

Cancer prevalence, stage at diagnosis and access to care in a pastoralist setting: a community-based study from Wajir County, Kenya

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Abstract

Cancer is a major cause of death worldwide, and its impact is especially heavy in low- and middle-income countries where health systems are weak and access to care is limited. In Kenya, cancer was the second leading cause of death in 2024, with the problem compounded by late diagnosis, low awareness and poor access to services. This community-based cross-sectional study used a mixed-methods approach – combining a household survey ($n = 1,410$) with key informant interviews and focus group discussions – to quantify and describe the cancer burden in Wajir County. The household-level cancer prevalence was 3.22%, with Wajir East recording the highest burden at 5.58%. Oesophageal cancer was the dominant malignancy, representing 48.9% of reported cases, and was most common among men aged 61–70 years. Most cancers (86.7%) were diagnosed at advanced stages (III/IV), and the mortality rate among identified cases reached 80%. Awareness and preventive engagement were very low: only 6.9% of respondents had ever received cancer prevention education, 3.1% had been screened, and 97.2% reported never having routine medical check-ups. Access to treatment and palliative care was highly constrained, with many patients referred to distant facilities in Nairobi or Garissa, often unable to complete treatment because of financial and logistical barriers. Qualitative data highlighted stigma, misconceptions and fatalistic views about cancer, all of which further delayed care-seeking. Overall, the findings point to an urgent need for socially appropriate cancer education, targeted risk reduction and strengthened oncology and palliative care services, alongside broader investments in health financing, workforce and supply chains to improve cancer outcomes in Wajir County and similar settings.

Keywords: cancer burden, oesophageal cancer, late-stage diagnosis, prevention, health systems, Kenya

Introduction

Cancer, defined by the uncontrolled growth of abnormal cells, is one of the four leading causes of death from non-communicable diseases globally, alongside cardiovascular, respiratory diseases and diabetes [1]. In 2022, an estimated 20 million new cancer cases and 10 million cancer deaths were recorded worldwide, and incidence is projected to rise by about 50% over the next two decades. This increase is driven by population ageing, lifestyle changes and persistent inequities in access to prevention, diagnosis and

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ecancer 2026, 20:2241
<https://doi.org/10.3332/ecancer.2026.2241>

Published: 22/10/2026
Received: 20/04/2026

Publication costs for this article were supported by ecancer (UK Charity number 1176307).

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treatment [2,3]. Low- and middle-income countries (LMICs) shoulder a disproportionate share of this burden because of under-resourced health systems, low public awareness and delays along the care pathway [4]. In sub-Saharan Africa alone, there were 1.2 million new cancer cases, 800,000 deaths, and more than 2.6 million people living with cancer between 2017 and 2022 [2]. Without scaled-up interventions, cancer mortality in the region is projected to rise from ~520,000 deaths in 2020 to nearly 1 million annually by 2030 [5].

Pastoralist and agro-pastoralist populations – who constitute nearly 25% of Africa's total population – are among the most vulnerable groups in this context. Spread across arid and semi-arid regions of sub-Saharan Africa, they remain statistically invisible in national health data and are often neglected in cancer control planning [5]. Their vulnerability is compounded by climate change, recurrent conflicts and marginalisation by central governments, which collectively exacerbate inequities in access to healthcare. Evidence shows that nomadic pastoralists in particular face profound barriers across the cancer care continuum – from prevention and early detection to treatment and palliative care – yet there is very little systematic data on their cancer burden or service utilisation. In Kenya, cancer was the second leading cause of death in 2024, after pneumonia, and the leading cause of mortality among adults aged 30 years and above [5]. The most common cancers, breast, cervical, prostate, oesophageal and non-Hodgkin's lymphoma, together accounted for nearly half of all diagnosed cases [6]. Many of these cancers are potentially preventable through modification of key risk factors, including tobacco and alcohol use, obesity and infections such as human papillomavirus (HPV). However, late presentation, limited pathology and diagnostic capacity and high out-of-pocket costs continue to contribute to poor survival and substantial financial hardship [7,8].

Pastoralist communities in Kenya are populations whose primary livelihood revolves around the herding of domesticated livestock. Within this system, nomadic pastoralists are highly mobile, moving unpredictably in search of pasture and water, while non-nomadic pastoralists follow structured seasonal migration patterns or remain partially settled near trading centres and water points [10]. Kenya's arid and semi-arid lands host the majority of pastoralists, who constitute an estimated 20%–25% of the national population [11]. These communities face unique health challenges due to geographic isolation, weak infrastructure and limited financial protection. Access to healthcare is generally poor, with many households living more than an hour from the nearest facility, and coverage by the Social Health Insurance remains low in pastoralist counties [12]. For NCDs, including cancer, the barriers are even more pronounced.

