

Socio-Demographic Factors of Diarrhoea among Children Under Five Years in Matungulu and Mavoko Sub-Counties, Kenya

Winfred Mbinya Manetu^{1*}, Kennedy Nyabuti Ondimu² and Amon Mwangi Karanja³

¹Department of Department of Social Sciences, Tharaka University, Marimanti, Kenya.

²Department of Geography, Egerton University, Nakuru, Kenya.

³Department of Geography, Masinde Muliro University of Science and Technology, Kakamega, Kenya.

ABSTRACT

Background: Children under five remain highly susceptible to diarrhoeal infections, accounting for about one in every nine deaths globally in this age group. Despite various national and global interventions to prevent diarrhoea and promote child health, diarrhoea persists as a major public health concern. This study, therefore, examined the socio-demographic factors influencing the prevalence of diarrhoea among children under five in Mavoko and Matungulu sub-counties.

Methods: A cross-sectional household survey involving 398 mothers or caregivers of children under five was conducted to assess socio-demographic factors linked to diarrhoea prevalence within the 14 days preceding the study. Multivariable binary logistic regression analysis was used to identify significant factors, with a 95% confidence interval and a significance level set at $p < 0.05$.

Results: Regression analysis revealed significant associations between childhood diarrhoea and specific socio-demographic factors in Matungulu and Mavoko sub-counties. In Matungulu, the education level of mothers or caregivers was significantly associated with diarrhoea occurrence among children (OR = 0.732, 95% CI: 0.217–2.204, $p = 0.011$). In Mavoko, maternal employment status showed a strong link to childhood diarrhoea (OR = 1.87, 95% CI: 0.94–3.76, $p = 0.004$). Additionally, the age of the child (7–36 months) was a significant predictor of diarrhoea in both sub-counties: Matungulu (OR = 1.704, 95% CI: 1.321–3.468, $p = 0.012$) and Mavoko (OR = 1.730, 95% CI: 1.221–2.468, $p = 0.023$).

Conclusion and Recommendations: The study demonstrated that childhood diarrhoeal disease in was influenced by mothers' or caregivers' education and employment status, as well as the child's age (7–36 months). Strengthening health education, promoting caregiver empowerment, and targeting households with young children are essential strategies for reducing diarrhoea prevalence in the study area.

Keywords

Childhood Diarrhoea, Socio-demographic Factors, Multivariate Logistic Regression model.

Corresponding Author Information

Winfred Mbinya Manetu

Department of Social Sciences, Tharaka University, Marimanti, Kenya.

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Introduction

According to the World Health Organization (WHO), diarrhoea is defined as the passing of three or more loose or watery stools within a 24-hour period, or a frequency of bowel movements higher than what is normal for an individual [1]. Diarrhoeal diseases are primarily caused by infections from bacteria, viruses, or protozoan parasites, particularly affecting young and older children [2]. Globally, diarrhoeal disease remains the second leading cause of death among children under the age of five, claiming the lives of approximately 525,000 children each year [3]. Notably, children below five years of age bear about 63% of the global diarrhoeal disease burden [4] making it the second leading cause of infant deaths in many developing countries [5,6] especially in areas lacking safe drinking water and adequate sanitation facilities. In Kenya, the 2022 Kenya Demographic and Health Survey (KDHS) reports that diarrhoea continues to be a major contributor to illness and death among children under five. The national prevalence rate of diarrhoeal diseases in this age group stands at 14%, showing only a minimal decline from the 15% reported in the 2014 KDHS, reflecting a mere 1% decrease over an eight-year period [7]. Further, in Machakos County, diarrhoeal diseases remain a significant public health concern. The Machakos County Statistical Abstract (2015) indicates that diarrhoea is the second most commonly reported illness, accounting for 14.6% of all disease cases among the top ten conditions in the county. This high prevalence highlights the ongoing health challenge posed by diarrhoeal diseases in the region. Despite various public health interventions, the burden of diarrhoea remains substantial, with considerable variation in its prevalence and contributing factors across different areas of the country. However, there is limited available data on the specific risk factors contributing to childhood diarrhoea within Machakos County. Therefore, this study seeks

to identify the socio-demographic risk factors influencing the prevalence of diarrhoea among children under the age of five in Mavoko and Matungulu sub-counties within Machakos County.

