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**Screening for developmental delay in children aged 9 and 16 months, Kigali-Rwanda:  
using Ages and Stages questionnaire 3.**

Victoire TUYISENGE, MD

College of medicine and health sciences

School of Medicine

Master of Paediatrics and child health

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RWANDA

SCREENING FOR DEVELOPMENTAL DELAY IN CHILDREN  
AGED 9 AND 16 MONTHS, KIGALI-RWANDA: USING AGES  
AND STAGES QUESTIONNAIRE VERSION 3

By

Victoire TUYISENGE, MD.

Student Registration number: 10107334

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In the College of Medicine and Health Sciences

**Supervisor:** Dr Febronie MUSHIMIYIMANA.

**Co Supervisors:** Dr Aimable KANYAMUHUNGA

Dr Jean Paul RUKABYA RWEMA

Prof CLIFF O'CALLAHAN

Dr Archana A. Patel, MD, MPH

April-2020

## DECLARATION

The researcher:

I declare that this dissertation contains my own work except those I have recognized especially my supervisors.

Date: April 25, 2020

Signature.....

Dr Victoire TUYISENGE.

The supervisor:

I hereby declare that this dissertation **“Screening for developmental delay in children aged 9 and 16 months,Kigali-Rwanda: using Ages and Stages questionnaire 3”**was submitted by Dr Victoire TUYISENGE.

Date: April 25,2020

Signature.....

Dr Febronie MUSHIMIYIMANA

**Authours contribution:**

Dr Victoire Tuyisenge<sup>1,2</sup>

Dr Febronie Mushimiyimana<sup>2</sup>

Dr Aimable Kanyamuhunga<sup>1,2</sup>

Dr Jean Paul Rukabyarwema<sup>3</sup>

Dr Archana A. Patel<sup>4</sup>

Dr Cliff O'Callahan<sup>5</sup>

**Affiliations**

<sup>1</sup> University of Rwanda, College of Medicine and Health sciences

<sup>2</sup> University Teaching Hospital of Kigali, Pediatrics and Child Health Department

<sup>3</sup> Muhima District Hospital, Rwanda

<sup>4</sup> Children's Hospital Boston, USA

<sup>5</sup> Middlesex Health/University of Connecticut, USA.

Short running title: Developmental delay in urban Rwandan children

**Corresponding author:** Victoire TUYISENGE

**Contact of the Corresponding Author:** University of Rwanda, College of Medicine and Health Sciences.

Telephone number: +250788743507, Email [tuyisengevictoria@gmail.com](mailto:tuyisengevictoria@gmail.com) , Kigali, Rwanda.

## **DEDICATION**

To the almighty God for his endless and unconditionally love for me,

To my whole family for moral support.

To all infants in this research, who still have a long way to go ,but who gave me the opportunity to be a small part of their incredible journey.

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## **ABSTRACT**

**Background:** Early screening of developmental delay (DD) is very important in early identification of developmental disabilities, allowing for early treatment and intervention with best long-term outcomes and child survival rate. With limited published studies focusing on developmental delay in Rwanda, we investigated the prevalence of children at high risk for DD and associated risk factors in children 9-16 months old presenting for routine vaccination at community health centers in Kigali city-Rwanda.

**Objective:** Using parent completed Kinyarwanda translation ASQ-3 for detecting the prevalence of suspected developmental delay (SDD) in children aged 9 and 16 months presenting at the health center for routine care and identification of associated risk factors.

**Methods:** A cross-sectional study was done on 358 Rwandan children and their parents attending Health centers for their 9th and 15th months of vaccination. Parents completed the ASQ-3 Kinyarwanda translation form on the day of vaccination. Scores below the cut-offs in one or more of the five areas of developmental: communication, fine motor, gross motor, personal social skills and problem solving, which defined the risk of DD for children were reported. A multivariable logistic regression analysis was done for associations between some factors and SDD.

**Results:** With established ASQ-3 cut-off points, the prevalence of SDD in one or more areas was 24.6% and successively 27.2% and 22.4% at 9 months and at 15 months. The highest prevalence of SDD was in the gross motor domain at 9 months of age. Gestational age was the real predictor of developmental delay in our sample population, where preterm children were 8.3 times more likely to have the risk of developmental delay compared to term children (AOR=8.3; 95% CI=2.5-27.4;  $p<0.001$ ) and infants with LBW at birth were 2.6 times more likely to be at high risk of DD compared to infants with normal weight at birth (OR=2.68; 95%CI=1.20-5.99;  $p=0.016$ ).

**Conclusion:** This study showed an association of suspected developmental delay with prematurity and LBW. Regular screening for DD in children with a background of prematurity and LBW should be considered.

**Keywords (MeSH):** mass screening; developmental disabilities, child development, growth and development.

## List of Abbreviations

#: Percentage.

ASQs : Ages and Stages Questionnaire

CHUK: Centre Hospitalier Universitaire de Kigali

CMHS : College of Medicine and Health Sciences

DD: developmental delay

DH: District Hospital

ECDI: Early Child Development Index

ECI: Early Childhood Intervention

EDI: early developmental intervention.

GDGs:Global Developmental Goals.

GP: General Practitioner

IRB: Institutional Research Board

IRB: Institutional Review Board

LBW:Low Birth Weight

LIC:Low Income Country

LMIC: Low Middle Income Countries

MUAC:Mid Upper Arm Circumference

OR: Odd-ratio

PI: Principal Investigator

PIH:Partners In Health

RDHS: Rwanda Demographic Health Survey

UN: United Nation

UR: University of Rwanda

WHO: World Health Organization

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Table 6: Final model from multivariable analysis of the predictors of SDD in recruited children.

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## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

The *Lancet Early Childhood Development* series estimates that 200 million children in developing countries do not reach their full developmental potential [1]. In 2014-2015, the Rwanda Demographic Health (RDH) Survey used a 10-element module to calculate the Early Child Development Index (ECDI). Each of the 10 item was used in one of four areas: Numeracy- Literacy, Social-emotional, Physical, and Learning. The ECDI score was calculated and the percentage of children on the right developmental track in at least three of four areas was 63% in children aged 36-59 months. However, 6% of newborns were of LBW (less than 2.5 kg), 38% of children under 5 years old were stunted, and 37% of children aged 36-59 months were anemic all of which are risk factors for sub-optimal development [2]. There are six factors known to contribute to optimal growth and development during early childhood: nutrition, parental behaviors, parenting style, social and cultural practices, infection, and the environment [3] .

Early childhood is the best time to prevent, identify and solve problems that could lead to developmental disorders and negatively affect the brain development, which has consequences on the ability to function throughout life. Early childhood development challenges are increasingly being recognized in Low- and Middle-income countries (LMIC) as important factors in child and less than ideal functioning in adulthood [4]. The health and education system in high-income countries (HICS) has policies and procedures designed to provide multiple opportunities to prevent, identify and manage early childhood developmental problems [5,6,7,8]. Interventions to ameliorate early infancy development are available in LIC and include inexpensive strategic plan such as combating iron deficiency and malnutrition, training caregivers, increasing Community Rehabilitation and psychosocial stimulation [3] .

The early childhood development is an essential part of the social and functional development of countries [9,10] The bank's work, through maternal and Child Health, nutrition and early learning, participates in prevention of developmental delay, The World Bank made early childhood investment a central economic challenge by working

with partners to increase these investments [11] . Despite this strong endorsement, 156 million young children worldwide suffer from chronic undernutrition and only a half of children aged 3-6 years old have access to preschool education. [12].

There are available examples in HIC of how a developmental surveillance and intervention approach has been integrated into primary care for infants [5,12,13] . However, in LMIC, there are often no system of preventive primary care and, thus, no clear approach to developmental assessment in our health care system. This huge gap in preventive health care draws attention to the nature and impact of the socioeconomic gradient observed between low and high-income countries. These gradients relate to the continuous increase in health, well-being and performance indicators related to the increase in socioeconomic level indicators, such as occupation, income or educational level In general, compared to relatively poor people, people living in better conditions are healthier, perform well and cope better. The gradient slope within populations reflects the overall level of well-being, health, and performance of the entire population. In other words, the greater the disparities in socioeconomic status within society or the steeper the socioeconomic gradient, the lower the average level of well-being, Health, and performance of people in that society. It is universally accepted that this disparity in sustainable gradients in health, wellbeing, and performance is significant because of the impact of early developmental experiences directly related to differences in the quality of children's physical and social environments associated with variations in social status [14,15] . It is therefore crucial to the GDGs of poor resource countries, such as Rwanda, to pay special attention to the early childhood quality.

## **1.2 Problem statement.**

According to WHO, much of the world's children live in LMIC where they are exposed to different risks factors including: poverty, malnutrition, lack of access to health and educational interventions? The health care system in these LMIC is generally the only one that can potentially reach younger children as well as their families [17].

Low stimulating home environments and Poor health detrimentally affect a child's socio-emotional, cognitive and motor development. There are limited national data on the

developmental status of young children in LMIC. The Lancet series on development measured childhood cognitive and educational performance by using the the number of people living in poverty and the prevalence of early childhood stunting as proxies: they estimated that 200 million children worldwide under 5years do not realize their developmental potential and Most of these children are from South Asia and sub-Saharan Africa. These children are likely to fail in school and consequently have higher fertility lower incomes and, provide poorer care for their children. This contribute to the intergenerational poverty transmission [1]. The critical role of optimal early brain development is reflected by the fact that the UN Millennium Development Goal was firstly to eliminate hunger and extreme poverty and the second was to allow all children complete the primary school [18].