Wajir County, in northeastern Kenya, is predominantly rural and pastoralist and does not have a population-based cancer registry. It is under-represented in national cancer statistics and surveillance reports [9,10]. This lack of local epidemiological data restricts the county's ability to plan, prioritise and resource cancer prevention, early detection, treatment and palliative care services. In this context, there was a clear need for a community-based assessment to quantify the burden of cancer in Wajir County and to describe community awareness and access to cancer-related healthcare services. Situating this study within the broader continental context underscores the importance of generating empirical evidence from Wajir County as part of a wider call to action for pastoralist populations across Africa [5].

Methods

This study used a mixed-methods design to investigate the burden of cancer in Wajir County, Kenya. A cross-sectional household survey was combined with qualitative inquiry through key informant interviews (KIIs) and focus group discussions (FGDs) to capture both numerical patterns and community perspectives. The sampling frame consisted of Community Health Units (CHUs), which function as primary health catchment areas. According to the Wajir County Integrated Development Plan 2023–2027, there were 118 CHUs distributed across six constituencies. Each constituency was stratified into urban and rural CHUs. For pre-testing, five urban and two rural CHUs were randomly selected; the pilot produced a Cronbach's alpha of 0.79, indicating acceptable internal consistency. For the main survey, approximately 30% of rural CHUs in each constituency were randomly selected to balance representativeness and feasibility.

In designing the sampling frame, we excluded nomadic pastoralist households due to their high mobility, unpredictable migration patterns and lack of fixed settlements, which made systematic household follow-up infeasible. Nomadic pastoralists move irregularly in search of pasture and water, often across county and national borders, and therefore could not be reliably captured within the CHUs used as the primary sampling units [10]. By contrast, the study focused on non-nomadic (semi-sedentary) pastoralists, who maintain livestock as their primary livelihood but reside in fixed or seasonally stable households within CHU catchment areas. This distinction was necessary to ensure

methodological rigour, minimise attrition and generate representative estimates of cancer burden among settled pastoralist populations in Wajir County. Additionally, two CHUs along the Somalia border were omitted for security reasons.

Sample size was determined using Yamane's formula (1967), applying a 2.65% margin of error to an estimated 147,000 households [11]. The resulting target was 1,410 households, allocated equally across the six constituencies (233 households each). To reflect population distribution, 70% of households were drawn from rural CHUs, except in Wajir East where higher urban density justified a larger urban share. Within each selected CHU, systematic random sampling ($k = 5$) was used with a random starting point; non-responding households were replaced by the next household in sequence. For the qualitative component, purposive sampling identified 15 key informants and 45 FGD participants across constituencies.

Data collection took place in March 2025. Quantitative data were collected using electronically structured questionnaires administered face-to-face via the Kobo Collect mobile application. The tool captured socio-demographic characteristics, food and water sources, reported cancer cases, health-seeking behaviour, cancer knowledge and access to healthcare services. Qualitative data were collected using semi-structured guides exploring perceptions of cancer, stigma, health-seeking pathways, barriers to care and service availability. Interviews and discussions were conducted by trained personnel, audio-recorded with consent, transcribed and translated where needed.

Quantitative data were analysed in SPSS version 20. Descriptive statistics summarised household characteristics and cancer patterns. Chi-square tests and logistic regression models were used to examine associations, with statistical significance set at $p < 0.05$. Qualitative data were analysed thematically using a combination of inductive and deductive coding. A coding framework was built around domains such as awareness and knowledge of cancer, access to services and perceived prevalence. Triangulation drew on convergence (agreement between quantitative and qualitative findings), complementarity (qualitative explanations of quantitative patterns) and divergence (instances where perspectives differed). Ethical approval was obtained from the Kenya Methodist University Institutional Scientific and Ethics Review Committee (KeMU/ISERC/EXT/04/2024) and the National Commission for Science, Technology and Innovation (NACOSTI/P/25/414937). Written informed consent was obtained from all participants before data collection.

