






RESEARCH ARTICLE

Public Perceptions Towards Integration of Herbal Medicine into Mainstream Healthcare in Kenya: A Cross-Sectional Study

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ABSTRACT

The integration of traditional medicine into health systems is one of the major objectives of the current World Health Organisation (WHO) strategy on traditional medicine. This may be achieved through a multidisciplinary approach involving conventional health workers (CHWs) and traditional medical practitioners. Whereas the majority of studies have focused on the two groups, a few have prioritized the general public, a key stakeholder. The study aimed to investigate the public perception regarding the regulation and integration of herbal medicine (HM) into the mainstream healthcare system in Kenya. A cross-sectional study design was adopted, and a systematic random sampling strategy was used to select participants, who included one adult participant from each household within a span of 5 kilometres around each sampled public health facility, in Kakamega County, Western Kenya. A total of 317 adults were interviewed, and targeted structured questionnaires were used to obtain their perceptions on key relevant thematic areas, including use, efficacy, improvements of HM practice, and integration into mainstream healthcare. Statistical analysis was performed using IBM SPSS version 28.0. An assessment of support for integration was considered as the motivating objective. From the findings, 88% of the respondents reported that they use HM as part of their treatment when ill, 59% believe that HM provides effective treatment, and 78% believe they are safe. On integration, 52% of the public support integration of herbal and conventional medicine (CM), with 62% of the view that both medicines can be used concurrently. Notably, integration is already being informally implemented in Kenya, mainly through cross-referrals between HPs and CHWs, with 22% reported referrals by CHWs to HPs and 24% from HPs to CHWs. In conclusion, the proposed strategies of integration include cross referrals, registration and licensing of herbal practitioners (HPs), training HPs in modern healthcare practices, as well as documentation and validation of the efficacy of herbal medicines.

Keywords: *Public Views, Herbal Medicine, Conventional Medicine, Integration, Regulation, Mainstay Healthcare*

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INTRODUCTION

The World Health Organization (WHO) estimates that 80% of the population in sub-Saharan Africa rely on traditional medicine (TM) for their health needs (Ngere et al., 2022; WHO, 2019). WHO defines TM as systems for health care and well-being, comprising practices, skills, knowledge and philosophies originating in different historical and cultural contexts, distinct from and pre-date biomedicine, evolving with science for current use from an experience-based origin; that emphasizes nature-based remedies and holistic, personalized approaches to restore balance of mind, body and environment (WHO, 2025). One of the four strategic objectives of the current WHO Global TM strategy is to integrate safe and effective traditional, complementary and integrative medicine into health systems (WHO, 2025). Herbal Medicine (HM) constitute a major component of TM, especially in Africa (Ozioma Ezekwesili-Ofili & Okaka, 2019). In Kenya, HM still plays an important part of primary healthcare, despite the advances in conventional healthcare owing to various factors (Gakuya et al., 2020; Inyangala et al., 2026; Kigen GK et al., 2013; Lambert et al., 2011; Nankaya et al., 2019). These include lack of availability and affordability of health services; and cultural beliefs (Lambert et al., 2011; Ngere et al., 2022). It is noteworthy that the use of HM is largely driven by patient perception and subjective beliefs, rather than evidence-based clinical efficacy.

Many patients believe that HM provides holistic, comprehensive treatment and improves the quality of life (Inyangala et al., 2026; Karimi et al., 2015; Ngere et al., 2022; Ondicho, 2015). Indeed, some believe that HM have better efficacy and safety, especially in the management of chronic disorders (Ameade et al., 2018; Inyangala et al., 2026; Kigen GK et al., 2013; Ondicho, 2015). Owing to these, amongst several other reasons including historical influence, socioeconomic and cultural aspects, many patients especially with chronic conditions use HM concurrently with CM (Inyangala et al., 2026; Kigen GK et al., 2013; Mwangi & Gitonga, 2014). In many instances, patients do this without the knowledge of their conventional health workers (CHW) for fear that the CHWs will discourage them from doing so (Inyangala et al., 2026; Mothupi, 2014). This may result in deleterious effects as a result of herb-drug interactions among several other adverse outcomes (Inyangala et al., 2026; Kigen GK et al., 2013; Meshesha et al., 2020; Tsele-Tebakang et al., 2023).

Additionally, some patients, especially those with conditions deemed to be incurable such as cancer, may completely stop beneficial therapy and resort to care by traditional herbal practitioners (THPs), who many believe that they can cure them, only to

come back to hospital when conditions have markedly deteriorated (Inyangala et al., 2026).

Moreover, some CHWs like their counterparts elsewhere, are reluctant to embrace HM owing to negative attitudes towards HM, or lack of knowledge on their potential effects (Inyangala et al., 2026; Tozun et al., 2022; Tsele-Tebakang et al., 2022). The situation is exacerbated by lack of regulation of herbal practice, and collaboration between the CHWs and THPs (Inyangala et al., 2026; Okumu et al., 2017; Ozioma Ezekwesili-Ofili & Okaka, 2019). The proliferation of quacks who seek to profit from desperate patients has also complicated the situation (Inyangala et al., 2026; Kigen GK et al., 2013; Okumu et al., 2017).

This may be ameliorated through the regulation and integration of herbal practice into mainstream healthcare, as well as by encouraging cooperation between CHWs and THPs for the benefit of the patient (Inyangala et al., 2026; Wake & Fitie, 2022). This aligns with the WHO's current TM strategy, which aims to support member states in developing legislative policies and strategic plans to safely integrate evidence-based traditional and complementary medicine into their national healthcare systems (WHO, 2025). However, whereas Kenya and most other African states now favour the integration of HM into mainstream healthcare, the strategies to achieve this are still in the formative stages owing to the complexity of the matter in Africa, unlike in Eastern countries (Hunter et al., 2026; Inyangala et al., 2026). Numerous challenges still exist in Kenya, including the strategies for integration, standardization of herbal products, legislative and regulatory policies/frameworks, and willingness of HPs to reveal their practices as well as acceptance by CHWs (Boateng et al., 2016; Chebii et al., 2020; Gakuya et al., 2020; Inyangala et al., 2026; Kretchy et al., 2016; Mutola et al., 2021; Ozioma Ezekwesili-Ofili & Okaka, 2019; Wang et al., 2025).

