# Socio-Demographic Determinants of Digital CQI Adoption Among MNCH Health Workers in Kenya, a case of Kwale County

### Charles Kimani Maina , Kenneth Rucha Kibaara , Eliphas Gitonga , Kabeu Emma Watetu

Abstract— Continuous Quality Improvement (CQI) is essential for enhancing maternal, newborn, and child health (MNCH) services, yet its digital adoption varies widely among healthcare workers. This study investigated how socio-demographic characteristics influence comfort with and uptake of digital CQI tools among MNCH staff in eight public health facilities in Kwale County, Kenya. A cross-sectional survey was administered to 64 clinical and technical health workers, capturing age, gender, education, years of experience, professional cadre, and prior digital exposure, alongside self-rated comfort using a 5-point scale. Chi-square tests of independence ( $\alpha$ =0.05) assessed associations between these factors and comfort (ranging from 1 least comfortable to 5 - most comfortable). Results showed that mid-career clinicians (age 30-39;  $\chi^2$ =13.2, p=0.002) and direct-care cadres (nurses, clinical officers;  $\chi^2=12.1$ , p=0.020) were significantly more comfortable with digital CQI compared to other staff and administrative roles. No significant associations were found for gender, education level, years of experience, or prior digital use (all p>0.05).

*Index Terms*— Continuous Quality Improvement (CQI), digital CQI adoption, digital CQI tools.

#### I. INTRODUCTION

Kenya's health system has made significant strides toward Universal Health Coverage, yet maternal and newborn outcomes remain uneven across counties. Kwale County, for instance, reports a neonatal mortality rate of 19 per 1,000 live births—well above the national target of <12—and only 35% postnatal modern contraceptive uptake against a 70% national goal (Asiimwe JB, 2024). Continuous Quality Improvement (CQI) frameworks, such as the Kenya Quality Model for Health, are central to closing these gaps by promoting systematic, data-driven enhancements in service delivery.

Traditional CQI trainings in Kenya have relied heavily on in-person workshops and manual record-keeping, leading to fragmented data capture and delayed feedback loops. The introduction of digital CQI platforms—offering real-time performance dashboards, standardized e-learning modules, and iterative Plan-Do-Study-Act (PDSA) cycle support—promises to overcome these limitations. Early implementations of digital clinical support systems like

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Despite these innovations, little is known about which health worker groups most readily adopt digital COI. Socio-demographic factors including age, professional cadre, education level, and prior digital exposure, have been linked to e-health uptake in other settings but have not been systematically studied within Kenya's MNCH workforce. This paper addresses that gap by examining how these factors influenced comfort with and uptake of digital CQI tools among MNCH staff in Kwale County, thereby informing targeted capacity-building strategies for sustainable digital CQI implementation.

#### I. LITERATURE REVIEW

Health worker socio-demographic factors such as age, gender, education, and work experience significantly influence the adoption of digital Continuous Quality Improvement (CQI) systems. A study in Ethiopia found that younger health workers were more likely to embrace digital innovations compared to older colleagues, who required more support (Ngusie, 2022).

Another study conducted still in Ethiopia revealed that health professionals with a master's degree were over twice as likely to possess adequate digital literacy compared to those with lower educational levels (Tegegne, 2023). Additionally, access to digital technology and prior training were strong predictors of digital literacy, which is essential for effective digital CQI adoption. Health professionals with access to digital technology were 1.89 times more likely to have adequate digital literacy, and those who had received training were 1.65 times more likely to be digitally literate. A positive attitude towards digital health technology also increased the likelihood of adequate digital literacy by 1.64 times.

In Northern Nigeria, research indicated that multiple demographic and professional factors significantly influence the adoption of digital health tools. Factors such as age, gender, education level, and professional experience were found to impact the likelihood of health workers embracing digital solutions (Anyanwu, 2024).

Collectively, these studies highlight that higher educational attainment, access to technology, targeted training, positive attitudes towards digital health, and supportive leadership are pivotal socio-demographic factors that enhance the adoption of digital health systems among health workers.



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# II. METHODS

#### A.Research Design

The study was a Quasi-experimental pre-post design, done in eight intervention public health facilities.

### B. Study Area

The study was conducted in selected public health facilities in Kwale County, located in Kenya's coastal region. Kwale is one of the 47 counties in Kenya, characterized by a largely rural population, with agriculture, fishing, and tourism as key economic activities. The county has a poverty incidence of 47%, higher than the national average, contributing to challenges in healthcare access and utilization.

# C. Study population

The study included clinical and technical health workers involved in patient management within the participating facilities. This group consisted of nurses, clinical officers, medical officers, pharmacists, and laboratory staff, reflecting the multidisciplinary nature of healthcare delivery. These health workers participated in the digital CQI training and were involved in implementing postnatal care services, including family planning (FP) counseling and service provision.

# **D**.Inclusion Criteria

Health workers who participated in the digital CQI training and were willing to provide informed consent for participation in the study.