Results

Demographic profile of surveyed households

Table 1 shows that of the 1,410 households targeted, 1,397 participated, yielding a response rate of 99.1%. Respondents were predominantly female (74.4%), with a mean age of 40.5 years ($SD = 13.9$; range 16–90 years); half were aged 38 years or younger. Educational attainment was low: 54.7% reported no formal schooling, and only 5.8% had tertiary education. Most households (37.4%) reported monthly incomes at or below KES 4,358, while 33.4% reported monthly income of KES 8,007 to 76,198, and a further 29.0% reported KES 4,359–8,006, while less than 1% fell into the higher income category of KES 76,199 and above. Boreholes were the primary water source for 62.1% of households, with shallow wells used by 20.5%. Rice was the main staple food in 72.2% of households, with maize and beans, pasta and wheat flour reported much less frequently.

Household cancer prevalence

From Table 2, we find that among 1,397 surveyed households, 45 reported at least one confirmed cancer case, giving a household-level prevalence of 3.22% (95% CI: 2.3–4.1). An additional 12 households (0.86%) reported a cancer case without available health records, and 95.9% reported no cancer case. The prevalence of households with confirmed cancer cases varied by sub-county. Wajir East had the highest proportion at 5.58% (95% CI: 2.9–9.3), followed by Wajir West and Wajir South (3.43% each; 95% CI: 1.5–6.6). Tarbaj reported 3.00% (95% CI: 1.2–6.0), Eldas 2.16% (95% CI: 0.7–5.0) and Wajir North the lowest at 1.72% (95% CI: 0.5–4.3). Among the 45 confirmed cancer patients, 55.6% were male and 44.4% female. Cases were concentrated in older age groups: 40.0% were aged 61–70 years, 28.9% were aged 51–60 years and 13.3% were aged 41–50 or 71–80 years. Very few cases occurred in those aged 11–20 years (4.4%), and none were reported in the 21–40 or ≥ 81 -year age groups.

Table1. Demographic characteristics of surveyed households in Wajir County (n = 1397).

Indicator	Category	Frequency	%
Response rate	Responses received	1,397	99.1
	Target households	1,410	–
Respondent's Gender	Female	1,040	74.4
	Male	357	25.6
Respondent's Age (years)	Count	1,397	–
	Mean (SD)	40.51 (13.86)	–
	Minimum / Maximum	16.0 / 90.0	–
	25th percentile (Q1)	30.0	–
	Median (Q2)	38.0	–
	75th percentile (Q3)	50.0	–
Education level	No formal education at all	764	54.7
	Primary/ Adult Education	169	12.1
	Secondary	144	10.3
	Tertiary	81	5.8
	Formal Islamic education only	239	17.1
Monthly household income	≤ KES 4,358	522	37.4
	KES 4,359–8,006	405	29.0
	KES 8,007–76,198	466	33.4
	> KES 76,199	4	0.3
Main water source	Borehole	867	62.1
	Shallow well	287	20.5
	Open dam/pan	243	17.4
Staple food	Rice	1,009	72.2
	Maize and beans (githeri)	32	2.3
	Freshly milled maize	220	15.7
	Pasta	100	7.2
	Wheat flour	35	2.5

Note: Percentages are based on valid responses per category; minor rounding differences may occur

Distribution of cancer types

Among the 45 confirmed cancer cases, oesophageal cancer was the most frequent diagnosis, accounting for 48.9% of all cancers (95% CI: 34.0–64.0), as shown in [Table 3](#). Cervical cancer contributed 8.9% of cases (95% CI: 2.5–21.2). Prostate, colon, breast, stomach, liver and lung cancers each represented between 4.4% and 6.7% of the total caseload, while nasopharyngeal, pancreatic and thyroid cancers were individually rare, each comprising 2.2% of cases. By sex, oesophageal cancer affected both men and women (13 male and 9 female cases). Prostate, lung, nasopharyngeal, pancreatic and thyroid cancers occurred exclusively in men, whereas cervical and breast cancers were reported only in women. Colon, stomach and liver cancers were observed in both sexes, with a slight male predominance.

Table 2. Household cancer prevalence and distribution of confirmed cancer cases in Wajir County, 2024.