A recent study reported that the representatives of herbal associations are strongly willing to work with conventional health workers by way of cross-referrals (Inyangala et al., 2026). The willingness of the general public to accept an integrated system rather than the current parallel/opaque system is also key to the success of the operationalization of an integrated system. Previous studies have reported that the general public largely favours integration of complementary and alternative medicine into mainstay healthcare (Agyei-Baffour et al., 2017; Ampomah et al., 2023; Krug et al., 2016). From the literature, however, studies on the views of the general public regarding integration of TM into

mainstay healthcare have not been conducted in Kenya to date. The study, therefore, sought to evaluate the public perceptions towards the integration of HM into mainstream healthcare system in Kenya.

METHODOLOGY

Study Area

The study was conducted in Kakamega county, located in Western Kenya (Figure 1). This was one of the four counties (Kakamega, Nairobi City, Keiyo Marakwet and Kilifi) where similar studies are planned to be conducted.

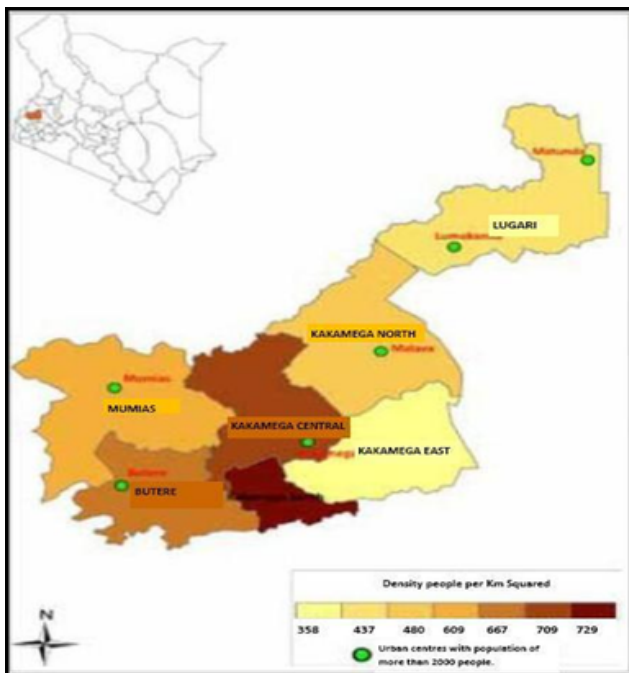


Figure 1: Map showing Kakamega County Interposed on the Kenyan Map

Adapted from: <http://www.crakenya.org/cra-county-factsheets-2nd-edition-2/> Nairobi

The inhabitants are a mix of urban and rural population with majority being from indigenous communities. As at 2019, the total population was 1,867,579 within an area of 3,224.9 km² leading to a population density of about 579 people per km² with majority residing in rural areas. The residents are low to middle income as per WHO classification, with a poverty level of 49 % (KIHBS, 2018; KNBS, 2016). A large portion of Kakamega forest, a tropical rainforest with a high number of medicinal plants is located within the county. This may have in part contributed to the widespread use of HM owing to easy accessibility and availability (Ojunga et al., 2023). The most prevalent diseases in the county include malaria, diarrhoea, skin diseases and respiratory tract infections (CRA; Kakamega, 2017). The available public health facilities include one county referral and teaching hospital, 12 sub-county hospitals, 40 health centres and 141 dispensaries (MOH, 2023).

Study Population

The target study population included adults aged 18 and above residing in Kakamega county for at least two years, for authentic representation. Participation was contingent upon providing informed consent, either through a signed document or an affirmative response to the consent query within the electronic questionnaire. Failure to meet any inclusion criteria or a refusal to consent resulted in the immediate termination of the interview session. Additionally, herbalists, healthcare workers and those unable to communicate were excluded. The target sample for the study was 303 participants. However, a total of 317 adults who were willing and available to participate in the study were interviewed. Targeted and semi-structured interviews were used to obtain the relevant information which included their social demographic characteristics, views on use of HM, perspectives on the efficacy of HM, improvement for HM practice, and integration of HM into mainstream healthcare.

Sampling

Participants were recruited from households through the use of a targeted systematic random sampling strategy, with one participant being selected from each household. The first household/participant was randomly selected from within a span of 5- kilometre radius around a sampled public health facility. The rest of the participants were systematically selected within the five-kilometre radius until the desired sample size was attained. If the county borders were reached before the desired sample size was obtained, another 5-kilometre radius strip (not overlapping with the previous strip) was defined and systematic sampling continued. The choice of distance, rather than number of participants ensured that a wider stretch of the county was covered, and hence a more accurate representation of the resident's opinions (Thomas et al., 2010).