The majority of brain growth happens before the age of 3 and delays are difficult to reverse after this age [19]. Some data are available in Rwanda through the Rwanda Demographic Health Survey (RDHS) from 2014-2015 with 4 domains of development (Learning, Literacy-numeracy, Physical and Social-emotional), the ECDI have been calculated and they demonstrated that among 36-59-month-old children, 63 percent are developmentally on track. Looking at the results more closely reveals that the ECDI score was higher at age 48-59 months than at age 36-47 months and urban children scored well than rural children and the score were higher among children whose mothers had a secondary education or greater level [20]. The RHDS reports that 37% of children between 3 and 5 years old have DD, but it does not measure the prevalence of DD in children under 36 months, which is the critical time for identifying and addressing development delay. This study explored and documented the level of SDD in known domains of development: gross motor, communication, problem solving fine motor, and personal social skills in children less than 36 months in an urban area in Rwanda.

### **1.3 Study justification**

Limited studies have been done in Rwanda even though approaches to eliminate some factors predisposing to developmental delay are in place including active nutritional screening of children. However, at present children at high risk are not being screened for developmental delay.

Pediatricians, GPs and nurses are in a key position to address child development in developing countries. Rwandan children make contact with a health facility at least 5 times for vaccines between the ages of 6 weeks and 15 months: their 9<sup>th</sup> and 15<sup>th</sup> month visits can be an ideal opportunity for Rwandan children to assess for developmental delay. Currently, however, this is not an integrated part of the Rwandan Ministry services. This study documented the proportion of infants suspected with DD among children aged 9 and 16 months of age in Kigali- Rwanda and identified possible associated risk factors. The study provided also some information to policymakers about developmental delay in Rwandan children.

## **1.4 Research aim and objectives**

### **1.4.1 Research aim**

Determine the proportion of suspected developmental delay among children coming to the health center for their 9<sup>th</sup> and 15<sup>th</sup> month vaccination in Kigali city.

### **1.4.2 Research objectives.**

#### *General objective*

Determine the prevalence of suspected DD among children coming at the health center for their 9<sup>th</sup> and 15<sup>th</sup> month vaccination.

#### *Specific Objectives*

1. Determine the proportion of children aged 9 and 16 months of age with suspected DD.
2. Determine possible risk factors associated with suspected DD.

## CHAPTER 2: LITERATURE REVIEW

Developmental screening is designed to help the pediatrician recognize children with developmental delay or possible disability and Screening is a rapid brief evaluation procedure designed to recognize children who may receive a more evaluation or intensive diagnosis [20]. There are available examples of developmental screening tool that are being used by trained professionals like Denver II screening test, the Battelle Developmental Inventory and the Bayley Neurodevelopmental screening tool. Long period of time, effort to administer and interpretation are known disadvantages of these tests and the Denver is not completely validated. The ASQ-3 is a parent-completed screen designed for children from 1 month and 5.5 years and it is currently the most widely used [20,21] .

The benefits of using ASQ have been identified: The instruments are easy to administer, easy to complete by respondents, require less instruction or training; inexpensive and do not require much time; tend to be quick and do not require much time or expertise for scoring and Parent reports can be used to estimate stages of development [23]. The strong psychometric properties of ASQ and its role in the early detection of developmental disability in children worldwide are well documented. The concurrent validity varies from 76 % to 88%, the sensitivity and specificity are respectively 75% and 86%; The reliability of the test-retest in two weeks was 94%; and between parents and professional examiners inter observer reliability was 94% [23,24] .

The questionnaire include five domains: gross motor, communication, fine motor, personal social skills and problem solving. Each area is assessed by questions reflecting age-specific stages of development and are chosen to generate a developmental quotient of 75–100% if the child is normal. Parents can respond with “no,” “sometimes” or “yes”, with a score of 0, 5 or 10 points respectively. Further evaluation is recommended if the score on a domain is below the cut-off point. The feasibility of performing screening using the ASQ has been evaluated in high-income countries [24], as well as in LMIC such as Zambia South Africa, Ghana [25,26] and Egypt [28]. In Norway [29] , a study

demonstrated that the prevalence rate of SDD varied between 5.7% and 7.0 % in infants of 4 to 12 months based on the Norwegian cut-off points, primarily in gross motor development, and more highly correlated with male sex and prematurity. In contrast [28], use of the ASQ in Egypt revealed a prevalence of SDD of 3.4% in children of 24 to 60 months of age. Consanguinity, Male gender, and parental education were associated risk factors with developmental delay. The study most pertinent to the goals of this research was conducted in a rural western province of Rwanda [30]. Of 158 preterm/LBW infants who left the neonatal unit, 54.4% were alive and localized for follow-up. Using ASQ, developmental delay was seen in 67.4% of preterm/low birth weight children at age 1 to 3 years old. An important conclusion from the Rwandan study is that as the Rwandan health system improves newborn survival, the follow-up care and early intervention services will be essential for these high-risk children to help them reach their developmental potential.

## **CHAPTER 3: MATERIALS AND METHODS**

### **3.1 Study Design**

Cross-sectional study of infants coming at the health center for their 9<sup>th</sup> and 15<sup>th</sup> month vaccination, for a period of 3 months: from August 2019 to November 2019.

### **3.2 Study sites**

The study took place in Kigali city at four health centers. City of Kigali is the Capital City of Rwanda and is composed of three districts: Nyarugenge, Gasabo and Kicukiro district. It has a surface area of 730 km<sup>2</sup> with eight hospitals including University Teaching Hospital, King Faisal Hospital, Rwanda Military Hospital and five district hospitals such as Kacyiru DH, Muhima DH, Masaka DH, Ndera psychiatric referral Hospital and Kibagabaga District Hospital. Each District Hospital has in its catchment area different health centers where vaccination is done. Data collection took place in Nyarugenge at Nyirnuma and Muhima health centers both located in Muhima district hospital catchment area, in Gasabo at Kimironko health center located in Kibagabaga district hospital catchment area and at the Kicukiro health center located in Masaka district hospital catchment area. These health centers have been selected using a convenience sampling methodology, where we chose one health center per district, but also the largest health center to make the study feasible.

### **3.3 Study population**

All children who came to above mentioned health centers for vaccination of their 9<sup>th</sup> and 15<sup>th</sup> month of age, fulfilling the inclusion criteria under the period of study.

### **3.4 Selection criteria**

#### **3.4.1 Inclusion criteria**

All children ranging from 9 to 10 months who came in above mentioned health centers for their 9<sup>th</sup> month vaccination and children between 15 and 16 months 30 days for their 15<sup>th</sup> month vaccination were included in the study until sample size was reached.

#### **3.4.2 Exclusion criteria**

Parents or caregivers who have not signed consent for their children.

Children brought to the health center by a person who was not the primary care provider.

### 3.5 Data collection tool

We have used Kinyarwanda translation of ASQ3 under permission from the publisher and google form database to get biological and demographic characteristics of the study population. This translated questionnaire has been used in Rwanda [30].

### 3.6 Sample size and Sampling

There is limited statistics on the prevalence of developmental delay in LIC. The DHS 2014-2015 found a prevalence of developmental delay of 37% in children aged from 36 months to 59 months of age, but measured development level by using a 10-item module, which is different from the ASQ-3 that is going to be used in this study. In Rwanda, another study using the same measurement tool for children between 1 and 3 years old at high risk of developmental delay (ex-premature babies in a rural site), the prevalence was 67.4% [30]. However, this population had many additional risk factors to explain this high prevalence of developmental delay, including 78.3% of children with stunting, 8.8% with wasting and 39.5% with signs of anemia. This prevalence, therefore would likely overestimate the rate of developmental delay in the general population. A study done in Chile using ASQ-3 showed a prevalence of 37% in infants of 8 months and 24% in children of 18 months [31]. There are no available data saying that the prevalence is so different in HIC versus LIC, however, children in lower income countries are exposed to many additional risk factors that can potentially affect development. Therefore, for our sample size calculation, we opted to use a prevalence of 37% and with a level of confidence of 95% and a precision of 5%, we find that the sample size should be 358 study participants [32]

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

n: the sample Size:358

Z: the statistic corresponding to level of Confidence of 95%

P: assumed prevalence of 37%

d: precision of 5 %

### **3.7 Recruitment methods**

1. The data collection was based on the use of independent data collectors. Data collection officers have been identified and trained on the use of the Ages and Stages Questionnaire-3, data entry using Google and paper forms as well as weight, length, MUAC and head circumference measurements.
2. Recruitment: The day of vaccination, Study staff approached both parents/caregivers of children coming for a vaccination visit and explained the study and how confidentiality will be assured. Voluntarily parents/caregivers signed consent and participated in the study.

### **3.8 Study procedures**

After consent was obtained, anthropometric measures (weight, length, Head circumference and MUAC) were being obtained from the trained data collector. Data have been collected using a translated ASQ-3 form in Kinyarwanda, 10<sup>th</sup> months form used on children of 9 to 10 months of age and 16 months ASQ-3 form used on 15 to 16 months children coming at the health center for vaccination in a period of 3 months, from August 2019 to November 2019. This form has been completed by parents or caregivers in the appropriate determined area by nurses and PI at health center (and if needed, with help from the data collectors, upon parent request) and after it is completed, it was handed back to the PI who scored it. The scoring of the ASQ-3 was based on the answers of the caregivers: yes, not yet, or sometimes. At the end of the questionnaire, the total score have been tabulated for each of the five subsections based on a standard scoring methodology. Depending on the score, the questionnaire has been counted as normal or abnormal (suspected DD). Suspected DD was defined as any single domain score that falls within the limits of concern or delay, according to the ASQ scoring table at the end of the questionnaire. In addition to the ASQ questionnaire, parents also completed a questionnaire in Kinyarwanda/English (Google form database). This form was piloted in 5 mothers with children of 15 months of age and 2 mothers of 9 months old infants and the median completion time took five minutes. The Google form has been used to record demographic and medical characteristics of the study group. The growth parameters and medical comorbidities were being entered into the google form database.

