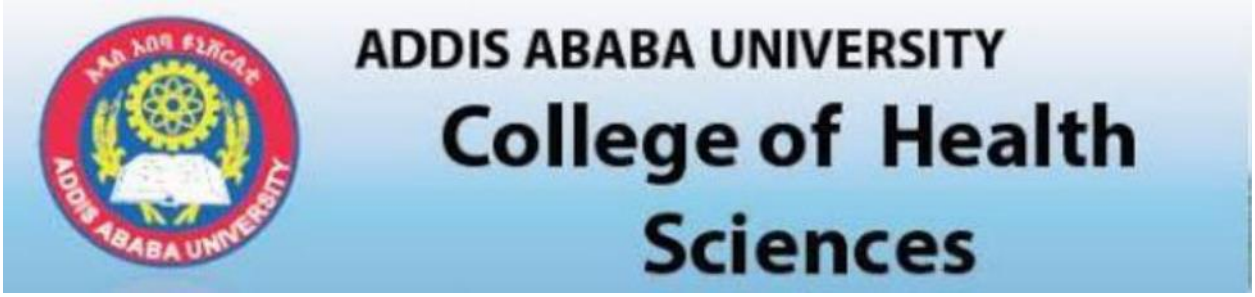

COLLEGE OF HEALTH SCIENCE
DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

Clinical profile and risk factors associated in global developmental delay children at Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia

Investigator: -**Suzy Kiden Sokiri (pediatrics and child health resident**

ADVISOR: Dr. Atsede Teklehaimanot (Assistant professor of pediatric and child health)

A Thesis submitted to Addis Ababa University, college of health sciences school of medicine department of pediatrics and child health as a partial fulfillment of the requirements for the specialty certificate in pediatrics and child health

February, 2025

ADDIS ABABA, ETHIOPIA

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DECLARATION

I, Suzy Kiden Sokiri declare that this thesis submitted in partial fulfilment for the requirement for and an award of specialty certificate in Pediatric and child health is my own work and any other works used have been duly referenced. I further declared that no part of this thesis has been previously been submitted by me for any degree in any institution of higher learning.

Name signature Date

Suzy Kiden Sokiri (Name of Resident)

This proposed work has been submitted with my approval as an adviser

Approved By:-
Dr. Atsede Teklehaimanot signature Date

AKNOWLEDGEMENT

First, I would like to give thanks to almighty GOD! Helping me all the way. Next Addis Ababa University College of Health Sciences, Department of pediatric and child health for providing significant chance to progress this research thesis. Especially my appreciation goes to my advisor DR. Atsede Teklehaimanot for positive guidance, constrictive comment, and continuous efforts for this proposal development. Finally, I thanks to the study participants and data collectors.

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ACRONYM

AOR -Adjusted odd ratio

GDD -global development delay

LMICs -low-and-middle income countries

NDD -Neurodevelopmental disabilities

SPSS - Statistical Package for Social Science

TASH - Tikur Anbessa Specialized Hospital

VLBW -Very low birth weight

WHO -World Health Organization

Abstract

Background: - The global development delay was used to measure the development status of under five children. The measurement was assessed and stat as when two or more domains had delayed. There is also controversy of symptom complex of GDD concerning to diagnosed under five children.

Objectives: - Assessment of the clinical profile and risk factors associated in GDD children among children aged 1 -5years in neurology and developmental clinic at Tikur Anbessa hospital specialized hospital, Addis Ababa, 2025.

Methods: - hospital-based, descriptive cross-sectional study was conducted which was conducted from November 1, 2024 - January 30, 2025 E.C. The data were collected using a standard questionnaire using a pretested structured interviewed questionnaire. The sample size is calculated using a single population formula, taking into consideration a 5% margin of error, 95% confidence level and 47% proportion used from a previous study calculated sample size, is 285. Then it was using computed bivariate and multivariable binary logistic regressions to assess factors associated with GDD. Descriptive results were presented by tables and graphs.

Results-: This study included 227 participants (79.6% response rate). Most were aged 25–48 months (58.1% male), 84.6% lived in urban areas, and 62% of mothers had primary education. Preterm birth occurred in 29.1%, 47% required resuscitation, and 58.1% were admitted to NICU. GDD was found in 76% of children, with 73.6% having communication delays and 79.4% problem-solving delays. Risk factors included age 25–48 months (AOR=2.6), female sex (AOR=1.9), and rural residency (AOR=2.8). C-section delivery reduced GDD risk by 66% (AOR=0.44).

Conclusion: - This study highlights a high prevalence of global developmental delay (GDD) among children at TASH, with communication and problem-solving delays being the most common. The findings emphasize the critical role of maternal health, neonatal complications,

and socio-environmental factors in child development. To mitigate the risk of developmental delays, early screening, improved maternal healthcare, and targeted interventions are essential, particularly in vulnerable populations.

Key words: - Pediatric patient, neurodevelopment clinic, risk factor

1. INTRODUCTION

1.1 Background

The process in which a child grows from the infant of helping by others to an independent of adult hood is called child development. Child who performs the age specific task was called normal development. There are different domains of development among those cognitive, gross and fine motor skills, speech and language, socio-emotional and behavioral were the main types of categories. From those a child having two or more delayed was called global developmental delay (1).

Global developmental delay (GDD) was used to assess te developmental status of under-five children.so the significant delay was assessed when the children had two or more domains of development (2-5).

GDD was assessed using two standard deviations or below the mean on age-related, activities in at least two or more developmental fields of gross/fine motor, cognition, social/personal and activities of daily living (6). The term "global developmental delay" was reserved the young children, specially for under five (7). The estimated prevalence of GGD affected children were 1% to 3% (8).