Sample Size Determination

The sample size was determined using the Hsieh's formula for binary or continuous covariates in logistic regression (Hsieh et al., 1998):

$$n = \frac{\left(Z_{1-\alpha/2} \sqrt{P_1(1-P_1)} / B + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2) \times (1-B/B)} \right)^2}{4(P_1 - P_2)^2 \times (1-B)}$$

Where; n = sample size, $Z_{1-\alpha/2}$ = significance level (e.g., 1.96 for 95 % confidence), $Z_{1-\beta}$ = statistical power (e.g. 0.84 for 80% power) P_1 = event rate in the first group, P_2 = event rate in the second group; B = proportion of sample in the second group. In order to determine the P values, data from two previous related studies conducted in South Africa were applied (Broll et al., 2002; Hou

& Chen, 2025; Hsieh et al., 1998). The first study which involved an assessment of the perceived treatment efficacy reported that up to 19% of the public had ever sought herbal medicine treatment (Peltzer, 2000). The second study which involved nurses reported that 43% of the patients initiated a discussion with a healthcare provider on the benefits of seeking herbal treatment for their condition (Peltzer & Khoza, 2002). The results from the second study were used as surrogate marker for the support of integration of HM into mainstream healthcare system. Hence with 80% certainty and 95% confidence, the required number of public participants was determined using the parameters in the Hsieh's formula; where P_1 (=43%) represents the patients/public who initiated a discussion with a healthcare provider (used as surrogate marker for support of integration of HM into mainstream healthcare), P_2 (=33%) the proportion of patients/public who support integration of HM into mainstream healthcare system among those who have never sought discussion about herbal medicine with their healthcare workers, and B (=19%) the public that have ever sought herbal medicine treatment. $P = (1-B) \times P_1 + B \times P_2$, the overall proportion of the patients/public willing to support integration of HM into the mainstream healthcare system, Z_c the quantile of the standard normal distribution corresponding to $c \times 100\%$ percentile, $c = (1-\alpha/2)$, a type I error equal to 5%, and b the type II error ($Z_{1-\alpha/2}=1.96$ and $Z_{1-\beta}=0.84$). This results in a sample size of 303 upon rounding up to the nearest whole participant for each of the four intended sites.

Data Collection Tools

Data was collected using an electronic questionnaire entered into an electronic data base linked to the Open Data Kit (ODK) platform (Hartung et al., 2010). The questionnaire had five relevant thematic sections including socio-demographic characteristics, use of HM, perceptions on efficacy of HM, improvement of HM practice, and integration of herbal with CM. A multiple response variable approach was adapted whereby respondents were allowed to choose more than one option in each questionnaire. The database was created using Microsoft excel and hosted in Ona Data website (Ona, 2026). The website had a secure link which required a username and a password to access. The data was downloaded and cleaned prior to analysis. Paper-based questionnaires were used in case of power failure, or in areas with poor network coverage. The questionnaires were always assessed for completeness and accuracy prior to release of the respondent when this mode of data collection was adopted. The physical data was then entered into an electronic database using the ODK platform within 24 hours.

Data Quality Control

A preliminary study was carried out to determine the suitability of the data-collecting tools. The findings of the study were used to improve the tools. The research assistants were trained before participating in the study. Two people, a researcher and a research assistant, interviewed one respondent at a time. All data entries were double-checked before submission. All the filled-in questionnaires were kept under lock and key, while the electronic database had a secure link that required a username and a password to access. The research assistants could only access empty questionnaires to be administered to participants, but could not access data once submitted. The electronic data was backed up regularly during and after data collection. Data cleaning was undertaken before data analysis.

Data Analysis

The analysis involved descriptive statistics for five thematic topics/variables namely: socio-demographic characteristics, use of HM, perception on efficacy of HM, improvement of HM practice, and integration of herbal with CM. The results for each variable were presented as counts and percentages for categorical variables. An assessment on the support for integration of conventional and HM was considered as the motivating objective. Bivariate analysis of the factors associated with support for integration of conventional and HM (before adjustment for confounding factors) was performed. Crude estimation of the association between support for integration of conventional and HM with each independent factor was conducted using Pearson Chi-Square test or Fisher exact test (informed by the mean expected counts per cell). Odds ratios with corresponding 95% confidence interval were used to measure the strength of association. To identify factors independently associated with support for integration of conventional and HM and to control for possible confounding variables, all factors identified at bivariate analysis with $p < 0.05$, and key plausible factors (age and sex of the participant), were considered for multivariable analysis. A binary logistic regression model was built by stepwise selection of factors performed using both backward and forward conditional methods, with inclusion criteria set at $p < 0.05$. Key plausible factors were forced into the model. A grand multivariable logistic model for socio-demographic characteristics, use of HM, perception on the efficacy of HM, improvement of HM practice, and integration of herbal with CM whose interpretation is based on the parsimonious model obtained from the analysis was constructed. Adjusted odds ratio with 95% confidence interval were determined. The threshold for statistical significance was set at

$p < 0.05$ (2-tailed), for all inferential statistics. Statistical analysis was performed using IBM SPSS version 28.0 (IBM, 2022).

RESULTS

Socio-demographic characteristics

The participant's sociodemographic characteristics are outlined in Table 1. From the results, 187(59%) of the 317 interviewed participants were males with

the number of females being 130(41%). With regards to age distribution, the most represented age group was 25-35 years(32%). On marital status, majority were married (50%), with a few divorcees (4%) and widows (9%). Christianity was the predominant religion (80%). A total of 224(70%) respondents had attained senior secondary education or higher; with 40% having achieved secondary or vocational level of training and 30% tertiary.