Materials and Methods

Study Settings and Design

This study employed a cross-sectional research design to assess the socio-demographic risk factors associated with diarrhoea prevalence among children under five years of age. A cross-sectional design was considered appropriate as it enables the collection of data at a single point in time to determine the prevalence of diarrhoeal diseases and identify potential associated factors within the study population. The study was conducted in Mavoko and Matungulu sub-counties, located within Machakos County, Kenya. Machakos County is situated in the Eastern region of Kenya and is characterized by both rural and rapidly urbanizing areas.

Study Participants and Response Rate

A sample of 398 households was estimated for the study using Yamane's equation. To determine and select the number of household respondents from Matungulu and Mavoko Sub-Counties, proportionate random sampling was used. Purposive sampling was used to select Mavoko and Matungulu Sub-Counties as the study areas due to their high number of diarrhoea cases and their diverse settlement characteristics. Mavoko is characterized by urban settlements, while Matungulu is predominantly rural, providing a contrast in settlement types. The study achieved a remarkable response rate of 100%, with all 398 distributed questionnaires completed and returned. Out of the 398 households surveyed, 97 did not have children under five years of age, leaving 301 households with children under five. These 301 households

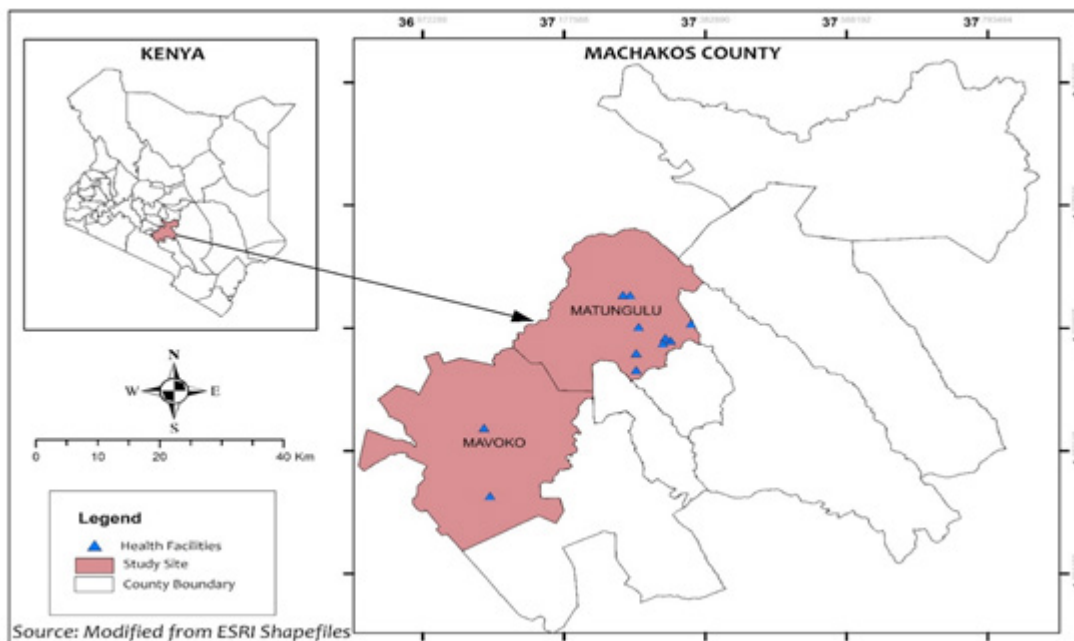


Figure 1: Study area locational and extend.

contributed to a total population of 400 children under five (with 114 in Matungulu and 286 in Mavoko), aligning with the study's focus on assessing diarrhoea prevalence and associated factors within this specific age group.

Data Collection tool and Procedure

A structured household questionnaire was employed to collect data on the socio-economic factors influencing the occurrence of childhood diarrhoea within the 14 days prior to the study. A 14-days recall period was used because it is reasonable for memory and limits recall bias. To avoid double counting, each surveyed household was geo-referenced (assigned x and y coordinates) using GPS. To ensure high content validity, the questionnaire was reviewed by 10 medical experts who assessed its relevance. Based on their feedback, revisions were made to improve its quality. Additionally, a pilot study involving 30 households from Mavoko and Matungulu sub-counties was conducted to test the questionnaire's reliability. These households were excluded from the main study to ensure the integrity of the primary data. This pilot phase ensured that the questions were clear and understandable, and any ambiguous items were revised to enhance clarity and the reliability of the data before the primary data collection began in the study area.

Data Analysis

Descriptive analysis was conducted to provide an overview of the study population's characteristics, identify trends in the data, and evaluate the distribution of key variables. This involved calculating frequencies and percentages for socio-demographic factors. Furthermore, multiple logistic regression was applied to explore the potential association between the identified socio-demographic factors and childhood diarrhoea. The logistic regression was used to measure the strength of association between under-five diarrhoea and the independent variables by calculating the odd ratios (OR) and 95% confidence intervals (CIs). A p-value less than 0.05 was considered as statistically significant ($p < 0.05$).