Childhood development is an issue in worldwide and the prenatal and postnatal periods are crucial (9). In the world 8.4% of the children has a developmental disorder and all this percentage were for under five children, from those 95% were in the development or low- and middle-income countries (10).

There are different factors which contributes for the development of GDD. Among those some of them having evidence were Trauma, chemical exposures, micronutrient deficiencies, infections, consanguinity, increased birth order to older women, and hereditary illnesses (11).

Study done in sub-Saharan countries revealed that the target area of developmental delay were cognition (50.5%), receptive language (55.6%), expressive language (55.4%), fine motor (23.2%), and gross motor (38.4%) which is a significantly high proportion. The finding also showed that 55.3% of the children has at list one targeted delay and 10.2% had all target of delayed (12).

1.2 Statement of the Problem

Developmental delays in children under five years old are a significant global health concern, affecting millions of children across various regions and socio-economic backgrounds. These delays can have long-lasting impacts on a child's cognitive, motor, language, and social-emotional development if not addressed early. According to the World Health Organization (WHO), approximately 5-15% of children worldwide experience developmental delays. These delays can be due to genetic factors, prenatal and perinatal complications, and environmental influences such as malnutrition and exposure to toxins (13).

The prevalence and patterns of developmental delays vary significantly across different regions. Low- and middle-income countries (LMICs) often report higher rates of developmental delays due to factors such as limited access to healthcare, poor nutrition, and higher exposure to infectious diseases (14). In high-income countries, while access to healthcare is better, disparities still exist based on socio-economic status and access to early intervention services (15).

The first five years of life are a critical period for brain development. Early identification and intervention can significantly improve developmental outcomes, making early detection crucial (Shonkoff & Phillips, 2000). Studies have shown that early intervention programs, including speech therapy, physical therapy, and educational support, can lead to significant improvements in developmental outcomes for children with delays (16).

Lack of awareness among parents and caregivers about the signs of developmental delays and the importance of early intervention can delay seeking help. Cultural beliefs and stigma associated with developmental delays also play a role in hindering timely intervention (17). Effective policy frameworks are essential to support early detection and intervention efforts. Policies should focus on improving access to screening and intervention services, particularly for vulnerable populations (18).

Comprehensive data on the prevalence and patterns of developmental delays in various regions is lacking, especially in LMICs. More research is needed to understand the scope of the problem and the factors contributing to it (19). Therefor the current study will assess the pattern of Pattern and risk factor associated in global development delay children at Tikur Anbessa Specialized Hospital Addis Ababa, Ethiopia.

1.3 Significance of the study

Studying patterns assessed the DD of children ang less than five years old is significant detection and made necessary action. Early detection of DD allows for timely intervention, which can significantly improve outcomes. Children who receive early support are more likely to alleviate the degree of the problem. Understanding specific patterns of DD helps in creating tailored intervention programs that address the its special need of the child.

The finding also important for research that can lead to the development of more effective screening tools and protocols, ensuring that delays are identified as early as possible. The findings can inform the training and education of healthcare providers, equipping them with the knowledge and skills needed to identify and address developmental delays. Data on developmental delays can inform policy decisions and resource allocation, ensuring that appropriate services and support systems are in place.

Research can highlight the need for increased funding and support for early childhood development programs and services. Studies can raise awareness among parents about the signs of developmental delays and the importance of early intervention. Increased awareness can lead to stronger community support systems and resources for families with children experiencing developmental delays. Early intervention can lead to better social and economic outcomes, reducing the long-term costs associated with developmental delays. Studying patterns of developmental delay contributes to the broader understanding of child development and the factors that influence it. Research can lead to the development of new and innovative solutions for preventing and addressing developmental delays.

2. Literature review

A study done in north India on associated factors of DD on children revealed that 16.2% had DDs 13.3%) GDD. From those cognitive delay accounts 20% followed by delay in speech and language area (9.6%), social delay (8.9%) and hearing and vision impairment (6.4%). Gestational age, complications during delivery, meconium aspiration, and child never breastfed were strong predictors for GDD(20).

A study done in King Fahad specialist hospital; Dammam (Saudi Arabia) revealed that 21% had development regression and 79% had development delay since birth. Overall severe development delay was 47%, moderate delay 18%, mild delay 16% and normal 6% in this group data. (21).

A study done in Sultan Qaboos University Hospital, Oman showed that 53.64% male and 46.4% were female with male: female ratio of 1.16:1. The most common etiology was perinatal asphyxia followed by metabolic disorders (11.4%). Neuronal migration disorder or cerebral dysgenesis was seen in 12 patients (10.5%). The other risk factors of GDD were neonatal sepsis, hyperbilirubinemia, hypoglycemia, seizures, prematurity and intrauterine growth retardation. Abnormal neurologic examination and microcephaly were the most common features (22).

The word "developmental milestones" is used to detect the developmental status of the children (24). The developmental process is influenced by the national institute of deafness and other communication disorders (25-26).

Delayed in global development is defined as slow to meet or not reaching the expected stage of development by more than one out of the five developmental domains (motor, cognition, communication, adaptive skills and social-emotional) (27, 28). The brain's vulnerability to insults is high in the early years after birth, leading to long-term functional and structural problems (29).