Table 1:

Socio-demographic Characteristics

Variable	n	%
Sex		
• Male	187	59
• Female	130	41
Age		
• 25-35 years	100	32
• 35-50 years	92	29
• 18-25 years	89	28
• Over-50years	36	11
Marital status		
• Married	159	50
• Single	120	38
• Widowed	27	9
• Divorced	11	4
Religion		
• Christianity	255	80
• Islamic	53	17
• Traditional	6	2
• Other	3	1
Educational level		
• Senior Secondary or Vocational education	128	40
• Tertiary education	96	30
• Primary education	55	17
• No formal education	23	7
• Junior Secondary or Middle School	15	5
Employment status		
• Self employed	139	44
• Unemployed	108	34
• Formally employed	70	22
Income per month (Ksh)		
• 5000-10,000	108	34
• Below 5,000	94	30
• 10,001-30,000	76	24
• Above 30,000	39	12

Variable	n	%
Place of residence		
• Rural	179	57
• Urban	138	44

With regards to employment, 66% of the respondents had a form of employment; with 44% on self-employment and 22% on formal employment. On income distribution, the highest proportion earned between 5,000-10,000 Kenya shillings (KSh) per month (34%), whereas 12% earned above 30,000 KSh (12%). Of note is that 30% of the participants earned less than 5,000, which is fairly low. Most of the respondents resided in the rural areas (57%).

Influence of socio-demographic characteristics on support for integration of herbal and conventional medicine

The results for bivariate and multivariate analysis on influence of socio-demographic characteristics on support for integration of conventional and HM are presented in Table 2. Prior to controlling for confounding factors, majority of the participants supporting integration were females (OR=2.53; 95%CI=1.59-4.01; p=<0.001), aged 25-

35 years, with senior secondary/vocational training (OR=4.01;95%CI=1.48-10.84); p=0.006), or tertiary education (OR=4.14;95%CI=1.50-11.44; p=0.006), formally employed (OR=3.63;95%CI=1.85-7.13; p<0.001), earning KShs 5000-10,000 (OR=0.36;95%CI=0.17-0.77; p=0.009), and residing in rural areas (OR=2.16; 95%CI=1.38-3.40; p<0.001). Multivariable analysis showed that adjusting for thematic variables i.e. socio-demographic characteristics, use of HM, perception on efficacy of HM, improvement of HM practice, and integration of herbal with CM; the support for integration was significantly associated with being female (aOR=3.47;95%CI=1.36-8.88; p=0.005), attaining senior secondary/vocational education (aOR=27.14;95%CI=5.04-146.11; p<0.001) and tertiary (aOR=6.79;95%CI=1.24-37.13; p=0.027), and being formally employed (aOR=6.3;95%CI=1.90-20.93; p=0.003).

Table 2:

Socio-demographic Characteristics Associated with Support for the Integration of Conventional and Herbal Medicine

Variables	Supports Integration		OR(95%CI)	p value	aOR(95%CI)	p value
	Yes n(%)	No n(%)				
Sex						
• Male	80 (42.8%)	107(57.2%)	1		1	
• Female	85 (65.4%)	45(34.6%)	2.53(1.59-4.01)	<0.001	3.47(1.36-8.88)	0.005
Age				0.425		0.051
• 18-25 years	42 (47.2%)	47(52.8%)	1		1	
• 25-35 years	58 (58.0%)	42(42.0%)	1.55(0.87-2.75)	0.138	2.54(0.88-7.27)	0.083
• 35-50 years	45 (48.9%)	47(51.1%)	1.07(0.60-1.92)	0.817	0.65(0.21-2.00)	0.452
• Over-50years	20 (55.6%)	16(44.4%)	1.40(0.64-3.05)	0.398	2.70(0.58-12.49)	0.203
Marital status						
• Divorced	5 (45.5%)	6(54.5%)	1			
• Married	93 (58.5%)	66(41.5%)	1.69(0.50-5.77)	0.402		
• Single	55 (45.8%)	65(54.2%)	1.02(0.29-3.51)	0.981		
• Widowed	12 (44.4%)	15(55.6%)	0.96(0.23-3.93)	0.955		

Educational level						
• No formal education	6 (26.1%)	17(73.9%)	1		1	
• Primary education	23 (41.8%)	32(58.2%)	2.04(0.70-5.96)	0.194	4.37(0.79-24.22)	0.092
• Junior Secondary/Middle	4 (26.7%)	11(73.3%)	1.03(0.24-4.50)	0.968	3.22(0.32-32.14)	0.319
• Senior Secondary/Vocational	75 (58.6%)	53(41.4%)	4.01(1.48-10.84)	0.006	27.14(5.04-146.11)	<0.001
• Tertiary education	57 (59.4%)	39(40.6%)	4.14(1.50-11.44)	0.006	6.79(1.24-37.13)	0.027
Employment status				<0.001		<0.001
• Unemployed	52 (48.1%)	56(51.9%)	1		1	
• Formally employed	54 (77.1%)	16(22.9%)	3.63(1.85-7.13)	<0.001	6.31(1.90-20.93)	0.003
• Self employed	59 (42.4%)	80(57.6%)	0.79(0.48-1.32)	0.372	0.68(0.27-1.68)	0.404
Income per month				0.025		
• Below 5,000	49(52.1%)	45(47.9%)	0.54(0.25-1.19)	0.126		
• 5000-10,000	45(41.7%)	63(58.3%)	0.36(0.17-0.77)	0.009		
• 10,001-30,000	45(59.2%)	31(40.8%)	0.73(0.32-1.63)	0.437		
• Above 30,000	26(66.7%)	13(33.3%)	1			
Place of residence						
• Urban	57 (41.3%)	81(58.7%)	1			
• Rural	108 (60.3%)	71(39.7%)	2.16(1.38-3.40)	<0.001		

Prevalence of herbal medicine use

The results for prevalence of HM use and associated factors are outlined in Table 3. A total of 225(71%) of the 317 respondents reported that they had fallen ill within three months prior to data collection. Out of these, 121(54%) informed that they used HM for their treatment during the period compared to 155(69%) who reported to have used CM. Of note is a further 69% reported to have sought spiritual healing for their therapy. Asked whether they had ever used HM, a significant proportion 227(87%) of the respondents reported to have done so. The reported reasons for choice of HM were affordability (62%), accessibility (53%), efficacy (41%), prior use (28%), fewer adverse effects (17%) and religious influence (11%). On use HM when ill, majority of the respondents (88%) reported using HM whenever they fall ill; with 13%

stating that they always use, 49% that they sometimes use and 26% reporting that they do so once in a while. Only 12% denied using HM when ill. It was also noted that 31% of the respondents use HM as first choice treatment, with 60% using HM as alternative to CM and 18% as complementary to CM. Majority of the respondents (71%) informed that they use HM for treatment, 48% for prevention and 16% for health promotion. The reported modes of acquisition were from relatives (38%), collected from gardens (37%) and from herbal practitioners (37%). Notably, 23% reported to have obtained from conventional healthcare professionals. Majority of the participants (79%) viewed HM as cheaper and culturally acceptable (59%) compared to CM.