Parents or caregivers with children with developmental delay or other medical comorbidity requiring pediatrician review, we facilitated them getting a transfer from the health center to the nearest district hospital for pediatrician assessment. For children with medical comorbidities (malnutrition) that could be addressed at the health center (malnutrition), the health center chief was informed, the care and follow up was being done at the health center.

### **3.9 Outcomes.**

The proportion of study participants screened positive for risk of DD.

### **3.10 Data management and analysis**

Data have been collected using ASQ 3 paper questionnaires of 10<sup>th</sup> and 16<sup>th</sup> months of age and after completion they were being kept by the principal investigator in secured way and completed google form data base on the locked machine .

### **3.11 Statistical analysis**

For data base creation, Epi data version 3.1 have been used to enter collected data and then exported to SPSS version 25 for analysis. Categorical data were presented using frequencies and percentages in charts and tables, Continuous data were summarized by median and mean values depending on their distribution and binary logistic regression was used to study the association between the outcome (having suspected developmental delay) and possible risk factors or predictors. Any factor with a p value less than 0.2 has been included in a multivariable logistic regression analysis to minimize confounding factors and to determine more accurate levels of association with developmental delay. The statistical significance of associations was taken at the level  $p < 0.05$ .

### **3.12 Ethics/study oversight**

#### **3.12.1 Funding & Sponsors**

Personal funds were used to support data collectors and for statistical analysis. Dr O'Callahan sponsored the license to use the translated ASQ-3.

### **3.12.2 Confidentiality**

All data were kept in a password-protected database, no identification of patients has been revealed in public.

### **3.12.3 Informed consent**

The objectives of this study, its significance and possible risks of the study have been explained to the children's parents or their legal representatives. Written information describing the study is included in the consent. Written consent has been obtained before being included in the study. The refusal of consent has not affected patient care.

### **3.12.4 Incentives for subjects**

Subjects have not received any incentive for this study.

### **3.12.5 Risk to Subjects**

Although every study carries some risks, no social, legal, physical, emotional, financial and physical risks on this study.

### **3.12.6 Potential benefits**

According to Rwanda Ministry of Health There are no established interventions for children with developmental delay in health centers and even at district hospital; however, children with developmental delay, their parents have been explained and have even been advised for pediatrician review and follow up.

This study offers the indirect benefit of providing policymakers and planners with detailed information about developmental delay in Rwandan children less than 36 months so that they may develop effective intervention targeted to population subgroups.

## **3.13 Institutional Review Board (IRB)**

The Pediatric academic team in University of Rwanda approved the study proposal. We got an approval of University of Rwanda, College of medicine and health sciences IRB: No 365/CMHS IRB/2019.

## CHAPTER 4:RESULTS

We enrolled 162 children aged 9-10 months and 196 aged 15-16 months of age. Both groups were similar in sex distribution and risk factors with the accompanying caregiver most frequently the child's biological mother (Table2).Among the entire cohort of 358, the percentage of children falling below the cutoff, indicating a need for further assessment based on SDD, the rate in any one area varied between 1.7% for personal social and 12.8% for gross motor. There is stability in rates between the two age groups for communication, fine motor, and personal social. Gross motor delay of 20.4% among the younger group drops dramatically six months later to 6.6% while problem solving increases from 3.1 to 11.2% (Table 3). Some children scored below the cut-off in multiple areas and, therefore, the overall prevalence of infants falling into the category for further assessment was 27.2% at 9 months and 22.4 % at 15 months with an overall prevalence of SDD at 24.6% (Table 4).

Bivariate analysis demonstrates a strong association between SDD and two variables, birth weight below 2.5kg and prematurity. (Table 5). Multivariable analysis (Table 6) of the variables that showed  $p < 0.2$  in the binary logistic regression (birth weight, stunting, and maternal marital status) resulted in gestational age being the sole predictor of SDD

**Table 1: Sociodemographic characteristics of the recruited children**

Characteristics	Children			
	9 -10 months		15-16 months	
	n	%	n	%
<b>Gender</b>				
Female	78	48.1	95	48.5
Male	84	51.9	101	51.5
<b>Economic category</b>				
Category I	13	8.0	8	4.1
Category II	89	54.9	101	51.5
Category III	60	37.0	87	44.4
<b>Birth weight</b>				
<2.5kg	16	9.9	11	5.6
≥2.5kg	146	90.1	185	94.4
<b>Height</b>				
Normal	159	98.1	195	99.5
Stunted	3	1.9	1	0.5
<b>Head circumference</b>				
Normocephalic	158	97.5	192	98.0
Microcephalic	4	2.5	4	2.0
<b>Current weight</b>				
Normal	157	96.9	194	99.0
Wasted	5	3.1	2	1.0
<b>Gestational age at birth</b>				
Term	152	93.8	192	98.0
Preterm	10	6.2	4	2.0
<b>Mother's age</b>				
≤35 years	149	92.0	171	87.2
>35 years	13	8.0	25	12.8
<b>Number of children in the household</b>				
1-3 children	137	84.6	167	85.2
≥4 children	25	15.4	29	14.8
<b>Started breastfeeding on first day of life</b>				
Yes	152	93.8	187	95.4
No	10	6.2	9	4.6
<b>Admitted to hospital in first month of life</b>				
No	148	91.4	182	92.9
Yes	14	8.6	14	7.1

This research included 358 children with 162 children 9 months old and 196 children 15 months of age. There were 185 boys, representing 51.6% of the studied population.

**Table 2: Sociodemographic characteristics of the caretakers of the recruited children**

<b>Characteristics</b>	<b>n</b>	<b>%</b>
<b>Marital status</b>		
Married	263	73.5
Single	94	26.3
Widower	1	0.3
<b>Relationship with the child</b>		
Mother	338	94.4
Father	7	2.0
Other	13	3.6
<b>District of origin</b>		
Nyarugenge	92	25.7
Gasabo	188	52.5
Kicukiro	71	19.8
Out of Kigali	7	2.0
<b>Medical insurance</b>		
Yes	321	89.7
No	37	10.3
<b>Education background</b>		
Primary	158	44.1
Secondary	141	39.4
University	37	10.3
None	22	6.1
<b>Disease during pregnancy</b>		
None	342	95.5
HIV	15	4.2
Syphilis	1	0.3
<b>Alcohol and tobacco consumption during pregnancy</b>		
None	318	88.8
Alcohol	37	10.3
Tobacco	3	0.8

Table 2 shows that, the children’s caregiver was most frequently to be the child’s biological mother (94.4%) and, of those, a quarter were single parents. Half of the mothers had no or only primary education, very few had HIV, but 10% admitted to alcohol use during pregnancy.

**Table 3: Prevalence of infants and children with suspected DD aged 9 and 16 months**

Area	Children					
	9 -1 0months		15-16 months		Overall total	
	n	%	n	%	n	%
<b>Communication</b>						
Below cutoff	4	2.5	5	2.6	9	2.5
Close to cutoff	13	8	26	13.3	39	10.9
Above cutoff	145	89.5	165	84.2	310	86.6
<b>Gross motor</b>						
Below cutoff	33	20.4	13	6.6	46	12.8
Close to cutoff	20	12.3	19	9.7	39	10.9
Above cutoff	109	67.3	164	83.7	273	76.3
<b>Fine motor</b>						
Below cutoff	10	6.2	20	10.2	30	8.4
Close to cutoff	49	30.2	60	30.6	109	30.4
Above cutoff	103	63.6	116	59.2	219	61.2
<b>Problem solving</b>						
Below cutoff	5	3.1	22	11.2	27	7.5
Close to cutoff	45	27.8	46	23.5	91	25.4
Above cutoff	112	69.1	128	65.3	240	67
<b>Personal-social</b>						
Below cutoff	3	1.9	3	1.5	6	1.7
Close to cutoff	21	13	9	4.6	30	8.4
Above cutoff	138	85.2	184	93.9	322	89.9

Table3 demonstrate the proportion of children with SDD according to the ASQ 3 cut-off points in the 5 area of development at 9 and 15 months of age. Of the 358 children involved, the percentage of children with suspected DD in the gross motor, communication, fine motor, social personal and problem solving areas varied between 1.7% and 12.8% in the combined group. Distinct differences are observed when examining each age separately: the percentage varied widely between 1.9% and 20.4 % at 9 months and much more narrowly between 1.5% and 11.2 % at 15 months of age. The highest prevalence of SDD was in the gross motor area of development (20%) at 9 months, which appears to decrease, as children grow older. Among 15 months old

children, the problem solving area (11.2%) was the most affected. Interestingly, communication scores were very similar in both groups.