Globally, eight percent of children under the age of five have developmental disorders, with 95% of them living in low- and middle-income countries (LMICs). The highest prevalence of developmental delay is found in Sub-Saharan Africa, which accounts for 73% of the global cases of developmental delay (30, 31). A study by Ballot et al. (2012), which followed up on very low birth weight babies in South Africa, reported BSID-III average scores in each subscale that were relatively low, but within normal limits, according to a monitoring of babies with very low birth weight (VLBW) in South Africa. One-third of the patients were classified as being at high risk for developmental issues, scoring between 70 and 85 on the BSID-III. In this context, VLBW infants belong to a high-risk group with a high chance of developing learning challenges in school and need to be placed under surveillance. This study used a sample size of 106 patients. Children had an increased chance of scoring below normal on the BSID-III motor scale if they had a history of resuscitation at birth (32).

A study done in India found that the children exhibiting visual, hearing, or speech impairment were placed in the developmental delay category and it accounts 31.6%. The GDD prevalence was higher in babies with low birth weight <2500 g (but >2000 g), preterm <36 weeks gestation period and twins (33).

A study done in rural China found that children aged six to 35 months had 35.7% exhibited developmental delay and 6-11 months age group had 48% GDD (34).

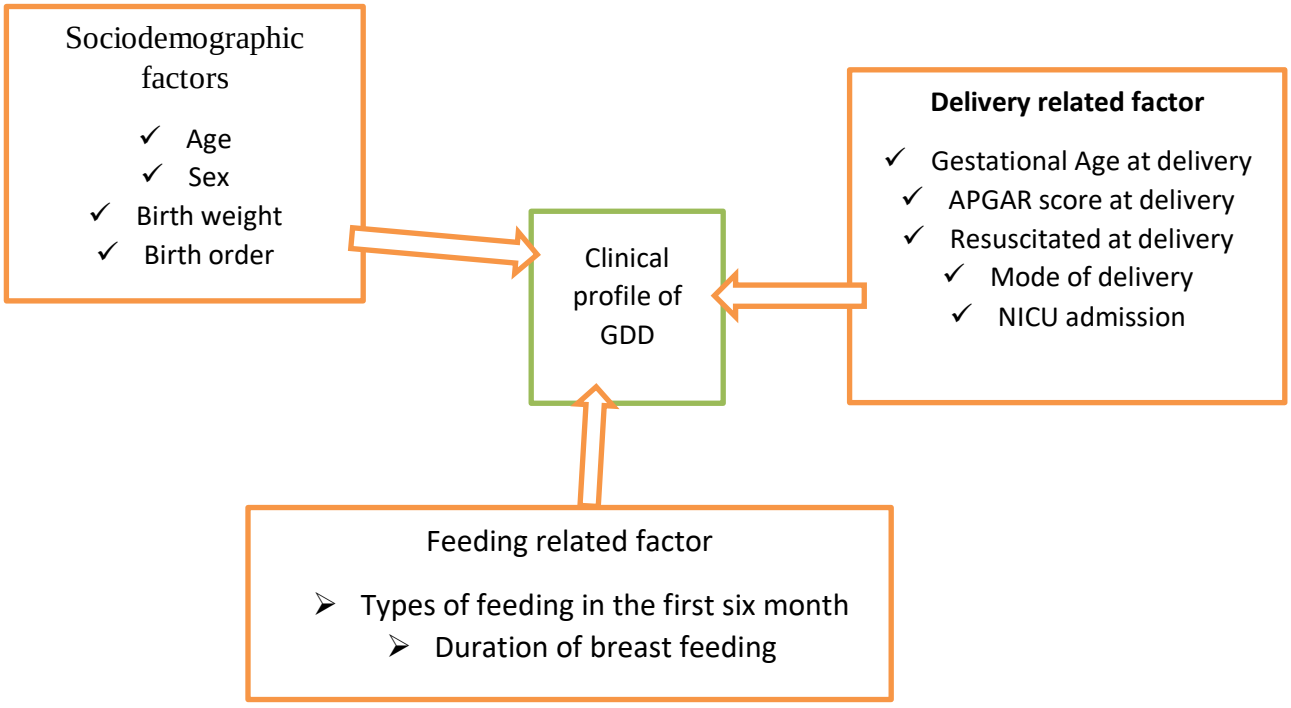
A study done in Tikur Anbessa specialized hospital revealed the major DD werecerebral palsy (24.6%), Global developmental delay/mental retardation (21.5%), idiopathic epilepsy (13.2%), and CNS infections (12.7%) (36)

A study done in Addis Ababa revealed that 50.6% of the participants were under the age of 5 years with a mean age of 5.6. sixty percent of them had bilateral spastic CP followed by unilateral spastic CP (21.8%), dyskinetic CP (10.4%) and ataxic CP (3.4%). Of the children

having DD, 95.4% had speech difficulty followed by learning disabilities (87.4%), epilepsy (60.9%), visual impairment (24.7%) and hearing impairment (8.6%) (37).

2.1 Conceptual framework

Clinical profile and risk factor associated with global developmental delay in children age 1-5 years at neurology and developmental clinic at TASH



3. Objectives of the study

3.1 General objective

Assessment of the clinical profile and risk factors associated in global developmental delay children at Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia, 2025

3.2 Specific objectives

To describe the clinical profile of global development delay among children at Tikur Anbessa Specialized hospital.

To identify the risk factor of global development delay among children in Tikur Anbessa specialized hospital.

4. Methods and Materials

4.1 Study Area and Period

This study was conducted in Addis Ababa University, College of Health Science, Tikur Anbessa Specialized Teaching Hospital, Department of Pediatrics and Child Health, located in Addis Ababa, the capital city of Ethiopia. It is the largest medical school in the country with undergraduate, postgraduate and some subspecialty trainings. It has around 600 beds and serves nearly 250,000 patients as outpatients annually. The pediatric inpatient beds account for 115 beds (excluding NICU) the pediatric Intensive care unit ward has 4-6 beds. This study was conducted in Tikur Anbessa specialized hospital neurology and developmental outpatient clinic.

