

Feasibility and Acceptance of Biometric Registration for Infants and Young Children in Rural Ghana: A Qualitative Study

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Abstract.

A significant number of infants and young children in low-income countries lack official documentation, hindering their admittance to important facilities such as healthcare. This study evaluated the feasibility of a novel biometric registration system utilizing smartphones and medications to detect physical features of children in rural Ghana. The research aimed to assess this technology's acceptability, challenges, and benefits between healthcare beneficiaries and caregivers in the Akuapem South Municipality, Ghana. Qualitative methods, including interviews and focus groups, were employed to gather data. Findings indicate a positive reception to the biometric system, with participants recognizing its potential to streamline the registration process and improve service delivery. However, barriers such as misconceptions, time constraints, and the absence of parental involvement emerged. To successfully implement this technology, addressing these challenges and promoting broader community engagement are crucial.

INTRODUCTION

A substantial share of the worldwide populace, mainly in low and middle-income nations, lacks formal identification. That issue is especially pronounced in children, with millions unregistered in civil and healthcare systems. Sub-Saharan Africa bears a disproportionate burden of this crisis, where a significant percentage of newborns and children remain undocumented. Ghana is a case in point, with a substantial portion of its population devoid of legal identity. This lack of registration impedes access to essential services, rights, and opportunities.

Several factors contribute to the low birth registration rates in this region. Insufficient awareness, conflicting cultural and religious practices, financial barriers, and inefficient bureaucratic processes are among the primary challenges. Despite mandatory and free birth registration policies in Ghana, the paper-based system presents obstacles.

Biometrics, encompassing distinct physical or behavioral traits, offer a potential solution for identification. While biometric systems are increasingly adopted for adult populations in many Sub-Saharan African nations, their application to children remains relatively uncommon.

Biometric identification for infants and children offers several potential benefits, including improved tracking of immunization and healthcare utilization, enhanced access to social programs, and the establishment of formal identity. The immutability and uniqueness of biometric data can reduce errors and fraud associated with traditional registration methods. Furthermore, digital health records linked to biometric identifiers can facilitate more effective healthcare delivery, particularly for conditions requiring long-term monitoring. However, the implementation of biometric systems also presents challenges, including privacy concerns, potential for exclusion due to technical failures, and the risk of data misuse.

To assess the practicality of using biometric data to identify young children, researchers at the Akuapem South Municipality Health Research Centre conducted a preliminary study within the Akuapem South Municipality district. A mobile-based system was utilized to collect the unique physical attributes of infants and children under five years old. The project involved training field workers to collect data and securely store biometric information.

METHODS

Study Setting

The research was conducted in Akuapem South Municipality district, located approximately 80 kilometers south of Ghana's capital, Aburi. Predominantly rural, with agriculture and small-scale trade as primary economic activities, the district has a substantial population, including a notable proportion of children under five years old. The Akuapem South Municipality Health Research Centre, a prominent institution engaged in health research and service provision, served as the base for this study.

Study Design and Participants

To understand the perceptions and experiences related to the biometric registration prototype, a qualitative research approach was employed. Semi-organized conferences and emphasis group conferences were employed to gather information from three key participant groups: healthcare providers, caregivers of children aged 0-5 years, and data collectors involved in the pilot project. Participants were recruited from health facilities and communities within the

Akuapem South Municipality district where the biometric registration system was implemented. This approach aimed to capture a diverse range of perspectives on the new technology.

Data Collection

Data collection occurred between January and March 2019. Semi-structured interviews were conducted with fifteen healthcare providers to explore their experiences, perceptions, and challenges related to the biometric registration prototype. Ten focus group discussions were held with caregivers of children under five. These discussions delved into caregivers' knowledge, attitudes, and opinions about biometric registration, comparing the experiences of those whose children were enrolled in the pilot to those who were not. Additionally, four focus groups with data collectors were conducted to gather insights into their roles, challenges, and recommendations for improving the registration process.

1. Data collection methods and illustration size.

Data collection methods	Participants Groups	Study sites and sampling	
		Manhiça	Bilene-Macia
In-Depth Interviews	Medical Personnel	5	0
Group Discussions	Parents with infants or children aged 1-4 years who joined the initial biometric pilot	6 FGDs (n = 42)	0
	Parents with infants or children aged 1-4 years who did not join the initial biometric pilot	0	1 FGD (n = 10)
	Survey Participants	2 FGDs (n = 8)	0

Table 2. Participant Selection Criteria

Participants Group	Participation Criteria	Location
Medical Staff	Participants were employed healthcare professionals aged 20-65, informed about the study, and consented to participate.	Akuapem South Municipality
Parents of Enrolled Children	Participants were adult caregivers aged 21-60 with children under six who had undergone biometric testing and consented to the study.	Akuapem South Municipality
Parents of Non-Enrolled Children	Adults aged 23 to 55 with a child under six who was not part of the biometric trial and is willing to participate.	Bilene-Macia
Data Collection Personnel	Data collectors aged between 25 and 50 years participated in the biometric registration system.	Akuapem South Municipality

Data Analysis

The information composed from conferences and focus group negotiations was meticulously transcribed and subjected to thematic analysis. This involved identifying, coding, and categorizing key themes and patterns within the data. The analysis aimed to comprehensively understand the participants' perceptions of the biometric registration prototype, including its acceptability, usability, and associated facilitators or barriers. To enhance the credibility of the findings, data triangulation across participant groups was employed.