Indicator	Category	n	%	95% CI (%)
Household cancer prevalence	Households with ≥ 1 confirmed cancer case	45	3.22	2.3–4.1
	Households with cancer case but no records	12	0.86	–
	Households with no cancer case reported	1,352	95.92	–
Geographical distribution*	Wajir East	13	5.58	2.9–9.3
(households with ≥ 1 confirmed case)	Wajir West	8	3.43	1.5–6.6
	Wajir South	8	3.43	1.5–6.6
	Wajir North	4	1.72	0.5–4.3
	Eldas	5	2.16	0.7–5.0
	Tarbaj	7	3.00	1.2–6.0
Gender of cancer patients†	Male	25	55.6	–
(n = 45 confirmed cancer cases)	Female	20	44.4	–
Age distribution of cancer patients†	11–20 years	2	4.4	–
(n = 45 confirmed cancer cases)	21–30 years	0	0.0	–
	31–40 years	0	0.0	–
	41–50 years	6	13.3	–
	51–60 years	13	28.9	–
	61–70 years	18	40.0	–
	71–80 years	6	13.3	–
	≥ 81 years	0	0.0	–

Note. Household prevalence estimates are based on 1,397 surveyed households

* Sub-county percentages are calculated as the proportion of surveyed households within each sub-county reporting ≥ 1 confirmed cancer case

† Percentages are based on 45 confirmed cancer cases

Table 3. Distribution of cancer types among confirmed cancer cases in Wajir County (n = 45).

Cancer type	n	% of all cancers	95% CI (%)	Male (n)	Female (n)
Oesophageal	22	48.9	34.0–64.0	13	9
Cervical	4	8.9	2.5–21.2	0	4
Prostate	3	6.7	1.4–18.3	3	0
Colon	3	6.7	1.4–18.3	2	1
Breast	3	6.7	1.4–18.3	0	3
Stomach	3	6.7	1.4–18.3	2	1
Liver	2	4.4	0.5–15.1	1	1
Lung	2	4.4	0.5–15.1	2	0
Nasopharyngeal	1	2.2	0.1–11.8	1	0
Pancreatic	1	2.2	0.1–11.8	1	0
Thyroid	1	2.2	0.1–11.8	1	0
Total	45	100.0	–	26	19

Note. Percentages and confidence intervals are calculated with reference to the total number of confirmed cancer cases (n = 45)

Stage at diagnosis and mortality outcomes

Results in Table 4 indicate that among the 45 confirmed cancer cases, 86.7% (95% CI: 73.2–95.0) were diagnosed at advanced stages (III/IV), while 13.3% (95% CI: 5.0–26.8) were diagnosed at an intermediate stage (II). No cases were identified at an early stage (I). At the time of assessment, 80.0% of patients (95% CI: 61.4–90.4) were reported deceased, and 20.0% (95% CI: 9.6–34.6) were still alive.

Treatment received by the cancer patients

Among the 45 cancer patients, 44.4% (95% CI: 29.6–60.0) were reported to have received spiritual or symptomatic care, and 37.8% (95% CI: 23.8–53.5) used herbal treatment (Table 5). Only 11.1% (95% CI: 3.7–24.1) received conventional cancer therapy in the form of chemotherapy or surgery. In 6.7% of cases (95% CI: 1.4–18.3), the treatment modality was unknown.

Multivariate logistic regression of cancer mortality

In the multivariable logistic regression model (Table 6), none of the predictors reached conventional statistical significance at $p < 0.05$. Gender was not significantly associated with mortality (Wald $\chi^2 = 0.023$, $p = 0.880$), with an odds ratio (OR) of 1.12 (95% CI: 0.26–4.88) for males compared with females. Stage at diagnosis showed a borderline association with mortality (Wald $\chi^2 = 3.365$, $p = 0.067$), with patients classified in the late-stage category having an estimated OR of 5.50 (95% CI: 0.89–33.99) relative to those in the early-stage category. The overall effect of treatment type on mortality was not statistically significant (Wald $\chi^2 = 3.510$, $df = 3$, $p = 0.319$), and category-specific estimates were unstable and considered unreliable due to sparse data. Age group, assessed as an overall factor (Wald $\chi^2 = 3.198$, $df = 5$, $p = 0.670$), was also not significantly associated with mortality. The specific contrast between age Group 6 and Group 7 yielded an OR of 0.12 (95% CI: 0.01–1.64) with $p = 0.112$.

Table 4. Stage at diagnosis and mortality outcomes among confirmed cancer cases in Wajir County (n = 45).

Indicator	Category	n	%	95% CI (%)
Stage at diagnosis	Advanced (III/IV)	39	86.7	73.2–95.0
	Intermediate (II)	6	13.3	5.0–26.8
	Early (I)	0	0.0	–
Mortality outcome	Deceased	36	80.0	61.4–90.4
	Alive	9	20.0	9.6–34.6

Note. Percentages are calculated with reference to all confirmed cancer cases (n = 45)

Table 5. Cancer treatment received by patients in Wajir County (n = 45).