There are an average 560 patients having neurology problem and developmental and behavioral clinic having 50 patients seen in a month.

4.2 Study Design

A hospital based cross-sectional study design was conducted on patients in neurology and developmental pediatrics clinic at Tikur Anbessa Specialized Hospital from November to January.

4.3 Population

4.3.1 Source Population

Source of populations was all children age between 1 year -5years who were at neurology and developmental clinic at Tikur Anbessa Hospital

4.3.2Study Population

All children who were on follow up at neurodevelopmental clinic at Tikur Anbessa Specialized Hospital during the study period.

4.4 Inclusion and Exclusion Criteria

4.4.1 Inclusion Criteria

- Children age between 1 -5 years both male and female who with diagnosis of global development delay.

4.4.2 Exclusion Criteria

- Children more than 5years
- Incomplete data
- Children having other comorbid disease like cardiac, cancer
- Children who have severe illness with acute infection

4.5Sample Size determination

The total sample was determined by using single population proportion formula by considering the following assumptions 95% confidence level, Margin of error = 5%,

Sample size was calculated using the following formula.

The prevalence of GDD were 21.5% taken from TASH (36).

$N=\frac{Z^2xP(1-P)}{}$ $\frac{1.96^2 x0.215x0.785=}{}$ 259

D^2 $(^{0.05})^2$

Then after adding 10% non-response rate the final simple size will be 285.

4.6 Study variables

4.6.1Dependent variables

Pattern and severity of GDD.

4.6.2 Independent Variables

Sociodemographic factor-Age, birth weight, sex, family income, family education

Other comorbid disease

Nutritional status

4.7 Sampling technique

All patients who visit the pediatric neurodevelopmental will be included in the study using convenience sapling method.

4.8 Methods of data collection and Tools

Structured and pre-tested Closs ended question were used. The questionnaire ASQ-3 was prepared in English and translated in Amharic language and back to English by a third person to check for consistency. The tool consists of demographic characteristics, labor and delivery related characteristics and GDD related characteristics by using ASQ-3 is developmental screening tools designed to assessed the developmental performance of children under 5years.

4.9 Data Quality control

Three data collectors received one day of training on the study's objectives and proper data handling procedures. The instrument was pretested on 5% of the respondents, who were not included in the actual study, to assess clarity, understandability, and acceptance. Based on the pretest results, unclear or confusing questions were revised accordingly. Data completeness and consistency were checked daily, and the collected data were cleaned and compiled by the investigator.

4.10 Data processing and Analysis

The principal investigator checked and cleaned the data daily during the collection period to ensure completeness and consistency. The data were then coded, entered, and analyzed using SPSS version 26.0, with analyses conducted at various levels as necessary and appropriate comparisons made. Descriptive statistics were used to summarize the frequency and percentage distributions of the study variables. Sociodemographic and other relevant variables were presented using tables, charts, and graphs. Binary logistic regression analysis was conducted to assess the association between each determinant factor and the dependent variable. Variables with a p-value less than 0.25 in the bivariate analysis were included in the multivariate model. Both bivariate and multivariate regression analyses were performed to identify significant factors. Odds ratios (OR) and adjusted odds ratios (AOR) with their 95% confidence intervals (CI) and p-values less than 0.05 were considered statistically significant.

4.11 Operational definition

Global developmental delay typically refers to a significant lag in achieving developmental milestones in two or more domains of development in children under the age of 5 years.

These children were developmentally assessed by using ASQ-3 developmental screening for 1-5 years.

4.12 Ethical Consideration

Approval was obtained from the department of pediatrics and child health, Addis Ababa University. Ethical clearance was obtained from Addis Ababa university collage of health science research directorate.

After thoroughly explaining the study's objectives, verbal consent was obtained from all participants. They were assured that their identities would remain anonymous, as no personal identifiers would be used. Following the acquisition of informed consent from each participant, the data collectors proceeded with the task, maintaining respect for the participants' norms and values while ensuring the confidentiality of the data.

4.13 Dissemination and Utilization of Result

The findings will be shared with pediatric and child health department, as well as other relevant organizations, through reports and publication in an appropriate journal. Efforts will also be made to present the results at scientific conferences, with publications being considered as well.

5. Result

5.1 Sociodemographic characteristics of the study participants

In this study 227 study participants were involved making a response rate of 79.6%. majority of the study participants were in the age group of 25-48months and 58.1% were male. Most of them (84.6%) were urban in residency and 42.7% were orthodox in religion. Sixty-two percent of the mother were primary education level and 58.1% of the father were an education level of secondary and above.

Table 1. The sociodemographic characteristics of children having follow up at neurodevelopmental clinic at Tikur Anbessa Specialized Hospital, 2024/5.

Variable	Frequency	Percent
Age in month		
12-24	72	31.7
25-48	87	38.3
40-60	68	30
Sex of the children		
Male	132	58.1
Female	95	41.9
Residency		
Urban	192	84.6
Rural	35	15.4
Religion		
Muslim	82	36.1
Orthodox	97	42.7
Protestant	48	21.1
Relationship to baby of filling the questionnaire		
Parent	215	94.7

Guardian	12	5.3
Mother's level of education		
she never went to school	15	6.6
Primary	140	61.7
secondary and above	72	31.7
Father's level of education		
she never went to school	6	2.6
Primary	89	39.2
secondary and above	132	58.1
Employed (Mother)		
Yes	78	34.4
No	149	65.6
Employed (Father)		
Yes	195	85.9
No	32	14.1

5.2 Obstetric related characteristics of the study participants

Eighty-three percent of the children's mother had ANC follow-up during their pregnancy age and 54.2% were delivered through spontaneously. Nineteen percent of the children were delivered at the age of preterm gestation and 20.3% had history of oligohydramnios. Nineteen percent of the children had IUGR and 29.1% were preterm birth. Forty-seven percent of the children were resuscitated during delivery and 58.1% were admitted in NICU.