Results and Discussion

Socio-Demographic Factors Associated with Childhood Diarrhoea in Matungulu and Mavoko

The findings from the multivariate logistic regression analyses revealed important risk factors associated with diarrhoea in children under five years old in Matungulu and Mavoko Sub-Counties. These results provided valuable insights into the significant variables that contribute to the occurrence of diarrhoea within the sub-counties. According to the results in Table 1, the likelihood of diarrhoea among children under five in Matungulu Sub-County varied by gender and age, with male children showing a non-significant 18.1% higher likelihood of diarrhoea compared to females (OR = 1.181, 95% CI: 0.651-1.873, $p = 0.722$). In Mavoko Sub-County, as indicated in Table 2, males also exhibited a non-significant 22.1% higher likelihood of diarrhoea (OR = 1.221, 95% CI: 0.565-1.867, $p = 0.754$). The findings revealed non-significant trends regarding gender differences in the likelihood of diarrhoea among children in both regions studied. Although the findings

do not reach statistical significance, they indicated a slight trend where male children have a higher likelihood of experiencing diarrhoea compared to female children.

This suggested that gender may play a minor role in the susceptibility to diarrhoea, with boys being somewhat more affected than girls. This finding aligns with a study conducted in Gambia, which revealed that female children had a lower likelihood of diarrhoea than male [8]. Similarly, a cross-sectional study in Ethiopia [9] found that boys had 2.52 times higher odds of experiencing acute diarrhoea than girls. This gender disparity in diarrhoea incidence was believed to arise from factors related to gender, such as biological differences, environmental exposure, and cultural influences [8]. On Biological, it is hypothesized that physiological differences between girls and boys might make boys more susceptible to acute diarrhoea [10,11]. Environmentally, hypothesis suggests that boys, especially older ones, might have different exposure levels due to activities like spending more time away from home or accompanying their fathers to work, leading to more frequent exposure to infectious pathogens [12].

Regarding child characteristics, the study found that the likelihood of diarrhoea among children under five varied by age in both Matungulu and Mavoko Sub-Counties. As indicated in Table 1, children aged 7-36 months in Matungulu had significantly higher odds of diarrhoea (OR = 1.704, 95% CI: 1.321-3.468, $p = 0.012$). Similarly, Table 2 shows that in Mavoko, children in the same age group also exhibited significantly higher odds of diarrhoea (OR = 1.730, 95% CI: 1.221-2.468, $p = 0.0231$). In contrast, those aged 37-59 months showed a protective effect with lower odds of diarrhoea (Matungulu: OR = 0.353, 95% CI: 0.189-0.736, $p = 0.610$). This trend was also observed in Mavoko, where the odds were similarly low (OR = 0.355, 95% CI: 0.314-1.736, $p = 0.770$). Consistent with other studies [13-15] child's age was a significant risk factor for diarrhoea with the highest risk group identified as children 13-36 months. According to World Health Organization, complementary feeding should be introduced after 6 months though some mothers introduce weaning earlier. Unhygienic food preparation, food storage and feeding of infants may explain the increase in diarrhoea in this age cohort as weaned foods get exposed to contamination [14,15]. Also, naturally, most children start crawling and teething from around 10 months and this predisposes many infants to frequent infections as they wander into unhygienic environments [15,16]. These findings suggested that child age played an important role in diarrhoea prevalence among young children in both sub-counties.

In Matungulu Sub-County, the analysis of diarrhoea occurrence among children under five revealed that an increase in mothers' or caregivers' age was associated with a non-significant 11.5% decrease in diarrhoea odds, as indicated in Table 1 (OR = 0.885, 95% CI = 0.532-2.023, $p = 0.311$). In Mavoko Sub-County, each unit increase in age, which accounted for 286 cases, demonstrated a non-significant 1.6% decrease in diarrhoea odds, as shown in Table 2 (OR = 0.984, 95% CI = 0.963-1.042, $p = 0.132$). In Matungulu