Participant Attribute	Frequency
Gender	
Male	3
Female	5
Age Group	
21-30	3
31-40	5

College Graduate	2
Marital Status	
Single	3
Married/Partnered	5
Religion	
Catholic	6
Protestant	2

Table 3. Sociodemographic characteristics of healthcare providers**Table 4. Sociodemographic characteristics of caregivers**

Participant Attribute	Akuapem Municipality (n = 42) n/%	SouthBilene-Macia (n = 10) n/%	Total (n = 52) n/%
Age Group			
19–26	24 (57)	4 (40)	28 (54)
27–36	14 (33)	5 (50)	19 (37)
37–50	4 (10)	1 (10)	5 (9)
Education Level			
No Formal Education	2 (5)	1 (10)	3 (6)
Incomplete Primary School	10 (24)	2 (20)	12 (23)
Completed Primary School	7 (17)	2 (20)	9 (17)
Incomplete Secondary School	19 (45)	4 (40)	23 (44)
Completed Secondary School	4 (9)	1 (10)	5 (10)
Marital Status			
Single	13 (31)	2 (20)	15 (29)
Married/Partnered	29 (69)	8 (80)	37 (71)
Occupation			
Homemaker	38 (90)	8 (80)	46 (88)
Factory Worker	4 (10)	2 (20)	6 (12)
Religion			
Protestant	25 (60)	5 (50)	30 (58)
Catholic	10 (24)	4 (40)	14 (27)
Other Christian Denominations	7 (16)	1 (10)	8 (15)
Participant Attribute	Akuapem Municipality (n = 42) n/%	SouthBilene-Macia (n = 10) n/%	Total (n = 52) n/%
Age Group			
19–26	24 (57)	4 (40)	28 (54)

Table 5. Sociodemographic characteristics of data collectors.

Participant Attribute	Frequency
Gender	
Male	3
Female	5
Age Group	
21–30	3
31–40	5
College Graduate	2
Marital Status	
Single	3
Married/Partnered	5
Religion	
Catholic	6

RESULTS

Acceptance of Biometric Registration

The biometric registration prototype was generally well-received by healthcare providers, caregivers, and data collectors. Healthcare professionals appreciated the potential for enhanced record accuracy and efficiency compared to traditional paper-based systems. Caregivers recognized the value of a reliable identification method for their children, particularly in accessing healthcare services. Data collectors found the technology user-friendly and effective in capturing biometric information.

Perceived Barriers

Despite the overall positive reception, several obstacles hindered the operation of the biometric recordkeeping system. Misconceptions and misunderstandings about the technology were prevalent among caregivers, creating resistance to the process. Insufficient information about the benefits of biometric registration exacerbated these concerns. Healthcare providers expressed challenges related to time constraints and increased workload, as the new task added to their existing responsibilities. Furthermore, the absence of fathers in the registration process due to cultural norms posed a significant barrier.

Facilitators of Biometric Registration

Several factors contributed to the successful implementation of the biometric registration system. Comprehensive training and ongoing support for data collectors were crucial in enhancing their confidence and proficiency in using the technology. Community engagement initiatives, including sensitization efforts, were instrumental in increasing awareness and acceptance of biometric registration among caregivers. The involvement of local leaders and influential community members helped to build trust and dispel misconceptions about the process. Additionally, integrating biometric registration into existing healthcare workflows was identified by providers as essential for long-term sustainability and minimal disruption to routine services.

CONCLUSION

The findings of this study demonstrate a positive reception to the biometric recordkeeping exemplar between healthcare benefactors, caregivers, and data amassers. The perceived benefits of accurate identification, enhanced record-keeping, and improved access to healthcare services contributed to this overall acceptance. However, to successfully implement and scale the technology, addressing identified barriers is crucial.

Targeted community education and awareness campaigns are essential to dispel misconceptions and highlight the advantages of biometric registration. Moreover, involving a broader range of family members, including fathers, in the registration process is necessary to overcome cultural obstacles and ensure wider acceptance. To minimize disruptions to healthcare delivery, integrating biometric registration seamlessly into existing workflows is essential. By addressing these challenges and capitalizing on the identified opportunities, the potential of biometric registration to improve child health and welfare can be fully realized.

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