Table 2. Obstetric related characteristics of the study participants

Variable	Frequency	Percent
Antenatal care		
Yes	189	83.3
No	38	16.7
Mode of delivery		
Spontaneously	122	54.2
Assisted	12	5.3
CS	92	40.5
Delivered with preterm		
Yes	42	18.5
No	185	81.5
History of oligohydramnios		
Yes	46	20.3

No	181	79.7
History of IUGR		
Yes	44	19.4
No	183	80.6
Birth weight in gram		
<2499	66	29.1
2500-3999	159	70
≥4000	2	0.9
Resuscitated during delivery		
Yes	106	46.7
No	121	53.3
NICU admission		
Yes	132	58.1
No	95	41.9
PNA diagnosed in NICU (n=132)		
Yes	58	
No	74	

5.3 Feeding status and family history related characteristics of the study participants

Forty-six percent of the children had EBF and 62.6% had normal nutritional status. Thirty-nine percent of the children were 2nd order of pregnancy and 5.7% of the children had a family history of developmental delay. Thirteen percent of the children had history of infection

Table 3. Feeding status and family history related characteristics of the study participants

Variable	Frequency	Percent
EBF		
Yes	104	45.8
No	123	54.2
Nutritional status		
Normal	142	62.6
Underweight	83	36.6
Overweight	2	0.9
Order of the child		
1st	51	22.5
2nd	89	39.2

3rd and above	87	38.3
Family history of DD		
Yes	13	5.7
No	214	94.3
History of infection		
Yes	30	13.2
No	197	86.8

5.4 The global development delay

Variable	Score below cutoff point regarding to age	Score above cutoff point regarding to age
Communication score	167(73.6%)	60(26.4)
Gross motor total score	138(60.8%)	89(39.2%)
Fine motor total score	158(69.6%)	69(30.4%)
Problem solving total score	187(79.4%)	40(20.6%)
Personal social total score	142(62.6%)	85(37.4%)

5.5 clinical profile of global development delay

The figure below showed that, 73.6% of the participants had delay in communication and 79.4% had delay in problem solving as shown in the figure below.

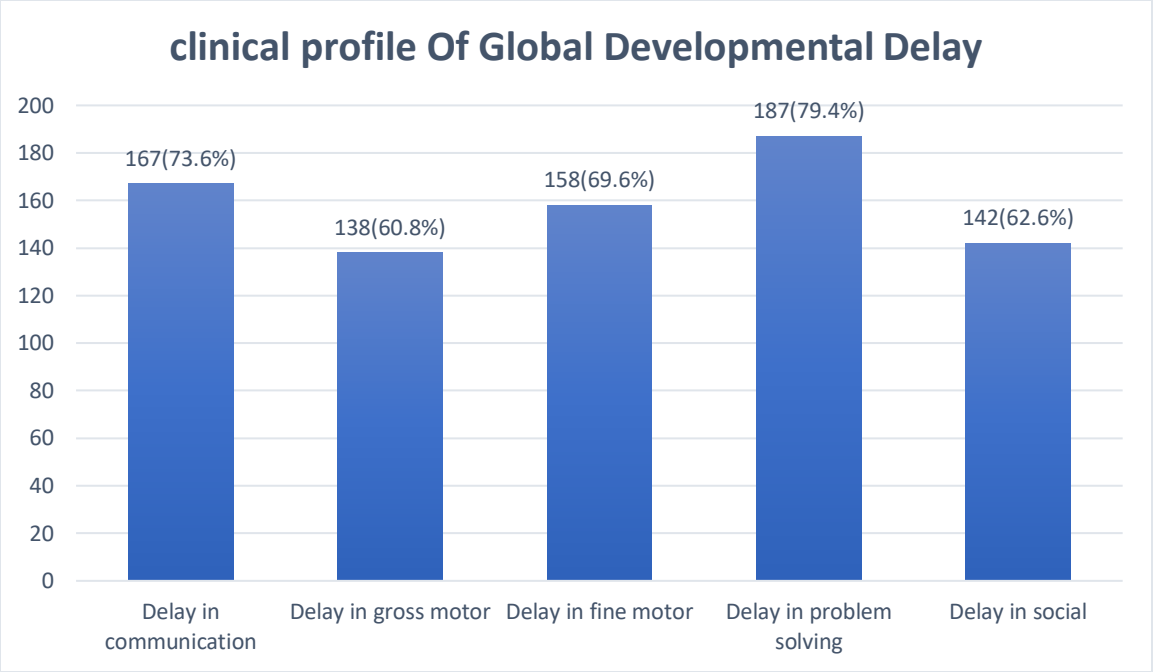


Figure 1. clinical profile of global development delay

5.6 Over all global developmental delay

The overall delay was measured using a child having at list two delay of the five GDD measurement. Accordingly, 76% of the children had a global developmental delay as shown in the figure below.