Indicator	Category / item	n	%	95% CI (%)
Treatment received	Spiritual/symptomatic	20	44.4	29.6–60.0
	Herbal	17	37.8	23.8–53.5
	Chemotherapy/surgery	5	11.1	3.7–24.1
	Unknown	3	6.7	1.4–18.3

Note. Percentages are calculated with reference to all confirmed cancer cases (n = 45)

Table 6. Binary logistic regression predicting cancer mortality by gender, stage at diagnosis, treatment type and age group (n = 45).

Predictor	B	SE	Wald χ^2	df	p-value	OR (Exp[B])	95% CI for OR
Gender (male versus female)	0.113	0.751	0.023	1	0.880	1.12	0.26–4.88
Stage at diagnosis (early versus late)	1.705	0.929	3.365	1	0.067	5.50	0.89–33.99
Treatment type (overall)	–	–	3.510	3	0.319	–	–
Treatment category*	–	–	–	–	0.999	>10 ⁸	Unreliable
Age group (overall)	–	–	3.198	5	0.670	–	–
Age contrast (Group 6 versus 7)	-2.14	–	–	–	0.112	0.12	0.01–1.64

Note. OR, odds ratio; CI, confidence interval; SE, standard error; df, degrees of freedom

*Treatment category-specific estimates were highly unstable (very large OR with wide CI) and considered unreliable due to sparse data

Discussion

Magnitude of the cancer burden

This community-based survey found a household-level cancer prevalence of 3.22% (95% CI: 2.3–4.1) across 1,397 households in Wajir County, with notable variation by sub-county: Wajir East had the highest proportion of affected households (5.58%), while Wajir North had the lowest (1.72%). Most cases (82%) occurred among adults aged 51 years and above, consistent with global and Kenyan evidence that cancer risk increases with age and is increasingly concentrated in older populations as life expectancy rises in low- and middle-income countries [12,13]. In the Kenyan context – where cancer is now a leading cause of adult mortality – these household-level estimates provide rare, granular data from a marginalised, largely pastoralist setting that is largely absent from national cancer surveillance.

Distribution of cancer types

Oesophageal cancer accounted for nearly half of all confirmed cancers in this sample (48.9%; 95% CI: 34.0–64.0), making it the dominant malignancy in Wajir County. Cervical cancer comprised 8.9% of cases, while breast, prostate, colon and stomach cancers each contributed 6.7%. Less frequent cancers included liver, lung, nasopharyngeal, pancreatic and thyroid malignancies, each representing 2.2%–4.4% of cases. The sex distribution followed expected patterns for sex-specific cancers: cervical and breast cancers occurred exclusively in women, while prostate cancer was confined to men. The prominence of oesophageal cancer aligns with facility-based reports from other Kenyan settings and with the national positioning of oesophageal cancer as a leading cause of cancer mortality [14,15]. However, unlike most existing hospital-based series, these estimates are derived from a community household survey and thus provide a complementary picture of the distribution of cancer types outside tertiary facilities.

Stage at diagnosis and mortality

Stage at diagnosis and mortality patterns in Wajir County were dominated by late presentation and poor survival. Among the 45 confirmed cancer cases, 86.7% (95% CI: 73.2–95.0) were diagnosed at advanced stages (III/IV), 13.3% at intermediate stage (II) and none at early stage (I). At the time of the survey, 80.0% of patients (95% CI: 61.4–90.4) were reported deceased. In the logistic regression model, none of the predictors reached statistical significance at $p < 0.05$, although there was a non-significant trend towards higher odds of death among those diagnosed at advanced versus intermediate stage (OR 5.50; 95% CI: 0.89–33.99; $p = 0.067$). These findings are consistent with regional evidence from sub-Saharan Africa showing that most cancers are detected at advanced stages and that survival is strongly stage-dependent

[16,17,18]. The absence of any early-stage diagnoses in this sample aligns with a context where screening and early detection infrastructure are limited.