**Table 4: Prevalence of SDD.**

<b>SDD</b>	<b>9 -10 months</b>	<b>15-16 months</b>	<b>Overall</b>
Yes	44 (27.2%)	44 (22.4%)	24.60%
No	118 (72.8%)	152 (77.6%)	75.40%
Total	162 (100%)	196 (100%)	100%

Table 4 demonstrates that the overall proportion of children with the score at or below the cut-off points in at least one developmental area, according to the ASQ-3 guidelines was 27.2% at 9 months and 22.4 % at 15 months with an overall prevalence of SDD at 24.6%.

**Table 5: bivariate analysis of association between SDD and different predictors.**

Predictor	SDD		OR (95% CI)	P value
	Yes	No		
<b>Birth weight</b>				
<2.5kg	12 (44.4%)	15(55.6%)	<b>2.68 (1.20-5.99)</b>	<b>0.016</b>
≥2.5kg	76 (23.0%)	255 (77.0%)		
<b>Current weight</b>				
Normal	84 (23.9%)	267 (76.1%)	4.2 (0.93-19.3)	0.062
Wasted	4 (57.1%)	3 (42.9%)		
<b>Household size</b>				
1-3 children	75 (24.7%)	229 (75.3%)	1.03 (0.52-2.03)	0.925
4 and more children	13 (24.1%)	41 (75.9%)		
<b>Mother's education</b>				
Primary/None	43 (23.9%)	137 (76.1%)	1.07 (0.66-1.74)	0.76
Secondary/University	45 (25.3%)	133 (74.7%)		
<b>Mother's age</b>				
≤35 years	76 (23.8%)	244 (76.3%)	1.48 (0.71-3.07)	0.292
>35 years	12 (31.6%)	26 (68.4%)		
<b>Marital status of the mother</b>				
Married	60 (22.8%)	203 (77.2%)	1.41 (0.83-2.39)	0.197
Single	28 (29.5%)	67 (70.5%)		
<b>Alcohol/smoking</b>				
No	75 (23.6%)	243 (76.4%)	1.56 (0.76-3.17)	0.22
Yes	13 (32.5%)	27 (67.5%)		
<b>Gender</b>				
Female	46 (26.6%)	127 (73.4%)	1.23 (0.76-1.99)	0.394
Male	42 (22.7%)	143 (77.3%)		
<b>Gestational age at birth</b>				
Term	78 (22.7%)	266 (77.3%)	<b>8.52 (2.6-27.9)</b>	<b>&lt;0.001</b>
Preterm	10 (71.4%)	4 (28.6%)		
<b>Breastfeeding on the first day</b>				
Yes	81 (23.9%)	258 (76.1%)	1.85 (0.71-4.87)	0.208
No	7 (36.8%)	12 (63.2%)		
<b>Admitted in hospital in the first month of life</b>				
No	79 (23.9%)	251 (76.1%)	1.50 (0.65-3.46)	0.336
Yes	19 (32.1%)	19 (67.9%)		

Table 5 demonstrates a strong association between SDD and birth weight below 2.5kg and prematurity. Preterm infants were 8.5 times more likely at high risk of having SDD

compared to term infants (OR=8.5; 95%CI=2.6-27.9; p<0.001). Likewise, infants who were born with weight less than 2.5kg were 2.6 times more likely to be at high risk DD compared to normal weight infants (OR=2.68; 95%CI=1.20-5.99; p=0.016).

**Table 6: Final model from multivariable analysis of the predictors of SDD in recruited children.**

<b>Predictor</b>	<b>Adjusted OR</b>	<b>95%CI</b>	<b>coefficient</b>	<b>Wald</b>	<b>Std. Error</b>	<b>P value</b>
<b>Gestational age</b>						
Preterm	8.3	2.5-27.4	2.1	12.2	0.6	<0.001
Term (ref)						
<b>Marital status</b>						
Single	1.3	0.79-2.35	0.3	1.3	0.27	0.253
Married (ref)						
Intercept			-1.124	3.2	0.62	0.07

Table 6 reflects the multivariable analysis of the variables that showed p< 0.2 in the binary logistic regression was done to find the best fitting model of predictors where we found that gestational age was the real predictor of developmental delay in our sample population where preterm children were 8.3 times higher to have developmental delay compared to term children (OR=8.3; 95% CI=2.5-27.4; p<0.001). Marital status on multivariate analysis did not meet significance regarding status and delay (OR=1.3; 95% CI=0.27-0.253; P=0.253).

## **CHAPTER 5: DISCUSSION.**

The aim of the study was to estimate the prevalence rate of SDD in a Rwandan community sample of infants aged 9 and 16 months old in Kigali City based on their ASQ-3 scores in known five developmental areas, as well as its associated risk factors. In this research, 358 children aged 9 months and 15 months old participated. Precisely, there were 162 children 9 months old and 196 children 15 months of age. Among them, 185 boys represented 51.6% of the studied population; 173 girls taking up the rest 48.4%. Children have been screened using ASQ-3. The results suggest that 24.6% of younger infants coming to the health center for vaccination at 9<sup>th</sup> and 15<sup>th</sup> months are suspected to have DD according to the ASQ-3 cut-off points. There was a higher suspected prevalence of 27.2% in infants of 9 to 10 months of age compared to 22.4% in infants of 15 to 16 months of age. The main factors associated with SDD were low birth weight and gestational age less than 37weeks.

### **5.1 Prevalence of SDD in infant of 9 and 15 months old.**

This study demonstrated that the prevalence of SDD in infants aged 9 to 16 months of age was 24.6% and this prevalence is significantly lower than the prevalence of 67.4% reported in another study done in Rwanda using the same measurement tool on children of 1 to 3 years old but at high risk of developmental delay (ex-premature babies in a rural site) [30] It was also less than the prevalence of RDHS, where the national developmental delay prevalence was 33% among urban Rwandan children of 3 to 5 years old[2] . The findings of our study are almost the same as those found in similar studies around the globe: Chili with a prevalence of 28.8% in 9, 18 and 30 month old children who attended a well-baby clinic ; the USA with a prevalence of 27 % in American children aged 9 to 31 months attending clinic for their well child visit [30,31] ; and in Turkey with the prevalence of 28.12% in children aged 3 to 72 months which used two-domain criterion to classify children as at risk [35] In comparison to other studies done in the sub-Saharan region, our findings are lower to the one in Ghana (44.6%)[26].A study conducted in India among children aged 4±1, 10±1, 18±1and 24±1 months who attended the Pediatric

Out Patient Department or High Risk Clinic of the hospital, calculated the prevalence at 51%, which is higher compared to our study [36] while in Norway they reported a prevalence of 5.7 % and 6.1% at 6 and 12 months respectively, which is lower compared to our study findings [29].

## **5.2. Prevalence of SDD per domain**

Screened children failed mostly in the gross motor area at 9 months with a prevalence of 20% that appears to decrease, as children grow older and this can be explained by the fact that younger infants are carried a lot up to 9 or 10 months and then encouraged to stand and walk and, thus, rapidly improve. Among 15 months old children, the problem solving area (11.2%) was the most affected. Interestingly, communication scores were very similar in both groups. These findings are similar to SDD observed in Norway in the first year with delays most often reported in the gross motor area[29] , and in Canada where infants of 12 months most often failed gross motor (26.6%), followed by communication (17.9%) and problem solving (12.7%) [37]. In this Rwandan study, infants scored well in communication and personal social area, which reproduces the findings of a study done in South Africa in which young infants scored equally well in communication as children of western countries. The South African authors suggested that it is due to the day-to-day African mothers practices who carry their babies on the mother's body, feeding on per need, pacifying babies when they cry immediately, co-sleeping, and the exposure of babies to a wide social network of kin and family. Additionally, similar findings were reported in an Iranian study where their children scored well in communication and problem solving in the first 3 years. [25,35,36] .

### 5.3 Prevalence of SDD in infant of 9 and 15 months old and risk factors.

In our study, after univariate analysis, different factors have been associated with a risk of developmental delay. Gestational age was associated with positive screening for developmental delay, indicating that preterm infants were 8.5 times more likely at high risk of having a risk of DD compared to term infants (OR=8.5; 95%CI=2.6-27.9;  $p<0.001$ ). Furthermore, infants who were born with weight less than 2.5 kg were 2.6 times more likely at high risk of screening positive for DD compared to infants with normal birth weight (OR=2.68; 95%CI=1.20-5.99;  $p=0.016$ ). Those findings were similar to studies performed in countries around the globe, including those by:

- Catherine M. Kirk in Rwanda [30]
- Pénélope Troude in Canada demonstrating that prematurity remained only associated with ASQ failure at 12 months with an OR of 4.6 (95% CI [1.7-12.3],  $p=0.002$ ) [37]
- Lisbeth Valla in Norway reporting that gestational age less than 37 weeks was significantly associated with the developmental delay in the communication domain at 4 months, and personal-social and fine motor domains at 6 months [29]
- Luisa Schonhautin in Chile demonstrating an increased risk of DD compared to full term infants, of infants at 8 or 18 month corrected postnatal age with an OR of 1.56 for *early term* (95% confidence interval [CI]: 1.19–2.06), 2.58 for *late preterm* infants (95%CI: 1.66–4.01), and 3.01 for *moderate preterm* infants (95%CI: 1.59–5.71) [33].

The multivariable analysis of the variable that showed  $p < 0.2$  in the binary logistic regression was done to find the best fitting model of predictors where we found that gestational age was the real predictor of risk for DD in our sample population where preterm children were 8.3 times higher to be at high risk of having DD compared to term children. Poverty is known to be associated with developmental delay [37,38] ; however, in this study there was no association with level of education, developmental outcomes,

greater number of children in the household and socioeconomic status classification. This may be explained by the fact that almost all the families in this cohort were universally poor. Further studies comparing children with varied economic background is needed to clarify this.