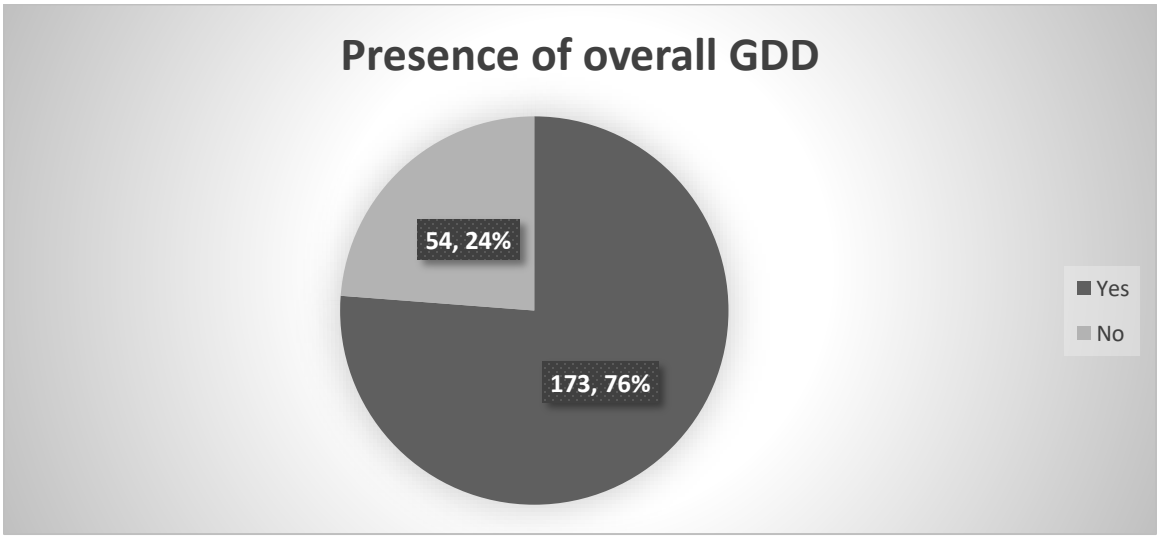


Figure 2. The Overall global developmental delay

5.7 The risk factors of global developmental delay

The age of the children and mode of delivery were associated with GDD, as determined by bivariate logistic regression. Multivariate logistic regression revealed that the odds of GDD were

2.6 times higher in children aged 25-48 months compared to those aged >48-60 months (AOR=2.6, 95% CI=1.93, 5.54). Additionally, the odds of GDD were 1.9 times higher in females compared to males (AOR=1.9, 95% CI=1.93, 4.19).The odds of rural in residency were 2.8 times increase its risk of GDD compared to those of urban in residency (AOR=2.8, 95%CI=1.78, 10.05) and the odds of caesarean delivery were 66% less likely of GDD risk compared to delivered by spontaneous (AOR=0.44, 95%CI=0.21, 0.92)

Table 4.The bivariate and multivariate association between development delay and independent variables among children having follow up at neurodevelopmental clinic at Tikur Anbessa Specialized Hospital, 2024/5.

Variable	GDD		P-value	COR with 95%CI	P-value	AOR with 95%CI
	Yes	No				
Age of the children						
12-24	59	13	0.116	1.9(0.85, 4.19)	0.173	1.8(0.77, 4.19)
25-48	78	11	0.011	2.9(1.27, 6.53)	0.043	2.6(1.93, 5.54)
>48	48	20	1		1	
Sex of the children						
Male	101	31	1		1	
Female	82	13	0.068	1.9(0.95, 3.94)	0.045	1.9(1.93, 4.19)
Residency						
Urban	151	41	1		1	
Rural	32	3	0.091	2.9(0.84, 9.94)	0.016	2.8(1.78, 10.05)
Employed of mothers						
Yes	66	12	0.272	1.5(0.73, 3.12)	0.397	1.4(0.63, 3.19)
No	117	32	1		1	
Mode delivery						
Spontaneous	104	19	1		1	
Assisted	12	0	0.999		0.999	
CS	67	25	0.037	0.49(0.25, 0.96)	0.028	0.44(0.21, 0.92)
History of IUGR						
Yes	38	6	0.207	1.7(0.65, 4.22)	0.126	2.2(0.80, 6.01)
No	145	38	1		1	
Family history of developmental delay						
Yes	12	1	0.205	3.1(0.38, 23.85)	0.169	4.5(0.83, 37.93)
No	171	43	1		1	
History of infection during pregnancy						
Yes	27	3	0.174	2.4(0.68, 8.19)	0.176	2.4(0.67, 8.80)
No	156	41	1		1	

6.Discussion

We aimed to investigate the patterns and risk factors associated in global developmental delay children at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia.

In this study the overall global developmental delay of children having 1-5 years using ASQ-3th CD-ROM measurement 76% were scored below the cutoff point regarding to their age. This finding was higher than the study done in India (20), but the finding was comparable with the study in sub–Saharan Africa (30). This was may be due to poor maternal nutrition, infections during pregnancy, or chronic conditions like diabetes or hypertension can affect fetal development. On the other had serious illnesses or infections during infancy or early childhood (such as meningitis or encephalitis) can lead to developmental delays. Insufficient nutrition in early life, particularly in low-income areas, can have long-lasting effects on cognitive, physical, and emotional development. These insights highlight the significant burden of global developmental delay in the study population, emphasizing the need for early screening and targeted interventions to address maternal health, childhood infections, and nutritional deficiencies as key contributing factors.

The study also found that 73.6% of the children experienced delays in communication, which was higher than the findings of a study conducted in India (20). This could be attributed to disorders that affect brain development, such as cerebral palsy, hearing loss, or brain injuries, which can severely impact the development of communication skills. Damage to specific brain areas responsible for speech production or comprehension may lead to these delays.