# E. Exclusion Criteria

Health workers who did not participate in the digital CQI training or declined to provide informed consent

#### F. Sample Size Determination

The study used the modified Cocran's formula in determining the sample size of the healthcare workers, and then distribute the sample between the selected health facilities using the single population proportion formula (Bartlett, 2001).

The Cocran's formula provided a sample that was large enough to give the confidence levels we need.

 $N_0 = ((1.96)^2(0.5) * (0.5)) / (0.05)^2 = 385$ 

Since Total number of health workers supporting the MNCH departments within treatment health facilities was 70,

N(T) = 70

n(T) = 385 / (1+(384 / 70)) = 54

Accounting for 10% for non-response, final sample for health care workers was

# Total sample = 59 (HCWs)

# G.Sampling Technique

The study employed a stratified random sampling technique to select participants from the target population. Health workers were stratified by cadre, including nurses, clinical officers, medical officers, pharmacists, and laboratory staff involved in patient management within the selected health facilities. From each stratum, participants were randomly selected to ensure representation across disciplines.

# H.Data collection Instrument

A structured questionnaire was developed and translated into Google forms, a user-friendly online application. This structured tool captured socio-demographic characteristics, digital CQI training experiences, perceptions of digital CQI implementation, and views on dashboard tracking. The socio demographic factors included in the questionnaire included age, gender, education, years of experience, cadre, and prior digital tool use. Responses on participants comfort in digital CQI Adoption were measured using a Likert scale to assess attitudes, knowledge, and practices related to CQI.

# I. Data Collection Methods

The questionnaire was developed and translated into Google forms, a user-friendly online application. The respondents were sensitized on the data collection tool and the respondents self-administered the questionnaire at the beginning and end of digital CQI training.

#### J. Validation of Questionnaire

A pre-test was conducted at Likoni Sub-County Hospital, Mombasa County to assess the clarity, feasibility, and consistency of the research instruments. The validity of the research instruments was ensured through expert review and stakeholder engagement. The internal consistency of the questionnaire was evaluated using Cronbach's Alpha, with all constructs achieving coefficients above 0.7, indicating satisfactory reliability. Additionally, consistent responses across similar items demonstrated stability, while the standardized administration of tools ensured uniformity during data collection. These results confirmed the instruments' reliability for the main study.

# K.Data Management and Analysis

Data was collected through Google Forms and automatically stored in Microsoft Excel. To enhance accuracy, the data was reviewed for errors, cleaned, and coded. Descriptive and inferential analyses were then performed using Microsoft Excel and SPSS version 25.0. Participants comfort in digital CQI adoption was measured using a Likert scale from 1 (least comfortable) to 5 (most comfortable). Socio demographic factors were also categorized. The associations between the socio-demographic factors and the respondents' comfort in digital CQI adoption was tested using chi-square test of independence ( $\alpha = 0.05$ ).

#### L. Ethical Considerations

Ethical clearance was secured from Kenyatta University Ethics Review Committee, National Commission for Science, Technology, and Innovation (NACOSTI) and Kwale County Department of Health. The participants provided written informed consent prior to completing the questionnaire, following an explanation of the study's objectives and significance. The collected data was maintained in a confidential manner. The questionnaire was composed in English, the language comprehended by the participants in the study area. To ensure confidentiality, all data collected were anonymized and stored securely, accessible only to the research team. Participants were informed of their right to withdraw from the study at any stage without consequences. The study adhered to ethical principles outlined in the Declaration of Helsinki (WMA, 2013), ensuring respect for participants, beneficence, and justice throughout the research process.



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#### III. RESULTS

The respondents were mainly female (at 58%), with 66% aged between 30 and 39 years. Fifty eight percent of the respondents had over 7 years' experience compared to 23% with between 4 and 6 years of medical experience. Most of the respondents had a relevant medical diploma at 80%, whereas 17% had a bachelors or master's level medical

qualification. Seventy eight percent of the respondents had previous experience in the maternal, newborn and child health (MNCH) department. Thirty percent of the respondents served as nurses, 17% as clinical officers. Detailed analysis of the demographic profile of the responding health care workers (HCW) is presented in *Table I* below.

<i>Table 1. Demographic profile of the responding HC</i>	aphic profile of the responding H	CW
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Age-Group	Number of respondents	Percentage
20 - 29 years	7	11%
30 - 39 years	42	66%
40 - 49 years	13	20%
50 years and above	2	3%
Gender		
Female	37	58%
Male	27	42%
Education level		
Bachelor's Degree	10	16%
Certificate	2	3%
Diploma	51	80%
Master's Degree or higher	1	2%
Years of Experience		
Less than 1 year	1	2%
1 - 3 years	11	17%
4 - 6 years	15	23%
7 years or more	37	58%
Experience in MNCH		
No	14	22%
Yes	50	78%
Role in facility		
Clinical Officer	11	17%
Nurse	19	30%
Laboratory technologist	7	11%
Pharmaceutical technologist	4	6%
Records and Information officer	6	9%
Other (specify)	17	27%

