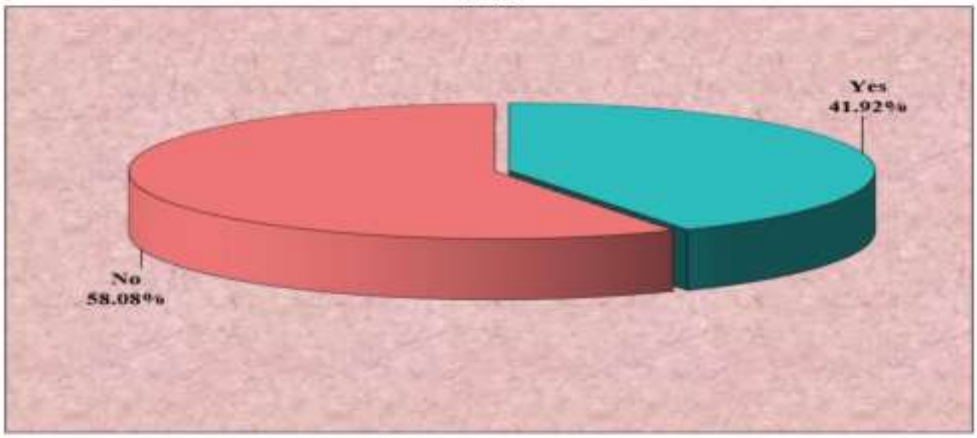

Figure: 8 History of birth asphyxia wise distribution of respondents

Table: 9 Breastfeeding wise distributions of respondents

Breastfeeding	No of respondents	% of respondents
Appropriate	536	60.56
Inappropriate	349	39.44
Total	885	100.00

The above table represents the Breastfeeding wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have appropriate breastfeeding practice as compared to 371 (41.92%) mothers have inappropriate breastfeeding practice. The His Breastfeeding wise distribution of respondents is also presented in the following figure.

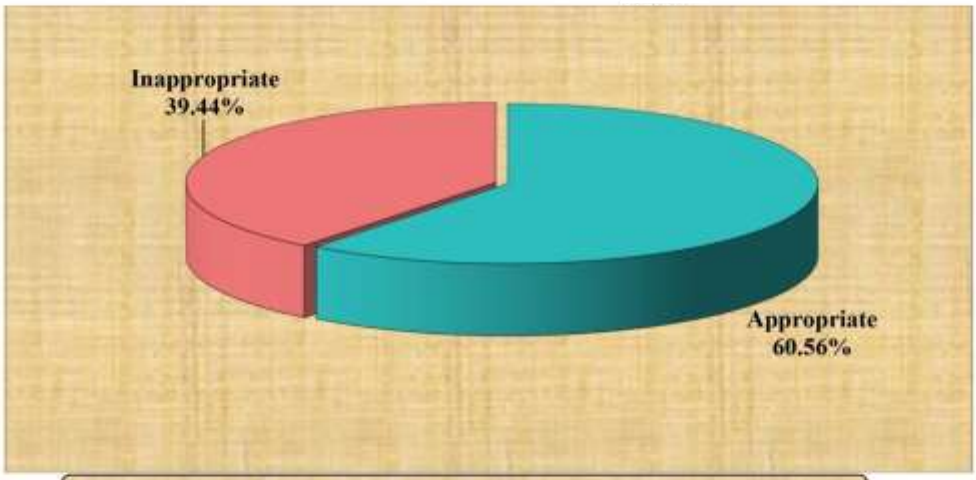

Figure:9 Breastfeeding wise distribution of respondents

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Table: 10Family size wise distribution of respondents

Family Size	No of respondents	% of respondents
1--5	194	21.92
6--9	473	53.45
>=10	218	24.63
Total	885	100.00

The above table represents the family size wise distribution of respondents. Out of a total of 885, maximum of 473 (53.45%) are living family with 6-9 membersas compared to 194 (21.92%) living family with 2-5 members followed by 218 (24.63%) living family with >=10 members. The His family size wise distribution of respondents is also presented in the following figure.

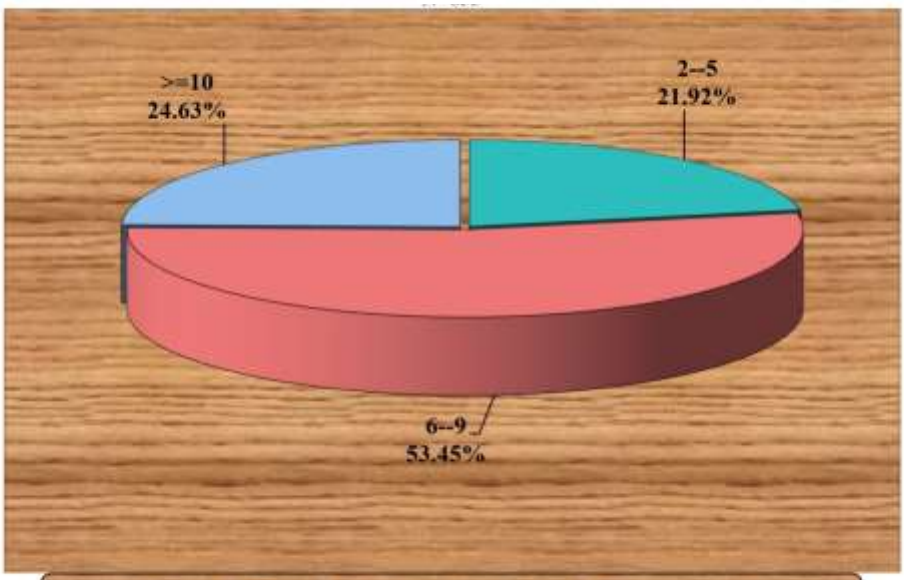

Figure: 10 Family size wise distribution of respondents

Discussion:

Looking into Biological factors of mothers in which Pattern of delivery shows that Repeat adult pregnancy contributed about 51.53% where as Adolescent (first) and adult (current) pregnancy contributed about 23.95% response. Consanguinity wise distribution of respondents. Out of a total of 885, maximum of 457 (51.64%) have not have Consanguinity as compared to 457 (48.36%) have consanguinity. Mode of delivery wise distribution of respondents. Out of a total of 885, maximum of 599 (67.68%) mother got a children by normal vaginal delivery by as compared to 286 (32.32%) mother got a children by caesarean delivery. Antenatal Care wise distribution of respondents. Out of a total of 885, maximum of 568 (67.68%) mothers are taken antenatal care as compared to 317 (35.82%) mothers are not taken antenatal care. Gestational at birth wise distribution of respondents. Out of a total of 885, maximum of 511 (57.74%) mothers have pre term as gestational at birth as compared to 374 (42.26%) mothers have term as gestational at birth. Multiple Gestation wise distribution of respondents. Out of a total of 885, maximum of 546 (61.69%) mothers have multiple gestation as compared to 339 (38.31%) mothers have no multiple gestation. History of birth asphyxia wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have no history of birth asphyxia as compared to 371 (41.92%) mothers have history of birth asphyxia. Breastfeeding wise distribution of respondents. Out of a total of 885, maximum of 514 (58.08%) mothers have appropriate breastfeeding practice as compared to 371 (41.92%) mothers have inappropriate breastfeeding practice. family size wise distribution of respondents. Out of a total

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Conclusion:

Biological predictors of gross motor development have influence among under-five children's however Normal vaginal delivery and breastfeeding have big impact for the complete growth and development among under five children. And rest of the factors need Additional research is required to understand complex interactions and its positive impact among under- five children's well-being.

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ANNEXURE VIII

DATA COLLECTION PHOTOS


GPS Map Camera

CALIBER CERTFICATE


Government of Karnataka
Department of Legal Metrology
LCR NO : AC21322
/ CERTIFICATE OF VERIFICATION
Date / Date : 23/10/2024
Place : (Trader Premises)
The Karnataka Legal Metrology (Enforcement) Rules,2021
Name of Legal Metrology Officer
S M BURANPUR
Identification No
KNT140
To M/s THE MEDICAL DIRECTOR KLES Dr,PRABHAKAR KORE HOSPITAL AND MRC BELGAUM, NEHRU NAGAR
BELAGAVI
I hereby certify that I have this day verified and stamped the under mentioned weights,measures,etc., belonging to
Quantity
Weights,Measures,Weighing and Measuring Instruments,Capacity,Class,Manufacturer,Type etc
Verification Fee Rs.
Carriage,Conveyance adjusting charges etc., in Rs.
2650
CPP
1325
Grand Total
3975.00
Used By THE MEDICAL DIRECTOR KLES Dr,PRABHAKAR KORE
Verification due on 22-10-2025
Rupees Three Thousand Nine Hundred and Seventy Five only
Assistant Controller of Legal Metrology-Grade-I
Belagavi Circle-I
Digitally signed By SHRI S M BURANPUR, Date: 23/10/2024


Government of Karnataka
Department of Legal Metrology
LCR NO : AC21322
/ CERTIFICATE OF VERIFICATION
Date / Date : 26/09/2024
Place : (Trader Premises)
The Karnataka Legal Metrology (Enforcement) Rules,2021
Name of Legal Metrology Officer
R I BISAGUPPI
Identification No
KNT011
To M/s THE MEDICAL DIRECTOR KLES Dr,PRABHAKAR KORE HOSPITAL AND MRC BELGAUM, NEHRU NAGAR
BELAGAVI
I hereby certify that I have this day verified and stamped the under mentioned weights,measures,etc., belonging to
Quantity
Weights,Measures,Weighing and Measuring Instruments,Capacity,Class,Manufacturer,Type etc
Verification Fee Rs.
Carriage,Conveyance adjusting charges etc., in Rs.
Grand Total
50000.00
Used By THE MEDICAL DIRECTOR KLES Dr,PRABHAKAR KORE
Verification due on 25-09-2025
Rupees Fifty Thousand Two Hundred only
Assistant Controller of Legal Metrology-Grade-I
Belagavi Circle-I
Digitally signed By RUDRAPPA BISAGUPPI, Date: 26/09/2024