On the other hand, the finding also revealed that 60.8% had gross motor delayed. This finding was higher than the study done India (20) and Addis Ababa, Ethiopia (37). This was may be due to Complications such as birth asphyxia (lack of oxygen during birth), low birth weight, or injury during delivery can affect the development of gross motor skills. These factors may damage the brain or other parts of the nervous system responsible for controlling movement. Maternal infections, poor nutrition, or health issues during pregnancy can also contribute to delays in motor skill development. Conditions such as gestational diabetes, pre-eclampsia, or maternal infections can lead to neurological or physical developmental challenges in the child.

the odds of female sex were 1.9 times increase its risk of GDD compared to those of male (AOR=1.9, 95%CI=1.93, 4.19). This finding was congruent with the study done in India (20). This was may be due to mutation or defect on both X chromosomes (in females) can result in more severe developmental delays. Conditions like fragile X syndrome, turner syndrome, and X-linked intellectual disabilities can cause developmental delays, and females are more likely to be affected by these disorders because of the involvement of the X chromosome.

The odds of rural in residency were 2.8 times increase its risk of GDD compared to those of urban in residency (AOR=2.8, 95%CI=1.78, 10.05). The finding was supported by the study done by A study by Ballot et al (32). This was may be due to families in rural areas may have to travel long distances to reach hospitals or specialized healthcare facilities, making regular check-ups, screenings, and access to therapy services more difficult. This can result in delayed identification of developmental issues and a lack of timely intervention. In the case of birth complications or emergencies, the response times in rural areas may be longer, which can affect the outcomes of the birth and a child's early health, increasing the risk for developmental delays.

the odds of caesarean delivery were 66% less likely of GDD risk compared to delivered by spontaneous (AOR=0.44, 95%CI=0.21, 0.92). the finding was supported by the study done in India (20). This was may be due to as the fact that spontaneous delivery (a natural, unassisted vaginal birth) is typically considered the safest mode of childbirth in uncomplicated pregnancies. However, even in spontaneous delivery, certain complications can arise that may increase the risk of developmental delays in children.

7. Conclusion

The finding of the study revealed that a high proportion of children had GDD. Among those delay majority of them had communication delay followed by problem solving delay. The major pattern of GDD were delay in problem solving followed by communication. The risk factor for the GDD were children age 25-48 months compared to those of age 60months (AOR=2.6, 95%CI=1.93, 5.54), female sex (AOR=1.9, 95%CI=1.93, 4.19), rural in residency (AOR=2.8, 95%CI=1.78, 10.05) and caesarean delivery compared to delivered by spontaneous (AOR=0.44,

95%CI=0.21, 0.92), furthermore this study highlights a high prevalence of global developmental delay among children at Tikur Anbessa Specialized Hospital, emphasizing the significant impact of maternal health, neonatal complications, and socio-environmental factors on child development, underscoring the urgent need for early screening and targeted interventions.

8. Recommendation

To mitigate the risk of developmental delays in children, it is essential to adopt strategies and recommendations that focus on both early childhood development and the specific factors influencing these delays.

- ✓ Regular developmental screenings during routine pediatric visits can help detect delays early.
- ✓ Educate expectant mothers in rural communities about the importance of prenatal care, postnatal check-ups, and developmental milestones.
- ✓ Set up mobile health clinics to reach remote areas, offering regular developmental screenings and health check-ups for children.
- ✓ Implement programs that address the socioeconomic challenges faced by families in rural areas, which often disproportionately affect girls. This includes providing resources for nutrition, education, and healthcare access.
- ✓ For children showing language delays or communication challenges, specialized speech-language therapy should be made available as soon as delays are identified, even if the delay is mild.

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Annex I: **Participant Information Sheet**

Questionnaire Code Number: _____

My name is _____. I am working as data collector in the research Conducted by Dr Suzy Kiden Sokiri, who is conducting this research for the partial fulfillment of her specialty in pediatrics and child health in AAU. We are trying to assess the pattern, risk factors associated with global developmental delay in neurodevelopmental delay clinic at TASH. You will participate if you give me consent after you have understood the following information sheet:

Purpose: The purpose of this study is to assess the pattern, risk factors associated with global developmental delay in

Procedure: To assess pattern, risk factors associated with global developmental delay in TASH. If you are willing to participate in this project, you need to understand and say "yes" on the agreement form.

Risk/ Discomfort: By participating in this research project, there are no payment and risk or discomfort you should fear as a result of participating in this study except, you may feel that it has some discomfort especially on spending time about 30 minutes. We hope you will participate in the study for the sake of the Benefit of the research result. I am sure there is no risk in participating in this research project.

Benefits: There may not be direct benefit to you but your Participation is likely to help us in assessment of predictors and outcome of time to presentation among children admitted to pediatric intensive care unit at TASH.

Confidentiality: The information collect from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it. In addition, it will not be revealed to anyone except the principal investigator and will be kept locked with key.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response.

If you have questions: If you have additional questions regarding this study, you can contact the principal investigator

Address of the principal investigator

NAME: Dr Suzy Kiden Sokiri

PHONE: +251907235687

Emil: sukisoki89@ gmail .com

Annex II: CONSENT FORM

I understand all conditions stated above. I have understood that Participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way Therefore, I am Ready and willing to participate in this study. You decided:

1. Agree to participate [ ] _____signature, continue

2. Not agree to participate (stop here); thank you very much!

If the study subject agrees to participate in the study, start the interview.

NB: No need of enforcing the respondent to be included in the study

Data collectors name _____ Signature _____Date __/__/____

Annex III: QUESTIONNAIRE

Annex III: Key Informant Questionnaire Guide

What is the impact of time to presentation on mortality among children admitted to PICU, TASH ?