Prevention, screening and access to care

The study documented very low engagement with cancer prevention and early detection. Only 6.9% of respondents reported having received cancer prevention education, 3.1% had ever undergone screening and 97.2% had never had a routine medical check-up [19]. Awareness of risk factors showed a statistically significant association with one concrete preventive practice, checking food expiry dates, but Cramer's V values were small, indicating weak effect sizes. There were no significant associations between screening uptake and either health insurance status or prior prevention education. Perceived access to cancer care and palliative services was also limited. Quantitative results showed significant associations between perceived availability of cancer care and several structural barriers, including financial constraints, fear of diagnosis, inadequate information, long waiting times and facility closures, with weak-to-approaching-moderate effect sizes (Cramer's V approximately 0.10–0.19). Most patients did not receive biomedical cancer treatment: 44.4% relied on spiritual or symptomatic care, 37.8% on herbal treatment and only 11.1% received chemotherapy or surgery. Qualitative findings reinforced these patterns, with participants describing a lack of local oncology services, high travel costs for referral to distant centres and experiences of stigma and fatalistic beliefs about cancer. Taken together, the data depict a setting where awareness, screening and access to definitive treatment and palliative care are all severely constrained [20,21]. These barriers mirror common challenges in LMICs, where strengthened referral systems, improved supply chains and community engagement are recommended [22].

Study implications

This study is, to our knowledge, among the first community-based assessments of cancer burden in a predominantly pastoralist Kenyan county, and it reveals a distinct and concerning profile: a measurable household-level cancer prevalence; a striking dominance of oesophageal cancer; near-universal late-stage diagnosis; high mortality and extremely low uptake of biomedical treatment, screening and routine preventive care. The weak but statistically significant associations between perceived cancer care availability and structural barriers (especially financial constraints and facility closures), combined with the overwhelming reliance on non-biomedical treatment and the near absence of early-stage diagnoses, point to a health system that is currently ill-equipped to prevent, detect, or manage cancer in this context. These findings add novel, population-based evidence from an under-represented region and underscore the need for strengthened cancer prevention, early detection, treatment and palliative care services in Wajir County and comparable marginalised settings in Kenya.

Conclusion

This study provides one of the first population-based assessments of cancer in a predominantly pastoralist Kenyan county. The findings point to a setting where cancer exists within a fragile care continuum, marked by constrained prevention, diagnostic and treatment capacity. Rather than isolated service gaps, the overall picture is of a health system that is not yet configured to manage cancer effectively at scale. By extending national cancer evidence into an under-represented region and generating county-level estimates, the study offers a concrete empirical basis for planning, prioritisation and the gradual development of a more responsive cancer care system in Wajir County and similar settings.

Recommendation

The results support a focused shift towards building a basic but coherent cancer response in Wajir County. Priority should be given to embedding simple, culturally appropriate cancer awareness and early-detection activities into existing community and primary care platforms, with clear referral pathways to higher-level facilities.

Although this study did not specifically assess vaccination coverage for HPV and hepatitis B, preventive interventions must be strengthened, particularly through integration of these vaccinations into community health platforms. Incorporating HPV and hepatitis B vaccination

would provide a cost-effective strategy to reduce cervical and liver cancer incidence. Innovative delivery models are essential in pastoralist contexts, and evidence from sub-Saharan Africa shows that One Health approaches – combining human and animal health services – can successfully reach nomadic populations [5]. Embedding cancer-related vaccination into mobile and integrated outreach programmes – at water points, grazing areas and CHUs – could overcome barriers of mobility and distance, while contributing to continental efforts to reduce inequities in cancer prevention among pastoralist communities.

Concurrently, strengthening diagnostic and palliative care capacity at county and sub-county levels, and clarifying formal linkages to regional oncology centres, would improve the viability of timely care. Addressing structural barriers, especially financial constraints, perceived service unavailability and long waiting times, should be integrated into broader county health financing and service delivery reforms. Finally, developing a straightforward cancer reporting and registry mechanism would allow Wajir to track trends and evaluate the impact of interventions over time.

Future work should establish simple, sustainable cancer surveillance systems at county level, linked to national registries, to ensure that both settled and nomadic pastoralist populations are systematically included. Longitudinal follow-up of identified cases could clarify survival patterns and care trajectories. Implementation studies evaluating pragmatic interventions – such as community-based awareness packages, streamlined referral pathways and basic palliative care models – would help determine which approaches are feasible and effective in resource-limited, pastoralist contexts. Together, such efforts could gradually transform the descriptive baseline provided by this study into an evidence-informed programme of cancer control.

Strengths and limitations

A key strength of this study is its community-based design, which moves beyond tertiary hospital data to capture cancer experience at household level in a hard-to-reach context. The mixed-methods approach, combining a structured household survey with KIs and FGDs, allowed the quantitative patterns to be interpreted alongside local narratives about access, beliefs and barriers. Sub-county disaggregation further enhances the usefulness of the findings for decentralised planning.