To assess the influence of the specific socio-demographic factors on the comfort of in digital CQI adoption, a chi-square test of independence was conducted using categorical data collected from health workers. The dependent variable was digital CQI adoption, measure by assessing HCW comfort of using digital tools for CQI training. Independent variables included age group, gender, highest level of education, years of experience in the health sector, role in the facility (cadre), and prior experience with digital tools, all recorded as categorical variables. The analysis aimed to determine whether significant associations existed between these socio-demographic factors and the uptake of digital CQI tools. Statistical significance was determined at p < 0.05. The summary of HCW comfort in digital CQI adoption is summarized in Table II below, with 1 being least comfortable and 5 most comfortable.

How comfortable were you with using digital tools for CQI	Frequency	Percentage
Least comfortable – 1	4	6%
2	7	11%
3	20	31%
4	18	28%
Most Comfortable – 5	15	23%
	1	

Table II. Summary of HealthCare Workers (HCW) comfort in digital CQI adoption

The association between health workers' comfort in digital CQI adoption and their socio-demographic characteristics—including age group, gender, highest level of *Table III* below summarizes the level of association with their corresponding p-values.





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	Frequency	Percentage	Chi Square
Age group			
20 - 29 years	6	9%	P = 0.00196
30 - 39 years	43	67%	
40 - 49 years	13	20%	
50+ years	2	3%	
Gender			
Male	27	42%	P = 0.10957
Female	37	58%	
Highest level of education			
Diploma	51	80%	P = 0.57186
Certificate	2	3%	
Master's Degree or higher	1	2%	
Bachelor's Degree	10	16%	
Years of experience in the healt	h sector		
< 1 year	1	2%	P = 0.05490
1 - 3 years	11	17%	
4 - 6 years	15	23%	
7+ years	37	58%	
Cadre (Role in the facility)			
HRIO	6	9%	P = 0.01967
Nurse	19	30%	
Clinical Officer	11	17%	
Laboratory technologist	7	11%	
Pharmaceutical technologist	4	6%	
Other (specify)	17	27%	
Previous Experience with Digita	al Tools		
			P = 0.56082

Table III. Analysis of the association between HCW socio-demographic characteristics and HCW comfort of digital CQI adoption

#### 53 83% Yes 11 17% 1. No

# IV. DISCUSSION

The association between socio-demographic factors and digital COI adoption was assessed using the chi-square test of independence. From Error! Reference source not found. below, the chi-square test results showed that age group (p = 0.001966) and role in the facility (p = 0.019672) had statistically significant associations with the comfort and uptake of digital CQI tools. Health workers aged 30-39 years were the most engaged (67%), while those aged 50+ years were least engaged (3%), suggesting younger workers are more receptive to digital solutions. Nurses and clinical officers demonstrated higher levels of adoption compared to records officers and pharmaceutical technologists, likely due to their routine involvement in patient care and quality improvement processes.

Conversely, gender (p = 0.1096), highest education level (p =0.5719), years of experience in the health sector (p = 0.0549), and prior digital experience (p = 0.5608) were not significantly associated with digital CQI adoption. This indicates that digital tools were accessible across diverse educational and experiential backgrounds.

#### V. RECOMMENDATIONS

Based on the findings of this study, particularly the significant influence of age and professional role on the adoption of digital CQI processes, several targeted recommendations are proposed to enhance uptake and ensure inclusive implementation, including:



Develop video tutorials & digital guides to support older health workers (50+ years).

2. Assign digital CQI mentors within facilities for peer learning.

3. Incorporate digital CQI adoption into health worker orientation programs.

#### REFERENCES

- [1] Anyanwu, M. O. (2024). Socio-demographic Factors Influencing the Adoption of Digital Health Tools for Public Health Emergencies in Northern Nigeria. Texila International Journal of Academic Research, https://doi.org/10.21522/tijar.2014.11.04.art015.
- [2] Asiimwe JB, A. E. (2024). Quality of newborn care and associated factors: An analysis of the 2022 Kenya demographic and health survey. PLOS Glob Public Health, 4(11).
- [3] Bartlett, J. E. (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research. Information Technology, Learning, and Performance Journal, Vol. 19, No. 1,, 43-50.
- [4] Dinh N, A. S. (2022). Implementation Outcomes Assessment of a Digital Clinical Support Tool for Intrapartum Care in Rural Kenya: Observational Analysis. JMIR Form Res, 6(6).
- [5]Tegegne, M. D. (2023). Digital literacy level and associated factors among health professionals in a referral and teaching hospital: An implication for future digital health systems implementation. Front. Public Health. 11:1130894. doi: 10.3389/fpubh.2023.1130894, 1-9.
- [6] Vatsa R, C. W. (2025). Impact evaluation of a digital health platform empowering Kenyan women across the pregnancy-postpartum care continuum: A cluster randomized controlled trial. PLoS Med, 22(2).