……
……
……
……

Patterns and risk factors associated in global development delay children at Tikur Abnessa Specialized Hospital , Addis Ababa , Ethiopia

MRN…….

Part I. Socio-demographic data

1. Age child in month_____
2. Sex of the child
    A. Female
    B. Male

3. Residence
    a. Rural
    b. Urban
4. Religion
    a. Orthodox
    b. Protistan
    c. Muslim
5. Mother Age in years _____
6. Level of education(mother)
    A. She never went to school
    B. Primary Level
    C. Secondary and above
7. Level of education (Father)
    a. She never went to school
    b. Primary Level
    c. Secondary and above
    d. Collage and above
8. Employed(mother)
    a. Yes
    b. No
9. Employed (Father)
    c. Yes
    d. No

Part II. Pregnancy and labour and delivery history

1. Antenatal Care
    a. Yes
    b. No
2. Mode of delivery
        a. Spontaneous
        b. Assisted
        c. C/S
3. History of preterm
    a. Yes
    b. No
4. If yes GA at delivery
5. History of oligohydramnios

A. Yes

B. No

6. history of IUGR
        A. Yes
        B. No
7. Weight during delivery in gram_____
8. Resuscitated during delivery
        A. Yes
        B. No
9. NICU admitted

A. Yes

B. No

10. Diagnosis of PNA in NICU

A. Yes

B. No

11. Exclusive Breastfeeding for 6 months

A. Yes

B. No

12. Nutritional Status

a. Under weight

b. Normal

c. Over Weight

13. Order of the child

a. 1st

b. Second

c. Third and more

14. Family history of developmental delay

a. Yes

b. No

15. History of infections during pregnancy

a. Yes

b. No

Part III. Physical Examination

1. Developmental screening (ASQ)

    A. Mild

    b. Moderate

    C. Sever

ASQ-3 — 12 Month ASQ-3 Information Summary

11 months 0 days through 12 months 30 days

Baby's name: _____ Date ASQ completed: _____

Baby's ID #: _____ Date of birth: _____

Administering program/provider: _____ Was age adjusted for prematurity when selecting questionnaire? ◯ Yes ◯ No

1. SCORE AND TRANSFER TOTALS TO CHART BELOW: See *ASQ-3 User's Guide* for details, including how to adjust scores if item responses are missing. Score each item (YES = 10, SOMETIMES = 5, NOT YET = 0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	15.64		●	●	●	●	○	○	○	○	○	○	○	○	○
Gross Motor	21.49		●	●	●	●	●	○	○	○	○	○	○	○	○
Fine Motor	34.50		●	●	●	●	●	●	●	○	○	○	○	○	○
Problem Solving	27.32		●	●	●	●	●	●	○	○	○	○	○	○	○
Personal-Social	21.73		●	●	●	●	●	○	○	○	○	○	○	○	○

2. TRANSFER OVERALL RESPONSES: Bolded uppercase responses require follow-up. See *ASQ-3 User's Guide*, Chapter 6.

1. Uses both hands and both legs equally well? Yes **NO**
   Comments:
2. Plays with sounds or seems to make words? Yes **NO**
   Comments:
3. Feet are flat on the surface most of the time? Yes **NO**
   Comments:
4. Concerns about not making sounds? **YES** No
   Comments:
5. Family history of hearing impairment? **YES** No
   Comments:
6. Concerns about vision? **YES** No
   Comments:
7. Any medical problems? **YES** No
   Comments:
8. Concerns about behavior? **YES** No
   Comments:
9. Other concerns? **YES** No
   Comments:

3. ASQ SCORE INTERPRETATION AND RECOMMENDATION FOR FOLLOW-UP: You must consider total area scores, overall responses, and other considerations, such as opportunities to practice skills, to determine appropriate follow-up.

If the baby's total score is in the ▭ area, it is above the cutoff, and the baby's development appears to be on schedule.
If the baby's total score is in the ▭ area, it is close to the cutoff. Provide learning activities and monitor.
If the baby's total score is in the ■ area, it is below the cutoff. Further assessment with a professional may be needed.

4. FOLLOW-UP ACTION TAKEN: Check all that apply.

_____ Provide activities and rescreen in _____ months.

_____ Share results with primary health care provider.

_____ Refer for (circle all that apply) hearing, vision, and/or behavioral screening.

_____ Refer to primary health care provider or other community agency (specify reason): _____.

_____ Refer to early intervention/early childhood special education.

_____ No further action taken at this time

_____ Other (specify): _____

5. OPTIONAL: Transfer item responses (Y = YES, S = SOMETIMES, N = NOT YET, X = response missing).

	1	2	3	4	5	6
Communication						
Gross Motor						
Fine Motor						
Problem Solving						
Personal-Social						

P101120700

Budget: Cost breakdown of the research project

Title	Qualification	Number	Salary	Duration in months	Total
Data collector's salary	Nurse	2	7250	½	14500
Typist salary	Secretary	1	6000	1	6000
Duplicator salary	Duplicator	1	2000	1	2000
Multi-purpose Printing Paper	Ream	1	2000	1	2000
Telephone	Above	-	600	-	600
TOTAL					**25,100 BTB**

Assurance of Principle Investigator

The author took responsibility for the research project's scientific and ethical conduct, provided timely progress reports, sought approval, and effectively communicated with all stakeholders, including funding sources related to the subject matter or materials discussed in this manuscript.

Name of the Resident: Dr. Suzy Kiden Sokiri

Signature: _____

Date: _____

Approval of Advisors

Name of the Primary Clinical Advisor: Dr. Atsede Teklehaimanot

Signature: _____

Date: _____