Interventions for Early Childhood (ECI) are supported by human rights, human capital and programs and by scientific justifications. In HIC, it is known that ECI for infants at high risk begin in the neonatal period. Specialized interventions are available as early as three months of age[43] . Interventions are particularly beneficial when they are given during the first thousand days of life due to the rapid growth of the brain and neuroplasticity, with a demonstrated impact on development progression of the child as well as on school outcomes and higher earnings later in life [40,41] . WHO, UNICEF, and the World Bank recognize three interventional support levels for child development during the preschool period: (1) universal: provided by society through child policy support; (2) targeted risk of developmental delay or disability through home visit of community health workers to young mothers and(3) specialized services indicated for children with specific additional needs such as caregivers community groups of children with disabilities [46].

From birth, good care of preterm infants is needed, directly by engaging caregivers and interacting with them. Adequate follow-up and monitoring in the first early years is needed. Based on a study conducted in Brazil, evaluating neurodevelopment outcome with blind evaluations of 2 groups between 12 and 18 months, showed that continuous and comprehensive early intervention at home by low-income caregivers was better than standard care for very premature children. The interventions used in the Brazilian study were kangaroo care and tactile-kinesthetic stimulation by the mothers randomized at discharge from the hospital when they receive an early intervention program consisting of 10 parental guidance sessions and 10 home visits compared to the standard evaluation and care [47]. The beneficial role of early intervention has been demonstrated also in a study done in rural communities in India, Pakistan, and Zambia who received an early developmental intervention.(EDI) implemented by parents, with 2 home visits per week by trainers in the first 36 months of life, more visits were associated good developmental

outcomes in the first 36 months of life. [48]. PIH does monitor prior premature infants in follow up clinics and track data. Some pediatricians in District hospitals are performing follow up services, but there is no national guideline and process for intervention among those identified at most risk, which explains the need for more data on content, implementation and impact of EDI in Rwanda for infants at high risk of developmental delay

#### **5.4 Study strengths and limitations**

The results of this study must be interpreted with prudence. It was conducted in an urban setting within a country that is largely rural and, thus, the results can not be generalized. Higher standards of living in urban areas can influence results.

Another limitation is related to the type of study since it was a cross-sectional study and therefore the association can be described but causality could not be assessed. They were not enough time for parents to interact with their infants in order to answer the questions more accurately and this could have negatively affected our data. The information from the parents report posed some challenges with the quality of the data, particularly around the true gestational age; this prohibited the use of adjusted gestational age for development.

## **CHAPTER 6: CONCLUSION AND RECOMMENDATIONS.**

### **6.1 Conclusion**

In our study, 24.6% of children were founded to be at high risk of DD based on the ASQ-3, specifically 27.2% at 9-10 months and 22.4% at 15 - 16 months of age. The highest prevalence of suspected DD was founded in the gross motor area in the youngest children. The studied group achieved good scores in personal social and communication areas, and we discovered that suspected DD was significantly associated with gestational age less than 37 weeks and low birth weight.

This study generates a baseline prevalence of SDD in children aged 9 and 16 months in Kigali- Rwanda. Furthermore, it highlights the burden of DD in infants with a history of prematurity and low birth weight.

### **6.2 Recommendation**

#### **To community health workers**

- To be aware about red flags about child neurodevelopment.

#### **To MOH**

- To consider screening for DD in order to identify children at risk
- A clear guideline on management and follow up of children at risk or with DD have to be established.
- To organize campaign emphasizing on awareness of normal child development and red flags.
- To establish Interventional services for children with developmental delay.
- To establish a developmental follow up program of infant with a background of prematurity or LBW.

## **To Researchers**

- Prospective research in infants with a background of prematurity and LBW.
- Prospective research to better understand whether the impact of prematurity is modifiable or transient or whether throughout life differences persist

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## List of appendice

### 1. Questionnaires



# 10 Month Questionnaire

9 months 0 days  
through 10 months 30 days

## KINYARWANDA

Ndaza kubaza ibibazo biyanye n'imirimo abana bashobora kuba bakora. Umwana wawe ashobora kuba yanakozwe imirimo imwe n'imwe mu yaganagajwe hejuru kandi birashoboka ko hari imwe n'imwe umwana wawe atari yatangiye gukora. Geregeza gukurikira neza buri kibazo, uhitemo igubwira ibindi kugaragaza imyitwarire y'umwana wawe. Mushobora kumbwira niba umwana wawe akora icyo gikorwa buri gihe, rimwe na rimwe cyangwa se ataratangira.

*I will ask questions about activities babies may do. Your baby may have already done some of the activities described above and there may be some your baby has not begun doing yet. Please listen to each question carefully and pick the option that best describes your child's behavior. I will also ask you if the behavior is a concern.*




### COMMUNICATION


1.	Ese umwana wawe ashobora kuvuga amajwi nka "da", "ga", "ka" na "ba"?  <i>Does your baby make sounds like "da," "ga," "ka," and "ba"?</i>	Yego - Yes <input type="radio"/>
		Rimwe na Rimwe - Sometimes <input type="radio"/>
		Ntarabikora - Not yet <input type="radio"/>
2.	Ese icyo wiganaye amajwi umwana wawe avuze, umwana wawe agusubiriramo ya majwi nk'uko wayavuze?  <i>If you copy the sounds your baby makes, does your baby repeat the same sounds back to you?</i>	Yego - Yes <input type="radio"/>
		Rimwe na Rimwe - Sometimes <input type="radio"/>
		Ntarabikora - Not yet <input type="radio"/>
3.	Ese umwana wawe avuye amajwi abiri aya nka "ba-ba," "da-da" cyangwa "ga-ga"? (Aya majwi ntakeneye kugira ibibabwira.)  <i>Does your baby make two similar sounds like "ba-ba," "da-da," or "ga-ga"? (The sounds do not need to mean anything.)</i>	Yego - Yes <input type="radio"/>
		Rimwe na Rimwe - Sometimes <input type="radio"/>
		Ntarabikora - Not yet <input type="radio"/>
4.	Ubisabye umwana wawe, ese akina nibura agakina kameze K'abana n'ubwo utamwezeka igikorwa wowe ubwawe (Nka: "Gupepera", "Kwibishana" "Gukoma amashyamba")?  <i>If you ask your baby to, does he play at least one nursery game even if you don't show him the activity yourself (such as, "bye-bye," "Peeta-boo," "clap your hands," "So Big"?)</i>	Yego - Yes <input type="radio"/>
		Rimwe na Rimwe - Sometimes <input type="radio"/>
		Ntarabikora - Not yet <input type="radio"/>
5.	Ese umwana wawe akurikiza ibwiriza rimwe ryoroshye umuhaye nka "Ngwino hano", "Kimpera", "Gisubiraye", udakoresheje amarenga?  <i>Does your baby follow one simple command, such as "Come here," "Give it to me," or "Put it back," without your using gestures?</i>	Yego - Yes <input type="radio"/>
		Rimwe na Rimwe - Sometimes <input type="radio"/>
		Ntarabikora - Not yet <input type="radio"/>





6.	<p>Ese umwana wawe avuga amagambo atatu, nka "Nana", "Dada", na "Baba"? ("Jambo" ni [wi cyangwa ama]wi umwana wawe avuga buri gihe mu guabanza umuntu cyangwa ikintu. "Nana" ashaka kuvuga "umwana")</p> <p><i>Does your baby say three words, such as "Mama," "Dada," and "Baba"? (A "word" is a sound or sounds your baby says consistently to mean someone or something).</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>
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## GROSS MOTOR

1.	<p>Iyo ufashe amaboko yombi ngo ufashe umwana guhagarara, abasha kwihanganira ibiro bye mu gihe ahagaze?</p> <p><i>If you hold both hands just to balance your baby, does she support her own weight while standing?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>
2.	<p>Igihe umwana wawe yicaye hasi, umwana wawe ajya yicara yemye mu gihe cy'iminota myinshi adakoresheje amaboko murwego rwo kumufasha?</p> <p><i>When sitting on the floor, does your baby sit up straight for several minutes without using his hands for support?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>
3.	<p>Igihe umwana wawe ahagaze afashe ku kintu, ashobora gukomeza guhagarara neza atifeshishije agatuzo?</p> <p><i>When you stand your baby next to furniture or the crib rail, does she hold on without leaning her chest against the furniture for support?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>




4.	<p>Mu gihe afashe ku ntebe cyangwa ku meza, ese umwana wawe arunama agaterura igikinisho kiri hasi hanyuma akongera agahagarara?</p> <p><i>While holding onto furniture, does your baby bend down and pick up a toy from the floor and then return to a standing position?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
5.	<p>Mu gihe afashe ku ntebe cyangwa ku meza, ese umwana wawe abasha gusutama ntawe umufashije (nta kugwa cyangwa kwiceka hasi)?</p> <p><i>While holding onto furniture, does your baby lower himself with control (without falling or flopping down)?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
6.	<p>Ese umwana wawe agenda iruhande rw'ikintu mu gihe agifasheho n'ukuboko kumwe gusa?</p> <p><i>Does your baby walk beside furniture while holding on with only one hand?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>