Sub-county, the analysis of diarrhoea occurrence among children under five years old showed that the age of mothers or caregivers had an impact, albeit not statistically significant, on the likelihood of children experiencing diarrhoea. Specifically, for each additional year in the age of the mother or caregiver, there was an observed 11.5% decrease in the odds of a child developing diarrhoea. This non-significant reduction suggested that older mothers or caregivers may possess more experience, knowledge, or resources related to child care and hygiene practices, which could contribute to better prevention of diarrhoeal diseases. These findings match in Mavoko Sub County, each unit increase in age showed a non-significant 1.6% decrease in diarrhoea odds. This suggests that older mothers are more likely than younger ones to have better knowledge of childhood diarrhoea and its home management. This corroborate a study in Uganda, which revealed that women in a higher age cohort, compared to those in the 15–19 age cohort, and those with a higher birth order, compared to the first, reduced the probability of occurrence of diarrhoea [17]. This can be attributed to the knowledge and experience concerning childcare accumulated by older women over time which unambiguously gives them an edge over younger women.

Education level significantly influenced diarrhoea odds in Matungulu Sub-County, while in Mavoko, the effect was non-significant. In Matungulu, secondary education showed significant reductions in diarrhoea odds compared to primary education (OR = 0.732, 95% CI = 0.217–2.204, $p = 0.011$), as indicated in Table 1. In contrast, in Mavoko, secondary education exhibited a non-significant effect (OR=0.743, 95% CI = 0.237–2.064, $p = 0.523$), as shown in Table 2. Tertiary education in Matungulu also demonstrated non-significant reductions in diarrhoea odds (OR = 0.677, 95% CI = 0.339–2.690, $p = 0.023$), while Mavoko had similar findings (OR = 0.577, 95% CI = 0.239–4.620, $p = 0.811$). This aligns with prior research indicating that children of less-educated mothers in Ethiopia [18], Kenya [14] and India [19] had higher odds of experiencing childhood diarrhoea. This could be attributed to the fact that mothers with more education are likely to have better knowledge, attitudes, and access to the crucial health information needed to effectively prevent diarrhoea. Another likely explanation is that education is anticipated to enhance healthcare and hygiene practices within households. It can equip parents with the necessary knowledge about the prevention and transmission of diarrhoea. Similarly, a study in Southwest Nigeria reported that, educated women have a better understanding of personal hygiene, nutrition and are more knowledgeable about accessing the healthcare system [20].

The study also indicated that children of employed mothers had higher odds of diarrhoea compared to those whose mothers were part-time employed or not employed. Employment status varied across the two sub-counties, with full-time employed mothers in Mavoko exhibiting a significant 87% higher odds of diarrhoea compared to their non-employed counterparts (OR = 1.87, 95% CI = 0.94–3.76, $p = 0.004$), as shown in Table 2. In Matungulu, part-time employed mothers demonstrated a non-significant variation

in diarrhoea odds (OR = 0.774, 95% CI = 0.132–1.375, $p = 0.512$), while in Mavoko, part-time employed mothers also showed a non-significant effect (OR = 0.747, 95% CI = 0.32–1.975, $p = 0.545$), as indicated in Table 1. This finding is in line with other studies in Ethiopia [21,22] and a health survey of 34 sub-Saharan countries [23]. This could be because employed mothers might not have enough time to care for their children since they spend most of their time at work to increase family income while mothers who are not employed usually have time to care for their children and can minimize the exposure of their children from contaminated objects. Surprisingly, this was in contrast to a study done in southwest Nigeria which observed that children of unemployed mothers are twice likely to have diarrhoea than children of employed mothers [24].

Neither marital status nor religious affiliation were found to have a significant impact on the odds of diarrhoea occurrence in children under five years old in Matungulu Sub-County, as indicated in Table 1. Similarly, Table 2 shows that these factors did not significantly affect diarrhoea odds in Mavoko Sub-County. This suggests that these socio-demographic factors do not play a crucial role in influencing childhood diarrhoea in the study areas. On the other hand, households with 3 or more children under five had significantly higher odds of experiencing childhood diarrhoea compared to households with up to 3 children in Matungulu (OR=1.625, CI=0.762–2.306, $p=0.019$). In comparing the results for the number of children under five, Matungulu sub county, showed an odds ratio (OR) of 1.625 as indicated in Table 1, indicating a moderate increase in the odds of diarrhoea for those with two or more children. This result was statistically significant with a p -value of 0.019. In contrast, Mavoko sub county had an OR of 0.532, suggesting a slight increase in the odds for those with two or more children as shown in Table 2. However, this result was not statistically significant, with a p -value of 0.319.