At the same time, the study has important limitations. The number of confirmed cancer cases was small, which reduced statistical power for multivariable analyses and produced wide confidence intervals and unstable estimates for some predictors. Case identification relied on self-report and available household-held records; some degree of under-ascertainment or misclassification is therefore possible. The cross-sectional design captures mortality and treatment status at a single time point, without survival follow-up. In addition, the exclusion of highly mobile nomadic populations and insecure border areas limits generalisability to those groups. These constraints should be borne in mind when interpreting and applying the findings.

Acknowledgments

The authors wish to acknowledge the Community Health Assistants (CHAs), who *assisted* in the data collection from the households across Wajir County. *The authors also* acknowledge the effort of research subjects in participating in this study. *The authors further* acknowledge the public health leadership of Wajir County, *for their* general support and approval.

Conflict of interest

The authors declare no conflict of interest.

Funding

This study received funding support from the National Cancer Institute of Kenya (NCI - K).

Author contribution statement

Dr. Mohamed Abdirahman Ahmed: Conceptualisation, Methodology, Investigation, Project Administration, funding acquisition, Writing – Original Draft, Data Curation.

Dr. Job Mapesa: Conceptualisation, Methodology, Formal Analysis, Supervision, Writing – Review & Editing, Validation.

Ibrahim Abdi Mohamed: Investigation, Data Curation, Resources.

Mohamed Abdi Salat: Investigation, Project Administration, Resources.

Dr. Fatuma Ibrahim Adan: Methodology, Writing – Review & Editing, Visualisation.

References

1. World Health Organization (2025) *Noncommunicable diseases* (Geneva: World Health Organization) in press [<https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>]
2. Ferlay J, Ervik M, and Lam F, et al (2024) *Global Cancer Observatory: Cancer today* (Lyon: International Agency for Research on Cancer) [<https://gco.iarc.who.int/media/globocan/factsheets/populations/900-world-fact-sheet.pdf>]
3. World Health Organization (2024) *Global cancer burden growing, amidst mounting need for services* (Geneva: World Health Organization) [<https://www.who.int/news/item/01-02-2024-global-cancer-burden-growing--amidst-mounting-need-for-services>]
4. Stefan DC and Tang S (2023) **Addressing cancer care in low- to middle-income countries: a call for sustainable innovations and impactful research** *BMC Cancer* 23 756 <https://doi.org/10.1186/s12885-023-11272-9> PMID: 37582762 PMCID: 10426184
5. Abdihamid O, Rubagumya F, and Vanderpuye V, et al (2024) **Neglected cancer care needs among the nomadic pastoralist communities in sub-Saharan Africa: a call to action** *BMJ Glob Health* 9(1) 14207 <https://doi.org/10.1136/bmjgh-2023-014207>
6. Civil Registration Services (2025) *Leading causes of registered deaths in Kenya by age and sex* (Nairobi: Stats Kenya) [<https://statskenya.co.ke/at-stats-kenya/about/leading-causes-of-registered-deaths-in-kenya-by-age-and-sex/145/>]
7. Kenya Medical Research Institute (2023) *Status of cancer in Kenya report* (Nairobi: Kenya Medical Research Institute) [<https://www.kemri.go.ke/cancer-research/>]
8. Omotoso O, Teibo JO, and Atiba FA, et al (2023) **Addressing cancer care inequities in sub-Saharan Africa: current challenges and proposed solutions** *Int J Equity Health* 22(1) 189 <https://doi.org/10.1186/s12939-023-01962-y> PMID: 37697315 PMCID: 10496173
9. World Bank (2022) *Economic and social consequences of cancer in Kenya: Case study findings* (Washington DC: World Bank) [<https://documents1.worldbank.org/curated/en/099930106092217126/pdf/P1638530bf035f0709da90b525153ad54c.pdf>]
10. Kondoltiony P, E; Okemwa P, and Wanjama L (2023) **Culture as a determinant to gender differentials in adoption of alternative livelihoods among pastoralists in West Pokot County, Kenya** *J Afr Interdiscipl Stud* 7(3) 98–117
11. NCD Alliance Kenya (2024) *Kenya NCD Health Equity Assessment Report* (Nairobi: NCD Alliance Kenya) [<https://ncdak.org/health-ncd-equity-report/>]