## FINE MOTOR

1.	<p>Ese umwana wawe aterura agakinisho gato n'ikiganza kimwe cyonyine?</p> <p><i>Does your baby pick up small toys with only one hand?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
2.	<p>Umwana wawe alya atora akantu gato neza akoresheje ikiganza hagati mukiganza n'intoki ze agakurura (niba agitora andika yego)</p> <p><i>Does your baby successfully pick up a crumb or Cheerio by using her thumb and all her fingers in a raking motion? (If she already picks up a crumb or Cheerio, mark "yes" for this item.)</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>


3.	<p>Umwana wawe aya atora igikinisho gito akoresheje imitwe y'intoki? (musabwe kwitegereza umwanya hagati y'igikinisho no hagati mukiganza?)</p> <p><i>Does your baby pick up a small toy with the tips of his thumb and fingers? (You should see a space between the toy and his palm.)</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
4.	<p>Nyuma yo kubigerageza inshuro imwe cyangwa ebyiri umwana wawe abasha gutora agace k'urudodo akoreheje urutoki rwa mbere n'igikumwe? (Urudodo rushobora kuba rufashe ku gikinisho.)</p> <p><i>After one or two tries, does your baby pick up a piece of string with her first finger and thumb? (The string may be attached to a toy.)</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
5.	<p>Ese umwana wawe ashobora gutora akamanyu gato akoresheje imitwe y'igikumwe n'urutoki? Ashobora gushyira ukuboko kwe cyangwa ikiganza cye ku rubaho cyangwa ku kindi kintu mu gihe arimo kubikora.</p> <p><i>Does your baby pick up a crumb or Cheerio with the tips of his thumb and a finger? He may rest his arm or hand on the table while doing it.</i></p>  <p><i>*If Fine Motor Item 5 is marked "yes" or "sometimes," mark Fine Motor Item 2 "yes."</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
6.	<p>Ese umwana wawe ashobora kurambika hasi agakinisha atagatuye hasi?</p> <p><i>Does your baby set a small toy down, without dropping it, and then take her hand off the toy?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>

## PROBLEM SOLVING

1.	<p>Ese umwana wawe alya afata igikinisho akivana mu kiganza kimwe agishyira mu kindi?</p> <p><i>Does your baby pass a toy back and forth from one hand to the other?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwibwira – Not yet <input type="radio"/></p>
2.	<p>Umwana wawe alya atora udukinisho tubiri duta, kamwe muri buri kiganza, akatumarana nk'umunota umwe?</p> <p><i>Does your baby pick up two small toys, one in each hand, and hold onto them for about 1 minute?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwibwira – Not yet <input type="radio"/></p>
3.	<p>Mughe afashe igikinisho mu kiganza cye, umwana wawe alya agihonda (kubita) ku kindi gikinisho ku meza?</p> <p><i>When holding a toy in his hand, does your baby bang it against another toy on the table?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwibwira – Not yet <input type="radio"/></p>
4.	<p>Ighe afashe agakinisho muri buri kiganza, ese umwana wawe akomanya ibikinisho hamwe?</p> <p><i>While holding a small toy in each hand, does your baby clap the toys together (like "Pat-a-cake")?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwibwira – Not yet <input type="radio"/></p>
5.	<p>Ese umwana wawe akura cyangwa agerageza gufata akamanyu k'ibintu mu icupa ribonerana nka gacupa ka plastic ka fanta cyangwa mu nkongoro y'umwana?</p> <p><i>Does your baby poke at or try to get a crumb or Cheerio that is inside a clear bottle (such as a plastic soda-pop bottle or baby bottle)?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntabwibwira – Not yet <input type="radio"/></p>

6.	Nyuma yo kukwitgereza uhisha agakinisho munsu y'urupapuro cyangwa umwenda ese umwana wawe aragahishura? (Menya neza ko ako gakinisho gahishwe neza.)  <i>After watching you hide a small toy under a piece of paper or cloth, does your baby find it? (Be sure the toy is completely hidden.)</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>

## PERSONAL-SOCIAL

1.	Iyo umwana wawe anyamye agaramye aya afata akarange ke akagashyira mu kanwa?  <i>While your baby is on her back, does she put her foot in her mouth?</i>  	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>
2.	Umwana wawe aya anywera amazi, umutobe, cy amata y'ifu mu gikombe mugihe umufatye?  <i>Does your baby drink water, juice, or formula from a cup while you hold it?</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>
3.	Umwana wawe aya yigaburira irindazi cy igisuguti?  <i>Does your baby feed himself a cracker or a cookie?</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>
4.	Igihe uhereje umwana ikiganza umusaba igikinisho cye, ese umwana wawe arakiguhereza nubwo atakikurekurira? (Mba akikurekurira mu ntoki zawe, shyiraho "yego" kuri icyo nteruro.)  <i>When you hold out your hand and ask for her toy, does your baby offer it to you even if she doesn't let go of it? (If she already lets go of the toy into your hand, check "yes" for this item.)</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>
5.	Igihe wambika umwana wawe, ese asunika ukuboko kwe mu ishati lyo kwamaze kwinjira mu kwaha k'ukuboko kw'ishati?  <i>When you dress your baby, does he push his arm through a sleeve once his arm is started in the hole of the sleeve?</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>
6.	Igihe unambuye ukuboko kwawe usaba umwana wawe igikinisho, arakiguha, akakigushyira mu kiganza?  <i>When you hold out your hand and ask for her toy, does your baby let go of it into your hand?</i>	Yego - Yes	<input type="radio"/>
		Rimwe na Rimwe - Sometimes	<input type="radio"/>
		Ntarabikora - Not yet	<input type="radio"/>

## OVERALL

Parents and providers may use the space below for additional comments.

1.	Ese umwana wawe akoresha naza mu buryo buranganiye ibiganze byombi n'amaguru yombi. <i>Does your baby use both hands and both legs equally well?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "oya" sobanura. <i>If no, explain.</i>	-----
2.	Igihe umwana wawe ahagaze, akerahi ibirenge bye biba bifashe hasi? <i>When you help your baby stand, are his feet flat on the surface most of the time?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "oya" sobanura. <i>If no, explain.</i>	-----
3.	Ese ufite impungenge ko umwana wawe asezetse cyane cyangwa adakozza nk'abandi bana? <i>Do you have concerns that your baby is too quiet or does not make sounds like other babies?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
4.	Ese umwe mu babyeyi bombi yaba yarigaze agira ubumaga bwo kutumva cyangwa gufata amatwi mu bwana bwa? <i>Does either parent have a family history of childhood deafness or hearing impairment?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
5.	Ese ufite impungenge ku kubona k'umwana wawe? <i>Do you have concerns about your baby's vision?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----

6.	<p>Umwana wawe yanagize ibibazo by'uburwayi mu mezi merahi ashize?</p> <p><i>Has your baby had any medical problems in the last several months?</i></p>	<p>Yego – Yes <input type="radio"/></p> <p>Oya – No <input type="radio"/></p>
	<p>Niba ari "yego" sobanura.</p> <p><i>If yes, explain.</i></p>	<p>-----</p>
7.	<p>Ese ufite impungenge ku myifatire n'imibanire y'umwana wawe?</p> <p><i>Do you have any concerns about your baby's behavior?</i></p>	<p>Yego – Yes <input type="radio"/></p> <p>Oya – No <input type="radio"/></p>
	<p>Niba ari "yego" sobanura.</p> <p><i>If yes, explain.</i></p>	<p>-----</p>
8.	<p>Ese hari ikintu kiguhangayikishije ku mikurire y'umwana wawe?</p> <p><i>Does anything about your baby worry you?</i></p>	<p>Yego – Yes <input type="radio"/></p> <p>Oya – No <input type="radio"/></p>
	<p>Niba ari "yego" sobanura.</p> <p><i>If yes, explain.</i></p>	<p>-----</p>



## 16 Month Questionnaire

15 months 0 days  
through 16 months 30 days

### KINYARWANDA

Ndaza kubaza ibibazo bijyanye n'imirimo abana bashobora kuba bakora. Umwana wawe ashobora kuba yanakozwe imirimo imwe n'imwe mu yagaragajwe hejuru kandi binashoboka ko hari imwe n'imwe umwana wawe atari yatangiye gukora. Genyewe gukurikira neza buri kibazo, uhitemo igubwira kirushije ibindi kugaragaza imyitwarire y'umwana wawe. Muashobora kumbwira niba umwana wawe abona icyo gikorwa buri gihe, rimwe na rimwe cyangwa se ataratangira.