Table 3:
Use of Herbal Medicine

Variable	n	%
Fallen ill within the last three months		
• Yes	225	71
• No	92	29
Which medical care did you seek when you were sick (n=225)		
• Conventional medicine	155	69
• Spiritual healing	155	69
• Herbal medicine	121	54
• Other	2	1
Ever used herbal medicine (n=317)		
• Yes	277	87
• No	40	13
What was/were the reason(s) for using herbal medicine (n=277)		
• Affordability/less costly	172	62
• Closeness to me/accessibility	147	53
• More efficacious/works	113	41
• Past experience with its use	78	28
• Less adverse side effects	46	17
• In line with my religion	29	11
• Other	4	1
How often do you use herbal medicine when you fall ill		
• Sometimes	154	49
• Once in a while	81	26
• Always	45	13
• Rarely/never	37	12
When do you use herbal medicine		
• Alternative to conventional medicine	192	61
• First choice treatment	98	31
• Complementary to conventional medicine	56	18
• Other	4	1
Purpose(s) for the use herbal medicine		
• Treatment of illness	225	71
• Prevention of Illness	153	48
• Promotion of health	50	16
• Other	1	0.3
Modes of acquisition of herbal medicine		
• From a relative	119	38
• Prescribed by traditional herbal practitioner	116	37
• Collected from garden/farm/backyard	118	37
• Prescribed by conventional healthcare worker	72	23
• Over the counter herbal/traditional remedies	39	12
• Other	9	3

Which medical care system do you find less expensive		
• Herbal medicine	251	79
• Conventional medicine	66	21
Which medical care system do you find more readily available		
• Conventional medicine	160	51
• Herbal medicine	157	50
Which medical care system do you find more culturally acceptable		
• Herbal medicine	188	59
• Conventional medicine	129	41

Bivariate analysis of the factors associated with use of HM that support integration of conventional with HM identified six items that are significantly associated with the support prior to controlling for confounders. They include: occasional use of HM whenever a participant falls ill, not using HM as first choice treatment, not using HM in prevention of illness, prescriptions from non-conventional healthcare professionals, not using over the counter herbal remedies and finding HM culturally acceptable. Multivariable analysis demonstrated that adjusting for thematic variables; support for integration of conventional and HM was significantly associated with not using HM in prevention of illness (aOR=4.83;95%CI=1.96-11.93; p=0.001).

Public perception on the efficacy of herbal medicine

The results of participant's perceptions regarding the efficacy of HM are presented in Table 4. Most of the respondents (59%) believe that HM provides effective treatment, but is less active compared to CM. Regarding the safety of HM, 46% rated it as safe or very safe (32%) with only 3% considering HM as very unsafe. On adverse effects profiles, a large majority (88%) reported that they had not experienced any adverse effects with the use of HM compared to those who had experienced adverse events while using CM (31%). Of note is that 62% of the respondents believe that both herbal and conventional medicines can be used concurrently.

Table 4:
Perception on the Efficacy of Herbal Medicine

Variable	n	%
Do you think herbal medicine is effective in the treatment of diseases		
• Yes	186	59
• No	131	41
Comparing herbal medicine to conventional medicine, which one do you consider more effective		
• Conventional medicine	172	54
• Herbal medicine	145	46
How would you rate the safety of herbal medicine		
• Safe	147	46
• Very safe	101	32
• Somehow safe	61	19
• Very unsafe	8	3
Ever experienced any adverse effect(s) with the use of herbal medicine		
• No	279	88
• Yes	38	12
Ever experienced any adverse effect(s) with the use of convention medicine		
• No	219	69
• Yes	98	31
Can one use both herbal and conventional medicine at the same time		
• Yes	196	62
• No	121	38

The results for bivariate analysis of the perception on HM efficacy factors that support integration are presented in Table 5. Before controlling for confounding factors, majority of the participants supporting integration find HM to be effective in treatment of diseases (OR=8.31;95%CI=4.97-13.91; $p<0.001$, consider HM more effective compared to CM (OR=1.72;95%CI=1.10-2.68; $p=0.018$), have at one time experienced adverse effect(s) with the use of CM (OR=2.20;95%CI=1.34-3.60; $p=0.002$) and believe that HM should not be concurrently used with CM (OR=5.00;95%CI=3.02-8.28; $p<0.001$). Multivariable analysis revealed that adjusting for thematic variables; the support for integration of conventional and HM is significantly associated with the perception that HM is effective in treatment of diseases (aOR=14.69;95%CI=5.91-36.51; $p<0.001$) and having experienced adverse effect(s) with the use of CM (aOR=3.71;95%CI=1.58-8.74; $p=0.003$).

Table 5:

Perception on Efficacy of Traditional Medicine Associated with Support for Integration of conventional and Herbal Medicine

Variables	Supports Integration		OR(95%CI)	p value	aOR (95%CI)	p value
	Yes n(%)	No n(%)				
Do you think herbal medicine is effective in the treatment of diseases						
• No	31(23.7%)	100(76.3%)	1		1	
• Yes	134(72.0%)	52(28.0%)	8.31 (4.97-13.91)	<0.001	14.69 (5.91-36.51)	<0.001
Comparing herbal to conventional medicine, which one do you consider more effective						
• Conventional medicine	79(45.9%)	93(54.1%)	1	0.018		
• Herbal medicine	86(59.3%)	59(40.7%)	1.72(1.10-2.68)	0.024		
How would you rate the safety of herbal/traditional medicine						
• Very unsafe	2(25.0%)	6(75.0%)	1			
• Very safe	64(63.4%)	37(36.6%)	5.19(1.00-27.04)	0.051		
• Safe	66(47.1%)	74(52.9%)	2.68(0.52-13.72)	0.238		
• Somehow safe	28(45.9%)	33(54.1%)	2.55(0.48-13.63)	0.275		
Have you ever experienced any adverse(s) with the use of herbal medicine						
• Yes	17(44.7%)	21(55.3%)	1			
• No	148(53.0%)	131(47.0%)	1.40(0.71-2.76)	0.338		
Have you ever experienced any side effect(s) with the use of convention medicine						
• No	101(46.1%)	118(53.9%)	1		1	
• Yes	64(65.3%)	34(34.7%)	2.20(1.34-3.60)	0.002	3.71(1.58-8.74)	0.003
Can one use both herbal and conventional medicine at the same time						
• Yes	74(37.8%)	122(62.2%)	1			
• No	91(75.2%)	30(24.8%)	5.00(3.02-8.28)	<0.001		

Public views regarding improvement of herbal medicine practice

The report on potential improvements in HM practice, by thematic topic, is outlined in Table 6. The listed challenges experienced with the use of HM include: lack of training of HM practitioners (44%), lack of research and clinical testing of HM (44%), lack of documentation of HM practice (35%), bitterness and bad smell (34%) and credibility of the HM practitioners (28%). On potential improvements of HM practice, 74% of the respondents recommended research into safety and efficacy, 52% suggested clinical testing of HMs before use, 48% suggested sustainable utilization of

medicinal plants, while 47% suggested provision of licences for herbal practitioners. A large majority (97%) recommended formal training of herbal practitioners (HPs) to improve their practices. With regard to specific training, 65% recommended practical training by experienced herbalists, 50% recommended university-level training, while 49% suggested classroom training. The preferred training areas for HPs include: hygienic preparations and administration of HM (62%), HM dosage and side effects (57%), branding and packaging of HM (52%), sustainable utilization of medicinal plants (44%), and revelation of indigenous knowledge (44%).

Table 6:
Improvement of Herbal and Traditional Medicine

Variable	n	%
Problems you experience with use of herbal medicine		
• Lack of proper training of herbal medicine practitioners	139	44
• Lack of scientific research and clinical testing of herbal medicine	139	44
• Lack of documentation of herbal medicine practice	112	35
• Bitter and bad smell of herbal medicines	108	34
• Unavailability of credible herbal medicine practitioners	89	28
• Other	42	13
Solution(s) you recommend for the improvement of herbal medicine		
• Scientific research into the safety and efficacy of herbal medicines	236	74
• Clinical testing of herbal medicines before use	165	52
• Sustainable utilization of medicinal plants	151	48
• Provision of license to herbal practitioners	150	47
• Other	7	2
Support the formal training of herbal practitioners for the improvement of their practices		
• Yes	307	97
• No	10	3
What type of training do you support (n=307)		
• Practical training by experienced herbalists	200	65
• University level training/education	152	50
• Classroom educational training	149	49
• Other	4	1
Area(s) do you think is/are important in the training of herbal practitioners		
• Hygienic preparation and administration of herbal medicine	195	62
• Dosage and side effects of herbal medicines	182	57
• Branding and packaging of herbal medicine	166	52
• Sustainable utilization of medicinal plants	140	44
• Revelation of indigenous knowledge	138	44
• Other	8	3

Bivariate analysis of improvement of HM factors that support integration indicated that prior to control of confounders; use of HM was significantly associated with the following improvements: sustainable utilization of medicinal plants, provision of licences to herbal practitioners and clinical testing of HMs before use. Additionally, support for integration was also significantly associated with the following training needs: dosage and side effects of HMs, hygienic preparation and administration of HM, revelation of indigenous knowledge, and sustainable utilization of medicinal plants. Multivariable analysis revealed that adjusting for thematic variables; the support for integration was not significantly associated with suggested improvements nor cited training needs for HM.

Participants' views on integration of herbal and conventional medicine

The results for the participants' views on the integration of herbal and CM are summarized in Table 7. There was a limited number of cross-referrals between HPs and conventional healthcare workers (CHWs), with 22% reported

referrals by CHWs to HPs and 24% from HPs to CHWs. Additionally, 24% of the respondents had obtained herbal medicines from CHWs, whereas 27% reported having obtained conventional medicines from HPs. Despite the low rate of cross-referrals, 52% of the respondents supported integration of herbal and conventional healthcare systems. There were mixed responses on potential ways through which the integration could be achieved, including: documentation of HMs and their respective uses (55%), cross-referrals (55%), training of HPs in modern healthcare practices (51%), testing for efficacy and safety of HMs (46%), and registration and licensing of HPs (45%). Some of the reported health constraints within the county include: long queues at the health facilities (54%), expensive health services (53%), public health facilities located away from home (44%), inadequate health care professionals (39), mishandling by healthcare workers (35%), and low public health education (22%). Notably, (51%) of the respondents believed that integrating conventional and HM could address the constraints.

Table 7:
Integration of Herbal Medicine with Conventional Medicine

Variable	n	%
Ever been referred by a medical doctor/hospital/clinic to an herbal practitioner		
• Yes	69	22
• No	248	78
Ever been referred by a herbal practitioner to a medical doctor/ hospital/clinic		
• Yes	76	24
• No	241	76
Herbal medicines ever been prescribed for you at the hospital/clinic or by a medical doctor		
• Yes	77	24
• No	240	76
Conventional medicine(s) ever been prescribed for you by a herbal practitioner		
• Yes	85	27
• No	232	73
Support the integration of herbal and conventional healthcare systems		
• Yes	165	52
• No	152	48
Specific way(s) you think integration of herbal and conventional medicine could be achieved		
• Cross-referrals of patients between herbalists and conventional healthcare workers	173	55
• Documentation (pharmacopeia) of herbal medicines and their uses	175	55
• Training of herbal practitioners in modern healthcare practices	160	51
• Testing of the efficacy and safety of herbal medicines	147	46
• Registration and provision of license to herbal practitioners	141	45
• Other	5	2

Some of the major health constraints being experienced in this county

• There are long queues at the public hospitals/clinics	171	54
• Health services are expensive	168	53
• Public health facilities are located far away from home	138	44
• Health care professionals are inadequate	122	39
• A number of healthcare workers mishandle patients	112	35
• Public health education is low	71	22
• Other	7	2

Integration of conventional and HM could help to address the health constraints in the county

• Yes	162	51
• No	155	49

Before controlling for confounding factors, the bivariate analysis established that integration was significantly associated with the fact that conventional medicine(s) have never been prescribed by HPs. Additionally, support for integration was significantly associated with perceived ways through which the integration could be achieved, i.e. cross-referrals, documentation of HMs and their uses, registration and licencing of HPs, training of HPs in modern healthcare practices, testing of the efficacy and safety of HMs and distant health facilities. Multivariable analysis revealed that adjusting for thematic variables; the support for integration of conventional and HM was significantly associated with perceived ways through which integration could be achieved, i.e. cross-referrals (aOR=3.82;95%CI=1.69-8.67; p=0.001), registration and licencing of HPs (aOR=3.94;95%CI=1.57-9.93; p=0.004), and training of HPs in modern healthcare practices (aOR=14.20;95%CI=5.91-34.09; p<0.001).

DISCUSSION

There have been several proposals to regulate and integrate HM into mainstay healthcare in Africa. However, this has been met with several challenges including the secrecy of the practice, identification of genuine practitioners, incorporation of spirituality, willingness of HPs to disclose their practices as well as acceptance by the CHWs, lack legal frameworks and resources for validation (Boateng et al., 2016; Ikhoyameh et al., 2024; Inyangala et al., 2026). The acceptance of the public to embrace the integrated system is also a major determinant (Agyei-Baffour et al., 2017). The study aimed to investigate the public perception regarding regulation and integration of HM into mainstream healthcare system in Kenya, the public being a core stakeholder for the success of this initiative. The study was carried out in Kakamega county in Western Kenya, and involved a total of 317 participants. Perception was

evaluated across four key thematic areas: usage, efficacy, improvement and integration of herbal and conventional medicine into mainstream healthcare. An assessment on support for integration was considered as the motivating objective. From the results, majority of the respondents (88%) reported that they use HM as part of their treatment whenever they fall ill. A further, 59% of the informants believe that HM provides effective treatment with 78% vouching for the safety of HM. With regards to integration, more than half of the respondents (52%) support integration of herbal and CM. The proposed strategies of integration include cross referrals, registration and licencing of herbal practitioners (HPs), training HPs in modern healthcare practices, as well as documentation and validation of the efficacy of herbal medicines. Notably, integration is already being informally implemented in Kenya, mainly through cross-referrals between HPs and CHWs, with 22% reported referrals by CHWs to HPs and 24% from HPs to CHWs.

With regards to the HM use, 87% of respondents reported to have used at some point, in addition to the 88% who use HM when ill. These results compare well with the WHO estimates (80%) and previous studies conducted in Kenya (Ngere et al., 2022; WHO, 2019). Previous studies have reported 69% use in the general population, 89% to 90% use in children under five years, and 98% use in children with diarrhoea (Kiptui et al., 2023; Njoroge & Kibunga, 2007; Nzuki, 2016; Ondicho, 2015). From the results, 54% of the respondents reported that they used HM when they got ill within three months prior to data collection, compared to 69% who used CM. Additionally, 31% of the respondents informed that they use HM as their first choice treatment, either as alternative (60%) or complementary to CM (18%). With regards to the intended use, 71% stated that they use HM for treatment purposes, whereas 48% informed that they use

HM for preventive purposes. The reasons provided for the choice of HM include affordability (62%), accessibility (53%), efficacy (41%) and historical experiences (28%). The results are consistent with findings from previous studies conducted in Kenya (Inyangala et al., 2026; Kipkore et al., 2014; Lambert et al., 2011; Ondicho, 2015). The high percentages demonstrate their confidence in HM. However, this may have also been as a result of the lack of affordability of CM (Lambert et al., 2011). This may explain the high percentage of those who seek spiritual intervention (69%), which, from the findings, constitutes an equal proportion as those who use CM (69%). This is very worrying and may require intervention from the authorities, as this cadre of patients may easily lose their lives in the quest for divine intervention. There has been a reported increase in religious zealotry in Kenya, whereby rogue pastors dissuade their adherents from seeking formal treatments, or even in some instances, encourage starvation, the worst being the recent infamous Shakahola massacre (Magak & Kilonzo, 2025; Ng'ang'a et al., 2025; Wikipedia, 2025).

The results on public perception regarding the efficacy of HM have provided some useful information regarding the integration of HM with CM. It is noteworthy that 59% believe that HM provides effective treatment, though less effective compared to CM. The majority of the participants (79%) also viewed HM as cheaper and culturally acceptable (59%) compared to CM. With regards to the adverse effects, 88% informed they have not experienced adverse effects while using HM use compared to those who experienced adverse events with the use of CM (31%). Notably, 62% believe that herbal and conventional medicines can be used concurrently. Multivariable analysis revealed that the support for integration of conventional and HM is significantly associated with the perception that HM is effective in the treatment of diseases, and having experienced adverse effect(s) with the use of CM. It was interesting to note that 23% of the participants reported having obtained HM from conventional healthcare professionals. This is unlike reports from previous studies, whereby CHWs are perceived to have low acceptance of HM, despite their patients using HM concurrently with prescribed drugs (Gakuya et al., 2020; Hunter et al., 2026; Inyangala et al., 2026; Kigen GK et al., 2013; Kretchy et al., 2016; Mutola et al., 2021). This is quite encouraging and may provide some strong foundation for the integration of HM and CM in Kenya. It is also encouraging that there are few traditional healers in Kenya who have attained formal higher education, who might provide the convergence between traditional and modern medicine (Matoke, 2023).

The public responses on the current status of HM practice, and potential improvements also provided some key recommendations, especially with regard to improvement. Despite the popularity of HM, the public expressed some key concerns, including lack of training of HM practitioners (44%), lack of research and clinical testing of HM (44%), lack of documentation of HM practice (35%), bitterness and bad smell (34%), and the credibility of the HM practitioners (28%). A large majority (97%) recommended formal training of herbal practitioners (HPs) to improve their practices in such areas as hygienic preparations and administration of HM (62%), dosage and side effects of (57%), branding and packaging of HM (52%), sustainable utilization of medicinal plants (44%), and revelation of indigenous knowledge (44%). The proposed training methods included on-the-job training by experienced herbalists (65%), formal training through universities (50%), and classroom training (49%). These are genuine concerns that have been raised in various forums and reported in several publications (Inyangala et al., 2026; Khan et al., 2025; Mutola et al., 2021; Mwangi & Gitonga, 2014; Okumu et al., 2017). It has also been a major concern, especially from CHWs, and has to be addressed as they may provide a major impediment to integration of HM and CM (Inyangala et al., 2026; Kretchy et al., 2016). Interestingly, the credibility of the HM practitioners had the lowest proportion among the respondents, suggesting that they have high confidence in HM practitioners despite several reports on the proliferation of quack herbalists in Kenya (Inyangala et al., 2026; Kigen GK et al., 2013; Okumu et al., 2017). This has to be addressed through education and legislation to protect the vulnerable public and improve confidence by CHWs in order to enhance the integration process (Chebii et al., 2020; Okumu et al., 2017).

The participants' views on the integration of herbal and conventional medicine provided some insights on the current integration status, current primary health challenges, and potential ways through which integration can be achieved. Currently, there are few cross-referrals between HPs and CHWs, with 22% reported referrals by CHWs to HPs and 24% from HPs to CHWs. In addition, 24% of the informants had obtained HMs from CHWs, whereas 27% reported having obtained conventional medicines from HPs. From the literature, the cross referrals, despite the low percentages for the first time indicate some level of cooperation between HPs and CHWs in Kenya, which is a very good indicator that integration is already going on. However, on

the flip side, the 27% who reported having obtained conventional medicine from the HPs is a bit worrying, considering that HPs are not permitted by law to keep prescription drugs, as they are not trained. These were most probably quacks, and buttress the published reports about quacks mixing conventional medicine with herbal concoctions for quick financial gains (Inyangala et al., 2026; Kigen GK et al., 2013; Maina et al., 2023). Significantly, 51% of the respondents believed that integrating conventional and HM could address the current health constraints within the county health facilities, including long queues (54%), expensive health services (53%), remote health facilities (44%), inadequate health professionals (39%), mishandling of patients by healthcare workers (35%) and low public health education (22%). The proposed methods for integration include cross-referrals (55%), documentation of HMs and their respective uses (55%), training of HPs in modern healthcare practices (51%), testing for efficacy and safety of HMs (46%), and registration and licensing of HPs (45%).

Conclusion

These results for the first time provide some evidence-based findings from the Kenyan public regarding their perceptions on the integration of HM into mainstay healthcare. The majority of the Kenyan public supports the integration of HM into mainstay healthcare through several ways, including cross referrals, registration and licensing of HPs, training HPs in modern healthcare practices, as well as documentation and validation of the efficacy of herbal medicines.

Recommendations

The findings from this study may be used in part to develop strategies and policies for integrating HM into the national healthcare system in Kenya. The Kenyan government should initiate policies to support scientific validation and clinical documentation of herbal products with a view to developing herbal pharmacopoeias. Additionally, HM practice should be professionalized through training and regulation of Herbal Practitioners. Mechanisms should also be established through which HM can be formally incorporated into national healthcare systems.

Limitations

The limitations are mainly those associated with the cross sectional study design which include the population sample, self-reporting and duration of study. The sample population may not be reflective of the broader Kenyan population, whereas the self-reported data may be biased since the

participants may have provided answers which they thought were favorable or expected, rather than reflecting their genuine beliefs or practices. Additionally, data was collected over a short period (about 30 minutes per person) thus, long-term effects could not be assessed. Future research should aim for larger, more heterogeneous cohorts, broader geographic distributions and longer duration of research to enhance the robustness of the findings and to capture long term trends.

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Ethical Approval

Ethical approval was granted by Kenyatta National Hospital (KNH)-University of Nairobi (UoN) Ethical Review Committee (KNH-UoN ERC) Ref: KNH-ERC/A97 and the research permit by National Science, Technology and Innovation Ref: NACOSTI/P/025/415408.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability

The data used for this study will be available upon reasonable request from the corresponding author.

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