12. Kazungu J, Moturi AK, and Kuhora S, *et al* (2024) **Examining inequalities in spatial access to national health insurance fund contracted facilities in Kenya** *Int J Equity Health* 23(1) 78 <https://doi.org/10.1186/s12939-024-02171-x> PMID: 38637821 PMCID: 11027528
13. Affey FH, Galgalo D, Wainaina GM, *et al* (2025) **Determinants of cancer care pathways at Wajir County, Kenya: Patient perspectives** *ecancermedicalscience* 13 1841 [<https://ecancer.org/en/journal/article/1841-determinants-of-cancer-care-pathways-at-wajir-county-kenya-patient-perspectives/pdf>] <https://doi.org/10.3332/ecancer.2025.1841>
14. Ahmed MA (2021) **Cancer prevalence in Wajir County, Kenya: estimation using cancer data at the healthcare facilities** *J Med Nursing Public Health* 4(1) 25–45
15. Kenya National Bureau of Statistics (2019) **2019 Kenya Population and Housing Census: Volume II – Distribution of Population by Administrative Units** [<https://www.knbs.or.ke/2019-kenya-population-and-housing-census-reports/>]
16. Kobia F, Gitaka J, and Makokha F, *et al* (2019) **The state of cancer in Meru, Kenya: a retrospective study** *AAS Open Res* 2 167 <https://doi.org/10.12688/aasopenres.13027.1>
17. Tu Z, Yu Y, and Li C, *et al* (2025) **Global epidemiological trend of cancer incidence and death in adults aged 60 years and older: a systematic analysis of data from GLOBOCAN 2022 and GBD2021** *BMC Geriatr* 26 22 <https://doi.org/10.1186/s12877-025-06632-y> PMID: 41339810 PMCID: 12781334
18. Parker S, Brawley O, and Wingo P, *et al* (2010) **Cancer statistics, 2010** *CA Cancer J Clin* 60(5) 277–300
19. International Agency for Research on Cancer (2024) **GLOBOCAN 2024: Cancer Today – Kenya Fact Sheet** (Lyon: IARC) [<https://gco.iarc.fr>]
20. Allemani C, Matsuda T, and Di Carlo V, *et al* (2018) **Global surveillance of trends in cancer survival 2000–14 (CONCORD-3)** *Lancet* 391(10125) 1023–1075 [https://doi.org/10.1016/S0140-6736\(17\)33326-3](https://doi.org/10.1016/S0140-6736(17)33326-3) PMID: 29395269 PMCID: 5879496
21. Ngwa W, Addai BW, and Adewole I, *et al* (2022) **Cancer in sub-Saharan Africa: a Lancet Oncology Commission** *Lancet Oncol* 23(6) e251–e312 [https://doi.org/10.1016/S1470-2045\(21\)00720-8](https://doi.org/10.1016/S1470-2045(21)00720-8) PMID: 35550267 PMCID: 9393090
22. Morhason-Bello IO, Odedina F, and Rebbeck TR, *et al* (2013) **Challenges and opportunities in cancer control in Africa: a perspective from the African Organisation for Research and Training in Cancer** *Lancet Oncol* 14(4) e142–e151 [https://doi.org/10.1016/S1470-2045\(12\)70482-5](https://doi.org/10.1016/S1470-2045(12)70482-5)
23. Adegboyega A, Wiggins AT, and Obielodan O, *et al* (2022) **Beliefs associated with cancer screening behaviors among African Americans and Sub-Saharan African immigrant adults: a cross-sectional study** *BMC Public Health* 22 2219 <https://doi.org/10.1186/s12889-022-14591-x> PMID: 36447190 PMCID: 9710024
24. Muinde FN, Nzioki JM, and Mahmoud MK (2020) **Effect of a community health worker intervention on uptake of breast cancer screening services among women of reproductive age in Kitui County, Kenya** *Afr J Health Sci* 33(2) 35–43 [<https://www.ajol.info/index.php/ajhs/article/view/201939>]
25. Dalton M, Holzman E, and Erwin E, *et al* (2019) **Patient navigation services for cancer care in low- and middle-income countries: a scoping review** *PLoS One* 14(10) 223537 <https://doi.org/10.1371/journal.pone.0223537>
26. Bamodu OA and Chung CC (2024) **Cancer care disparities: overcoming barriers to cancer control in low- and middle-income countries** *JCO Glob Oncol* 10 e2300439 <https://doi.org/10.1200/GO.23.00439> PMID: 39173080