*I will ask questions about activities babies may do. Your baby may have already done some of the activities described above and there may be some your baby has not begun doing yet. Please listen to each question carefully and pick the option that best describes your child's behavior. I will also ask you if the behavior is a concern.*

*At this age, many toddlers may not be cooperative when asked to do things. You may need to try the following activities with your child more than one time. If possible, try the activities when your child is cooperative. If your child can do the activity but refuses, mark "yes" for the item.*

#### COMMUNICATION

1.	Umwana wanyu aya atunga urutoki, agakora, cyangwa akagaragaza gufata/kwerekana ifoto mugitabo?  <i>Does your child point to, pat, or try to pick up pictures in a book?</i>	Yego - Yego <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
2.	Ese umwana wawe avuye amagambo 4 cyangwa menshi yiyongera kuri "Mama" na "Papa"?  <i>Does your child say four or more words in addition to "Mama" and "Dada"?</i>	Yego - Yego <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
3.	Igihe umwana wawe ashaka ikintu, ese abikubwira agitunga urutoki?  <i>When your child wants something, does he tell you by pointing to it?</i>	Yego - Yego <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
4.	Igihe ubajije umwana wawe ku jya gushaka igikiriho cyangwa ikindi kintu, ese aya mu kindi cyumba? (Ushobora kumbwira uti "Umupira wawe uri he?" cyangwa ukavuye "Nanira ikoti ryawe" cyangwa "Jya gufata umwenda wawe.")  <i>When you ask your child to, does he go into another room to find a familiar toy or object? (You might ask, "Where is your ball?" or say, "Bring me your coat" or "Go get your blanket.")</i>	Yego - Yego <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>


5.	<p>Ese umwana wawe yigana interuro y'amagambo 2, nk'urugero, igihe uvuze interuro y'amagambo 2 nka "Mama ararya", "Papa arakina", "Jya mu rugo" "iki ni iki?" Umwana wawe ayaguzubiriramo yombi? (Shyiraho "yego" n'ubwo amagambo ye akomeye kuyumva.)</p> <p><i>Does your child imitate a two-word sentence? For example, when you say a two-word phrase, such as "Mama eat," "Daddy play," "Go home," or "What's this?" does your child say both words back to you? (Mark "yes" even if his words are difficult to understand.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
6.	<p>Ese umwana wawe avuye amagambo 8 cyangwa menahi yiyongera kuri "Mama" na "Papa"?</p> <p><i>Does your child say eight or more words in addition to "Mama" and "Dada"?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>


## GROSS MOTOR

1.	<p>Ese umwana wawe ahagarara wenyine hagati mu hantu harambuye wenyine agatera intambwe nyirahizi agana imbere?</p> <p><i>Does your child stand up in the middle of the floor by herself and take several steps forward?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
2.	<p>Umwana wanyu ashobora kurira/kuzamuka ku ntebe/ameza cyangwa ikindi kintu kigali?</p> <p><i>Does your child climb onto furniture or other large objects, such as large climbing blocks?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
3.	<p>Ese umwana wawe arunama cyangwa agusutama kugira ngo atora ikintu hasi, hanyuma akongera guhagarara ntacyo yifashihije?</p> <p><i>Does your child bend over or squat to pick up an object from the floor and then stand up again without any support?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
4.	<p>Ese umwana wawe agendera ku kintu aho gukambakambisha amavi n'ibiganza?</p> <p><i>Does your child move around by walking, rather than crawling on his hands and knees?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
5.	<p>Ese umwana wawe abasha kugenda neza akagwa rimwe na rimwe?</p> <p><i>Does your child walk well and seldom fall?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>

6.	<p>Ese umwana wawe ashaka icyo ahagararaho cyangwa akoresha ubundi buryo (nko gufata inkoni akagikubita) kugira ngo agere icyo ashaka (urugero nko kuvana ikintu ku idiribya cyangwa kugufaha mu gikoni)</p> <p><i>Does your child climb on an object such as a chair to reach something he wants (for example, to get a toy on a counter or to "help" you in the kitchen)?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
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## FINE MOTOR

1.	<p>Ese umwana wawe afasha guhinduranya impapuro z'igitabo?</p> <p>(Ushobora kuzamura urupapuro kugira ngo arufata.)</p> <p><i>Does your child help turn the pages of a book? (You may lift the pages for her to grasp.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
2.	<p>Ese umwana wawe ajugunya umupira mutoya anyeganyaza ikizigira cy'ukuboko? (Niba uwurukuye ukture hasi andika "Ntarabikora" kuri iyi nteruro)</p> <p><i>Does your child throw a small ball with a forward arm motion? (If he simply drops the ball, check "not yet" for this item.)</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
3.	<p>Ese umwana wawe agereka agatafari cyangwa agakinisha hejuru y'akandi kamwe?</p> <p>(Ushobora gukoresha ikidongi cy'ubudodo, udukarito duta cyangwa udukinisha tutarengeje mu mubyimba igikumwe)</p> <p><i>Does your child stack a small block or toy on top of another one? (You could also use spools of thread, small boxes, or toys that are about 1 inch in size.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>
4.	<p>Ese umwana wawe agerekeramye, udutafari 3 cyangwa udukinisha kamwe hejuru y'akandi we ubwe?</p> <p><i>Does your child stack three small blocks or toys on top of each other by herself?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe – Sometimes <input type="radio"/></p> <p>Ntarabikora – Not yet <input type="radio"/></p>

5.	<p>Ese umwana wewe ashyira ikimenyetso ku rupapuro akoresheje umutwe w'ikaramu y'ibara (ikaramu y'igiti cyangwa ikaramu banze) igihe agerageza gushushanya?</p> <p><i>Does your child make a mark on the paper with the tip of a crayon (or pencil or pen) when trying to draw?</i></p> 	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
6.	<p>Ese umwana wewe ahinduranya impapuro z'igitabo we ubwe? (Ashobora guhindura impapuro zinzwe rumwe icyarimwe.)</p> <p><i>Does your child turn the pages of a book by himself? (He may turn more than one page at a time.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>

### PROBLEM SOLVING

1.	<p>Nyuma yo gushwarambura ku rupapuro n'ikaramu y'ibara (ikaramu y'igiti cyangwa ikaramu banze) imbere n'inyuma, ese umwana wewe arakwigana agashwarambura? (Niba yarazanywe ashwarambura abyikoresheje zhyiraho "yego" kuri iki nteruro.)</p> <p><i>After you scribble back and forth on paper with a crayon (or pencil or pen), does your child copy you by scribbling? (If she already scribbles on her own, mark "yes" for this item.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
2.	<p>Umwana wanyu ashobora gashyira akavungukira k'umugati/keke/irindazi mu gacupa gato kabonerana? (nk'agacupa ka fanta cyangwa k'abana)</p> <p><i>Can your child drop a crumb or Cheerio into a small, clear bottle (such as a plastic soda-pop bottle or baby bottle)?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>
3.	<p>Ese umwana wewe ashyira udukinishe tubiri duto kamwe nyuma y'akandi mu gashuri cyangwa mu ikarito? (Ushobora kumwerekako uko babikora.)</p> <p><i>Does your child drop several small toys, one after another, into a container, such as a bowl or box? (You may show him how to do it.)</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntabwo - Not yet <input type="radio"/></p>

4.	<p>Nyuma yo kwereka umwana wawe uko abikora, ese agerageza gutona agakinisha gato kari hiryu gato y'aho agera akoresheje ikiyiko, agati cyangwa ikindi gikoraho?</p> <p><i>After you have shown your child how, does she try to get a small toy that is slightly out of reach by using a spoon, stick, or similar tool?</i></p> 	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
5.	<p>Nta kumwerekana uko bikorwa, ese umwana wawe ashobora gushwanambura aganisha imbere n' inyuma icyo umuhaye ikaramu y'igiti?</p> <p><i>Without your showing him how, does your child scribble back and forth when you give him a crayon (or pencil or pen)?</i></p>	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
6.	<p>Nyuma y'uko akamanyu k'ikintu kaguye mu gacupa gato kabonerana, ese umwana wawe ashobora gucurika icupa, kugira ngo akuremo ako kamanyu? (Ushobora kumwerekana.) (Ushobora gukoresha icupa ry'amazi rya pulasitiki cyangwa inkongoro ye)</p> <p><i>After a crumb or Cheerio is dropped into a small, clear bottle, does your child turn the bottle upside down to dump it out again? (You may show her how.)</i></p>	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>

## PERSONAL-SOCIAL

1.	<p>Umwana wanyu ajya yiruha akoresheje ikiyiko, n'ubwo bimwe byatakam?</p> <p><i>Does your child feed himself with a spoon, even though he may spill some food?</i></p>	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
2.	<p>Umwana wanyu ajya yifasha gukuramo cy kwiyambura imyenda nk'amashyamba, ingofero, inkweto, cyangwa udusogbi bambara mu ntoki?</p> <p><i>Does your child help undress herself by taking off clothes like socks, hat, shoes, or mittens?</i></p>	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>
3.	<p>Ese umwana wawe akinbaha igikinisha gusa n'igishamba cyangwa n'umuntu aya n'ugihobera?</p> <p><i>Does your child play with a doll or stuffed animal by hugging it?</i></p>	Yego - Yes <input type="radio"/> Rimwe na Rimwe – Sometimes <input type="radio"/> Ntarabikora – Not yet <input type="radio"/>

4.	<p>Mu gihe yireba mu ndorerwamo aze umwana wawe aha igikinaho ihusho ye abona mu ndorerwamo?</p> <p><i>While looking at himself in the mirror, does your child offer a toy to his own image?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>
5.	<p>Ese umwana wawe agusaba kumwitaho [ nk'yo ashaka kwituma, kwihagarika cyangwa ko umwarurira ibiryo] cyangwa ajya agerageza kukwereka ikintu agukurura ikiganza cyangwa imyenda?</p> <p><i>Does your child get your attention or try to show you something by pulling on your hand or clothes?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>
6.	<p>Ese umwana wawe ajya aza agusanga igihe akomeye ko umufasha, nko gufunga igikinaho, cyangwa gufundura icupe nifundikiye?</p> <p><i>Does your child come to you when she needs help, such as with winding up a toy or unscrewing a lid from a jar?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Rimwe na Rimwe - Sometimes <input type="radio"/></p> <p>Ntarabikora - Not yet <input type="radio"/></p>

## OVERALL

Parents and providers may use the space below for additional comments.