These agrees with studies conducted in Vietnam [25] that revealed that a higher risk of diarrhoea among under-five children was found in households with two or more under-five children. These results were also supported by a study done in Ethiopia, that revealed the presence of two or more children under-five in the house also showed a significant association with acute diarrhoea. Children in households with two or more children under-five were 2.84 times more likely to develop acute diarrhoea than those in households with only one child [26]. The possible reason might be when the number of under-five children in a household increases, the risk of exposure to germs and pathogens increases and parents' attention and quality of care decreases because of the incapability of the mothers to care for a large number of children. This indicates that child spacings might have positive influence to prevent diarrhoea. Hence, it should be considered as one main intervention to reduce morbidity and mortality of under-five children related to diarrhoea. Marital status and religious factors did not significantly affect diarrhoea odds in either sub county.

Table 1: Multivariate Logistic Regression Analyses of the Socio-Demographic Factors Associated with Childhood Diarrhoea in Matungulu Sub County.

Variable	n	OR	95% CI	p-value
Sex of the child				
Female	49	-	—	-
Male	65	1.181	0.651–1.873	0.722
Age of the Child (Months)				
0–6	32	-		-
7–36	55	1.704	1.321–3.468	0.012
37–59	27	0.353	0.189–0.736	0.610
Mothers/Caregivers age	86	0.885	0.532–2.023	0.311
Mothers/Caregivers Education Level				
Primary	8	-	—	-
Secondary	58	0.732	0.217–2.204	0.011
Tertiary	20	0.677	0.339–2.690	0.803
Mothers/Caregivers Employment Status				
Not Employed	61	-	—	-
Part-time employed	25	0.774	0.132–1.375	0.512
Mothers/Caregivers Marital Status				
Single	17	-	—	-
Married	69	0.835	0.373–1.178	0.245
Mothers/Caregivers Religion				
Christian	85	-	—	-
Muslim	1	1.04	0.226–1.233	0.623
Number of Children Under Five				
Up to 3	38	-		-
3 or more	76	1.625	0.762–2.306	0.019

Table 2: Multivariate Logistic Regression Analyses of the Socio-Demographic Factors Associated with Childhood Diarrhoea in Mavoko Sub County.

Variable	n	OR	95% CI	p-value
Sex of the child				
Female	147	-	—	-
Male	139	1.221	0.565–1.867	0.754
Age of the Child (Months)				
0–6	45	-		-
7–36	135	1.730	1.221–2.468	0.023
37–59	106	0.355	0.314–1.736	0.770
Mothers/Caregivers age	215	0.984	0.963–1.042	0.132
Mothers/Caregivers Education Level				
Primary	20	-	—	-
Secondary	74	0.743	0.237–2.064	0.523
Tertiary	121	0.577	0.239–4.620	0.811
Mothers/Caregivers Employment Status				
Not Employed	83	-	—	-
Part-time employed	78	0.742	0.320–1.975	0.545
Full-time Employed	54	1.87	0.940–3.760	0.004
Mothers/Caregivers Marital Status				
Single	36	-	—	-
Married	163	0.336	0.227–1.168	0.112
Widowed	8	1.012	0.327–6.168	0.129
Divorced/Separated	6	1.663	0.012–2.575	0.214
Mothers/Caregivers Religion				
Christian	209	-	—	-
Muslim	6	1.22	0.326–2.306	0.611

Number of Children Under Five				
Up to 3	111	-	-	-
3 or more	175	0.625	0.762–2.306	0.319

Conclusion

The study revealed several key factors influencing diarrhoea among children under five in Matungulu and Mavoko sub-counties. In Matungulu, higher education levels among mothers/caregivers were protective against diarrhoea, while larger household sizes and reliance on surface water significantly increased the risk. In Mavoko, employment status of mothers/caregivers, improper waste disposal practices, and water sources were strongly associated with diarrhoea. In both sub-counties, children aged 7–36 months faced significantly higher odds of diarrhoea, likely due to increased exposure to environmental pathogens. Thus, the findings of this study can be used to design tailored interventions for reducing the massive burden of diarrhoea and improving child health in the two regions.

Recommendations

To address the high rates of diarrhoea among children under five in Matungulu and Mavoko sub-counties, county governments and policy-makers should implement targeted interventions informed by evidence. In Matungulu, low maternal education was linked to higher diarrhoea prevalence, highlighting the need for adult education and health literacy programs focused on hygiene and child care. In Mavoko, maternal employment was associated with increased risk, calling for supportive policies such as affordable childcare and flexible work arrangements. Children aged 7–36 months are particularly vulnerable in both areas, requiring targeted health measures like safe feeding, immunization, and hygiene promotion. Strengthening community health outreach and surveillance will support timely identification and intervention for at-risk households.

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