1.	<p>Ese utakereza ko umwana wawe yumva neza?</p> <p><i>Do you think your child hears well?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Oya - No <input type="radio"/></p>
	<p>Niba ari "oye", sobanura.</p> <p><i>If no, explain.</i></p>	<p>-----</p>
2.	<p>Ese utakereza ko umwana wawe avuga nk'abandi bana bato bo mu kigero cye?</p> <p><i>Do you think your child talks like other toddlers his age?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Oya - No <input type="radio"/></p>
	<p>Niba ari "oye" sobanura.</p> <p><i>If no, explain.</i></p>	<p>-----</p>
3.	<p>Ushobora kumva byinshi mu byo umwana wawe avuye?</p> <p><i>Can you understand most of what your child says?</i></p>	<p>Yego - Yes <input type="radio"/></p> <p>Oya - No <input type="radio"/></p>
	<p>Niba ari "oye" sobanura.</p> <p><i>If no, explain.</i></p>	<p>-----</p>

4.	Ese utakereza ko umwana wawe uko agenda, yiruka ndetse n'uko yurira abikora nk'abandi bana bato bo mu kigero cye? <i>Do you think your child walks, runs, and climbs like other toddlers her age?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "oya" sobanura. <i>If no, explain.</i>	-----
5.	Ese umwe mu babyeyi bombi yaba yanigaze agira ubumuga bwo kutumva cyangwa gupfa amatwi mu bwana bwe? <i>Does either parent have a family history of childhood deafness or hearing impairment?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
6.	Ese ufite impungenge ku mibereho k'umwana wawe? <i>Do you have concerns about your child's vision?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
7.	Umwana wawe yaba yanagize ibibazo by'uburwayi mu mezi menshi ashize? <i>Has your child had any medical problems in the last several months?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
8.	Ese ufite impungenge ku myitwarire y'umwana wawe? <i>Do you have any concerns about your child's behavior?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----
9.	Ese hari ikintu kiguhangayikishije ku mikurire y'umwana wawe? <i>Does anything about your child worry you?</i>	Yego – Yes <input type="radio"/> Oya – No <input type="radio"/>
	Niba ari "yego" sobanura. <i>If yes, explain.</i>	-----

# Description of children with and without developmental delay.

DISTRICT/AKARERE:

SECTOR/UMURENGE:

CELL/AKAGALI:

VILLAGE/UMUDUGU:

**NUMBER:**

---

1. What is the sex of your child? NI ikihe gitsina cyumwana wawe?

Mark only one oval.

- Female/umukobwa  
 Male/umuhungu

2. What category of ubudehe do you have? muba mukihe cyoliro cyubudehe?

Mark only one oval.

- Category I/icyambere  
 Category II/icyakabiri  
 Category III/icyagatatu

3. current weight/ibiro afitse ubu

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4. height/uburebure umwana afitse ubu.

Mark only one oval.

- stunted  
 normal

5. MUAC/umuzenguruko wukuboko afitse ubu.

---

6. Head circumference/umuzenguruko wumutwe afitse ubu.

Mark only one oval.

- microcephaly/umutwe muto  
 normocephalic/umutwe muzima  
 macrocephaly/umutwe munini

7. what was the birth weight of your child?  
umwana yavukanye ibiro bingaha?

---

8. Was your child born at term or preterm/umwana yawutse ashyitse?

Mark only one oval.

- Term/ashyitse
- Preterm/adashyitse

9. have you ever had below mentioned disease on the pregnancy?/wigeze uwara izi ndwara utwite?

Mark only one oval.

- HIV/Ubwandu bwagakoko gatera sida
- syphilis/mburugu
- others/izindi ndwara:
- no/oya
- Other: \_\_\_\_\_

10. what is the hiv status of your child?/umwana wawe abana nubwandu bwa virus itera SIDA?

Mark only one oval.

- Yes/yego
- No/oya

11. have you ever smoke or took alcohol on the pregnancy?utwite wanywaga itabi oyangwa inzoga?

Mark only one oval.

- alcohol/inzoga
- tobacco/itabi
- no/oya

12. what was your age at child's birth?/wabyaye umwana ufite imyaka ingaha?

\_\_\_\_\_

13. does your child started breastfeeding the first day of life?umwana wawe yatangiye konka umunsi yawutseho?

Mark only one oval.

- yes/yego
- no/oya

14. Was your child admitted to the hospital in the first month of life?/umwana wawe yabaye mu bitaro mukwezi kwa mbere nyuma yo kuvuka?

Mark only one oval.

- yes/yego
- no/oya

15. How was your child feed for the first six months of life? Check all that apply/wagaburiye umwana gute mumezi atandatu yambere?

Check all that apply.

- Breastfeed/konka
- Formulalamata yo mubikombe
- Cows milk/amata yinka.

16. How is your child currently feed? ubu umwana aya iki?

Check all that apply.

- Breastfeed and food/aronka akanarya.
- Infant formula and food/anywa amata yo mubikombe akanarya.
- cow's milk and food/anywa amata yinka akanarya.
- food alone/ibiryo gusa

17. when have you started food supplementation?wafangiyе ifachabere ryari?

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18. your child have ever taken child micronutrient powder?/umwana wawe yigeze afata ongera

Mark only one oval.

- yes/yego
- no/oya

19. do you use to take your child to growth monitoring check-ups?/ujya utwara umwana wawe kumupimisha ibiro ngo urebe ko yiyongera?

Mark only one oval.

- yes/yego
- no/oya

20. have you spoke to a community health worker in the last month?/ukwezi gushize wigeze uganira numujyenama wubuzima?

Mark only one oval.

- yes/yego
- no/oya

## Untitled Section

21. Was your child admitted to the hospital for meningitic or cerebral malaria?/umwana yaba yarabaye mubitaro kubera mugiga oyangwa marariya?

Mark only one oval.

- Yes/yego.
- No/oya

22. What is your relationship status?/urubatshe?

Mark only one oval.

- married/warashitse
- single/ingaragu
- widow/umupfakazi

23. What is your relationship to the child?/upfana iki numwana?

Mark only one oval.

- mother/mama
- father/papa
- family member/uwo mumuryango numwana

24. do you have insurance?/ufite ubwishingizi?

Mark only one oval.

- yes/yego
- No/ya

25. have you ever consulted for this problem?/wigeze uya kwamuganga kubera iki kibazo?

Mark only one oval.

- yes/yego
- no/ya

26. What is your highest education level completed?/wize amashuri angaha?

Mark only one oval.

- None/nayo
- Primary school/abanza
- Secondary school/ayisumbuye
- university/ayakaminuza

27. household/umuryango wo murugo ugizwe nabana bangaha?

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**2.Certificate of Consent.**

Study number.....

I have read the above information, or it have been read to me and I have even had the opportunity to ask questions about this study and all asked questions have been answered to my satisfaction. I voluntarily consent to participate in this study

Name of the caregiver\_\_\_\_\_

Caregiver signature\_\_\_\_\_

Date \_\_\_\_\_

Day/month/year

If illiterate

I have witnessed the exact reading of the potential participant consent form, and the person had the opportunity to ask any questions. I confirm that the person has given his consent freely.

Name of witness\_\_\_\_\_ AND the caregiver thumb

Signature of witness \_\_\_\_\_

Date \_\_\_\_\_

Day/month/year

### 3. Certificate of Consent-Kinyarwanda version

Ubushakashatsi no.....

Nasomye amakuru y'ubushakashatsi cyangwa bansomeye amakuru y'ubushakashatsi. Nahawe umwanya uhagije wo kubaza ibibazo kuri ubu bushakashatsi ,nasubijwe neza.Nemereye umwana wanjye kuba muri ubu bushakashatsi kandiMfite nuburenganzira bwo kuvana umwana wanjye mubushakashatsi igihe cyose nabishakia kandi ntibingireho ingaruka mumivurirwe ye.

Amazina y'umubyeyi w'umwana \_\_\_\_\_

Umukono w'umubyeyi w'umwana \_\_\_\_\_

italiki \_\_\_\_\_umunsi/ukwezi/umwaka.

Niba umubyeyi/umurwaza atarize

Ndahamyako umubyeyi/umurezi w'umwana yasomewe neza amasezerano yo kwemera kujya mu bushakashatsi,kandi ko umubyeyi/umurezi yahawe amahirwe yo kubaza ibibazo,ndemeza kandi ko umurwayi afite uburenganzira bwo kuvana umwana we muri ubu bushakashatsi igihe cyose yabishakira.

Amazina y'umuhamya \_\_\_\_\_ igikumwe cy'umubyeyi.

Umukono w'umuhamya \_\_\_\_\_

Italiki \_\_\_\_\_umunsi/ukwezi/umwaka.

### 4.Ethical Approaval



**CMHS INSTITUTIONAL REVIEW BOARD (IRB)**

Kigali, 19<sup>th</sup>/07/2019

**Dr Victoire TUYISENGE**  
School of Medicine and Pharmacy, CMHS, UR

**Approval Notice: No 365/CMHS IRB/2019**

Your Project Title *"Screening Of Developmental Delay in Children of 9<sup>th</sup> And 15<sup>th</sup> Months of Age, Kigali-Rwanda: Using Ages and Stages Questionnaire 3"* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No ( Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyashongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Madenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 19<sup>th</sup> July 2019, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 19<sup>th</sup> July 2019

Expiration date: The 19<sup>th</sup> July 2020

  
Professor GAHUTU Jean Bosco  
Chairperson Institutional Review Board,  
College of Medicine and Health Sciences, UR



Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR