# Prevalence and associated factors of herbal medicine use among patients living with chronic disease in Ethiopia: A systematic review and meta-analysis

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A B S T R A C T

*Background:* Complementary use of medicinal plants with prescribed drugs is becoming more widespread concern among people with chronic disease like cancer, HIV/AIDS, diabetes and hypertension. Consequently, the purpose of this review was to determine the prevalence and associated factors of herbal medicine use among patients suffering from chronic disease.
*Methods:* This systematic review and meta-analysis was conducted by searching articles from Cochrane library, Google scholar, PubMed and African journal online. Data was extracted using Microsoft excel format and imported in to Stata software version 11 (Stata Corp LLC, TX, USA) for analysis. Statistical heterogeneity across the studies was investigated using Cochran's Q chi-square test at the significance level of <0.05 and the $I^2$ index. A random-effects model was used to estimate the pooled prevalence of herbal medicine use.
*Results:* Our systematic search yielded a total of 17,665 records from four databases (Google scholar (12,800), PubMed (3835), Cochrane library (30) and African journal online (12). The pooled estimate of herbal medicine use among patients with chronic disease in Ethiopia is found to be 56.94% (95% CI: 49.75, 64.12, P < 0.001). Being female (POR = 2.06, 95% CI = 1.55, 2.75, $I^2$ = 10.0%), rural residence (POR = 2.80, 95% CI = 1.42, 5.52, $I^2$ = 89.1%), duration of the disease greater than 5 years (POR = 6.42, 95% CI = 4.188, 9.84, $I^2$ = 48.3%) and having complication (POR = 4.65, 95% CI = 3.75, 5.77, $I^2$ = 0.0%) were factors associated with herbal medicine use among patients living with chronic disease.
*Conclusion:* The study found a high prevalence of herbal medicine use among patients living with chronic disease. Being female, rural residence, duration of disease greater than 5 years and having complication were factors that are significantly associated with herbal medicine use. The prevalence of herbal medicine use among persons with chronic disease in Ethiopia presents significant implications for healthcare practice. Healthcare professionals need to adopt a patient-centered strategy that promotes open, judgment-free discussions about herbal medicine usage.
*Prospero registration:* CRD42024498817.

## 1. Introduction

Global mortality from chronic disease has increased to 16.1% during 2006–2016 and could reach 52 million by 2030 [1]. Chronic conditions including cancer, diabetes mellitus, chronic obstructive pulmonary disease, and cardiovascular problems are increasing alarmingly in Ethiopia and they are associated with increased rates of morbidity and mortality [2]. The national prevalence of cardiovascular disease is estimated to be 15% and the prevalence of both cancer and chronic obstructive pulmonary disease is estimated to be around 4% of the

population. In 2011, the World Health Organization (WHO) estimated that over 30% of Ethiopians suffer from chronic diseases and/or die from them [3]. Additionally, the magnitude of diabetes is frighteningly increasing with a national prevalence of 6.5% [4].

Majority of patients with chronic disease shifted to complementary and alternative medicine (CAM) modalities to manage their condition because of the chronic nature of the disease and challenges associated with sticking to long-term treatment plans. One of the most common complementary and alternative medicine methods used by many chronically ill patients in the worldwide is the usage of herbal medicine [5]. Traditional medicine (TM) is still widely practicable worldwide, despite the fact that modern medicine has become the predominant medical practice since the 20th century. The magnitude of people who have used TM ranges from 40% to 50% in developed countries like the United States and Australia, whereas the prevalence of TM used to address basic healthcare needs ranges from 60% to 90% in low and middle income countries [6].

According to World Health Organization (WHO), traditional medicine is defined as "Health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques, applied singularly or in combination to treat, diagnose and prevent illnesses and maintain well-being". Herbal medicine is the most widely utilized traditional medical practice in both the general population and people with chronic disease [7]. Medicinal plants have been utilized for medical purposes all over the world, and 80–85% of people rely on these plants for their basic healthcare requirements [8].

Since the beginning of human history, medicinal plants have been used for therapeutic purposes. Complementary use of medicinal plants with prescribed drugs is becoming more widespread concern among people with chronic illnesses like cancer, HIV/AIDS, diabetes, and hypertension [9,10]. The belief that medicinal plants are completely safe because they are obtained from natural sources is the primary driver for the co-use of these plants with conventional medicine [11]. Additional reason for the preference of medicinal herbs are they are more widely available, affordable, effective, patient report of dissatisfaction and side-effects encountered related with conventional treatment and past good experiences of taking medicinal plants [12–14].

The common factors associated with HM use includes socio-demographic characteristics of chronic patients, cultural and psycho-social predictors [15]. Higher socioeconomic status, being women, rural residence, lower education, anxiety, older age, poor quality of life, depression, perceived poor health status and multiple chronic conditions are another factors associated with HM use [16–18].

In Ethiopia HM is still the major means of disease prevention and management for many millions of people especially for patients living with chronic disease [19]. Given the high burden of chronic disease in Ethiopia, it is important to document the management strategies of patients living with chronic disease, including the usage of HM. However, systematic review on the extent of medicinal plants usage by patients suffering from chronic disease in Ethiopia are still limited. According to these limited research finding, the majority of medicinal plants were used in combination with the modern medications, resulting in significant clinical interactions. The results of this review will enables healthcare systems to integrate culturally relevant approaches into chronic disease management strategies and improves effective communication between healthcare providers and patients, fostering a holistic and patient-centered approach that acknowledges both traditional and conventional methods, ultimately enhancing the overall chronic disease management in Ethiopia. Therefore, this review aimed to synthesize the available literature to determine the prevalence and associated factors of herbal medicine use among patients living with chronic disease.

## 2. Materials and methods

This systematic review and meta-analysis was performed based on the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guideline (Supplementary file).

### 2.1. Search strategy

To find studies regarding on the prevalence and associated factors of herbal medicine use among patients with chronic disease, articles was searched using with the following electronic databases: Cochrane library, Google scholar, PubMed, and African journal online from December 22/2023 to January 20/2024. The search was conducted by using the following medical subject heading terms; "herbal medicine" OR "alternative medicine" OR "medicinal plants" AND "plant medicine" OR "complementary medicine" OR "home medicine" OR "traditional medicine" AND "Diabetes Mellitus*" OR "hypertension*" OR "cancer *" OR "HIV/AIDS*" OR "chronic pulmonary disease*" and "Ethiopia*". The reference lists of the retrieved articles were also reviewed to access more articles. The search focused on cross-sectional epidemiological studies conducted in Ethiopia on herbal medicine use among patients with chronic disease.

### 2.2. Inclusion and exclusion criteria

Observational studies/cross-sectional studies done in Ethiopia, and reporting the frequency or prevalence of herbal medicine use, or providing adequate information to calculate this prevalence, accessible full text articles and articles published in English language were included in the review. Inaccessible full-text articles due to non-responsiveness of the corresponding authors upon frequent inquiry through email and studies that didn't report the prevalence of herbal medicine use were excluded from the review.

### 2.3. Outcome of interest

The primary outcome variable for the review is herbal medicine use. In primary studies respondents were considered as herbal medicine users if they have taken herbal medicine(s) through oral, intra-vaginal or topical routes after the occurrence of their chronic illness. Other preparations that are consumed as routine meal preparations and those that are taken as nutrients were excluded.

### 2.4. Data extraction

Microsoft Excel sheet template adapted from the Joanna Briggs Institute (JBI) was used to extract the following data on the primary studies; corresponding authors name with publication year, study design, study population, study area/region, sample size, sampling technique, participants, prevalence of herbal medicine use, and associated factors of herbal medicine use. The data was extracted by two reviewers (YAF and GWA) independently. Disagreements raised between reviewers were resolved by couple discussion. A two-by-two table was also used to address odds ratios from studies depicting factors associated with herbal medicine use. Factors that were extracted from primary studies were sex, residence, duration of the disease, complication of the disease and comorbidity.

### 2.5. Quality assessment

At this stage, the two authors (AMZ, YAF) independently examined the methodological quality of the selected studies based on the items of the STROBE checklist adapted for cross-sectional studies conducted related to herbal medicine utilization. The tool appraised study methodology, participant characteristics and HM use, with 1 point given to each aspect under the three domains methodology (representative
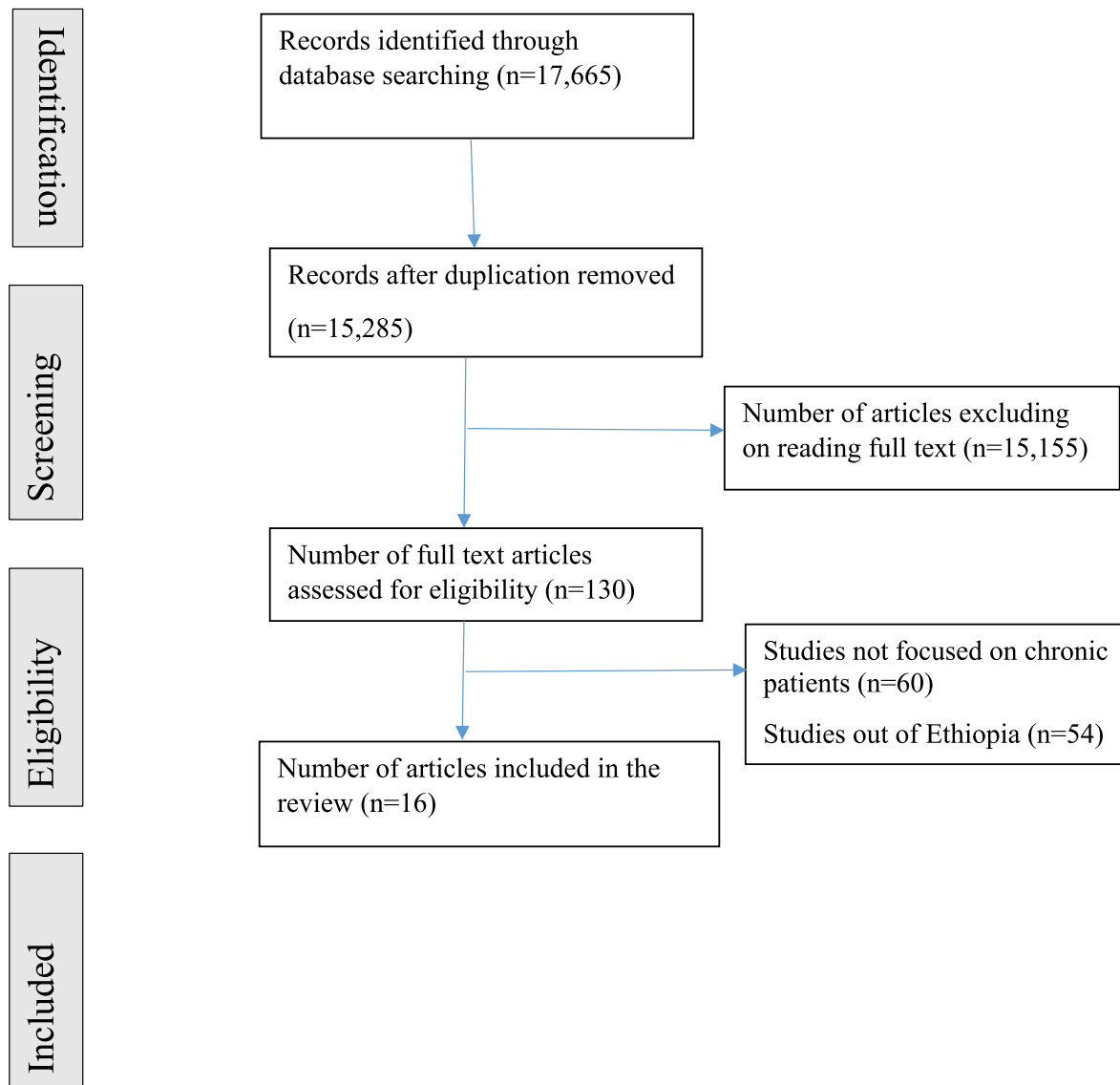
**Fig. 1.** PRISMA flow diagram for a systematic review and meta-analysis of Prevalence and associated factors of herbal medicine use among patients living with chronic disease in Ethiopia.

strategy, sample size adequacy), reporting of participant characteristics (acceptable response rate, low recall bias, age, gender, socio-economic status, ethnicity and location) and reporting HM use (definition of HM use, assessed use of HM use, name type of HM use). A maximum potential score of 12 was tallied if all aspects of the three domains were met. The authors separately analyzed and allocated scores. Differences in the final score were resolved through discussion with the other two authors (WCT, GWA) to make the final decision. Only articles with quantitative designs were considered as they formed the greater part of the reviewed papers. Articles with summated scores ranging from 9 to 12, 6–8 and 0–5 were considered of good, fair and poor quality, respectively [20]. The details of the quality appraisal tool and the summated score of each paper is provided as supplementary file.

### 2.6. Statistical analysis

The data was extracted using Microsoft excel format and imported in to Stata software version 11 (Stata Corp LLC, TX, USA) for analysis. To determine heterogeneity between studies, a forest plot was used, which reported the pooled prevalence of the combined studies. In addition, statistical heterogeneity across studies was investigated using Cochran's

Q chi-square test at the significance level of $<0.05$ and $I^2$ index, based on the values of 0–40, 40–60, 60–90 and 90–100% which indicated low, medium, substantial and high heterogeneity, respectively [21]. Since statistically significant heterogeneity was found with $I2 = 81.4\%$, $P < 0.001$, Random effect model was applied to estimate the pooled prevalence of herbal medication use among patients with chronic diseases. Subgroup analysis was also performed to investigate the potential sources of heterogeneity between the included studies. The measure of association that determine HM use among patients with chronic disease was estimated using pooled odds ratio. Possible publication bias was evaluated using Egger's linear regression test at the significance level of $P < 0.05$ and graphically with funnel plot.

### 3. Results

#### 3.1. Study selection

Our systematic search yielded a total of 17,665 records from four databases (Google scholar (12,800), PubMed (3835), Cochrane library (30) and African journal online (12)). Following the removal of duplicate records, a total of 2380 articles were screened based on their titles

**Table 1**
Characteristics of the included studies and prevalence of herbal medicine use in article.

| Author | Pub Year | Region | Study Design | Study Population | Sample size | Prevalence | Quality score |
|---|---|---|---|---|---|---|---|
| Z.D. Kifle et al. [24] | 2021 | Amhara | IBCS | DM patients | 419 | 58.5% | Fair |
| Mekuria et al. [27] | 2018 | Amhara | IBCS | DM patients | 408 | 62% | Fair |
| Meshesha et al. [22] | 2020 | Addis Ababa | IBCS | DM patients | 845 | 80.7% | Good |
| Z Tilahun et al. [36] | 2018 | (Amhara, Oromia, SNNP Tigray & AA) | IBCS | DM patients | 806 | 47.8% | Good |
| Kassahun H [26] | 2021 | Amhara | IBCS | DM patients | 341 | 33% | Fair |
| Shiferaw et al. [23] | 2020 | Addis Ababa | IBCS | HIV/AIDS Patients | 318 | 26.1% | Fair |
| Daniel Asfaw [25] | 2016 | Amhara | IBCS | Hypertensive patients | 423 | 67.8% | Good |
| Gebregeorgise et al. [35] | 2019 | (Amhara, Oromia, SNNP Tigray & AA) | IBCS | Hypertensive patients | 366 | 46.8% | Good |
| Z.D. Kifle et al. [28] | 2021 | Amhara | IBCS | Hypertensive patients | 450 | 67.5% | Fair |
| Aferu et al. [33] | 2022 | South | IBCS | Hypertensive patients | 230 | 56.07 | Good |
| Feyissa al [34] | 2022 | Benishangul | IBCS | HIV/AIDS & TB Patients | 355 | 52.7% | Fair |
| A.L Bilal et al. [37] | 2020 | (Amhara, Oromia, SNNP Tigray & AA) | IBCS | HIV/AIDS Patients | 845 | 66.2% | Good |
| Gurmu et al. [29] | 2017 | Amhara | IBCS | HIV/AIDS Patients | 300 | 36.64% | Fair |
| A.A. Ayele et al. [30] | 2017 | Amhara | IBCS | Chronic diseases | 369 | 50.4 | Good |
| Daniel Asfaw [31] | 2016 | Amhara | IBCS | Cancer patients | 231 | 72.1% | Fair |
| K.T. Haile et al. [32] | 2017 | Amhara | IBCS | HIV/AIDS Patients | 396 | 70.8% | Fair |
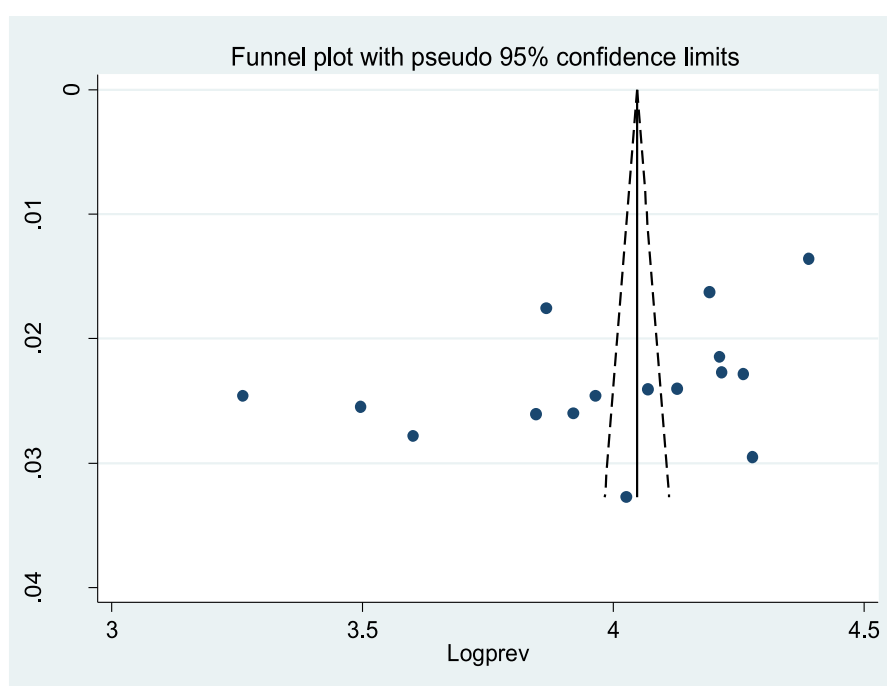


**Fig. 2.** Funnel plot assessed for publication bias in 16 studies.

and abstracts. From this pool, the full texts of 60 articles were assessed for eligibility, with 16 ultimately meeting the inclusion criteria for the review. A summary of the steps involved in the screening process and reasons for exclusion of articles after full text review are provided in (Fig. 1).

### 3.2. Characteristics of included studies

The current review synthesizes the findings of 16 cross-sectional studies published from 2016 to 2022. The sample sizes of individual studies ranged from 230 to 845 participants. The highest magnitude of herbal medicine use is reported from Addis Ababa (80.7%) [22] and the least is also from Addis Ababa (26.1 %) [23]. The included studies were conducted from the following regions of the country; 2 from Addis Ababa [22,23], 9 from Amhara region [24–32], 1 from Southern Ethiopia [33], 1 from Benishangul gumuz region [34] and the remaining 3 are from 5 selected hospitals (Amhara, Oromia, SNNP and Tigray) and (Addis Ababa) [35–37]. Detailed characteristics of the included studies are presented in Table 1.

### 3.3. Quality of the included studies

The quality of included studies is varied, with scores ranging from 7 to 11 out of 12. Based on the quality assessment, (43.75% [n = 7]) of the articles demonstrated good quality, having recorded a score of ≥9. However, about (56.25%) of the studies were deemed to have fair quality. The most prominent area of methodological flaws was the lack of a nationally representative sampling strategy and sample size adequacy in the included studies. Furthermore, important aspect of minimizing recall bias, namely the time frame of HM use within the past ≤12 months, was only addressed in a limited number of studies (n = 2). Additionally, only a small number of studies (n = 2) use adequate sample size of >500 participants. Detailed results of the quality assessment of the studies is presented in supplementary file (Supplementary file).

### 3.4. Publication bias

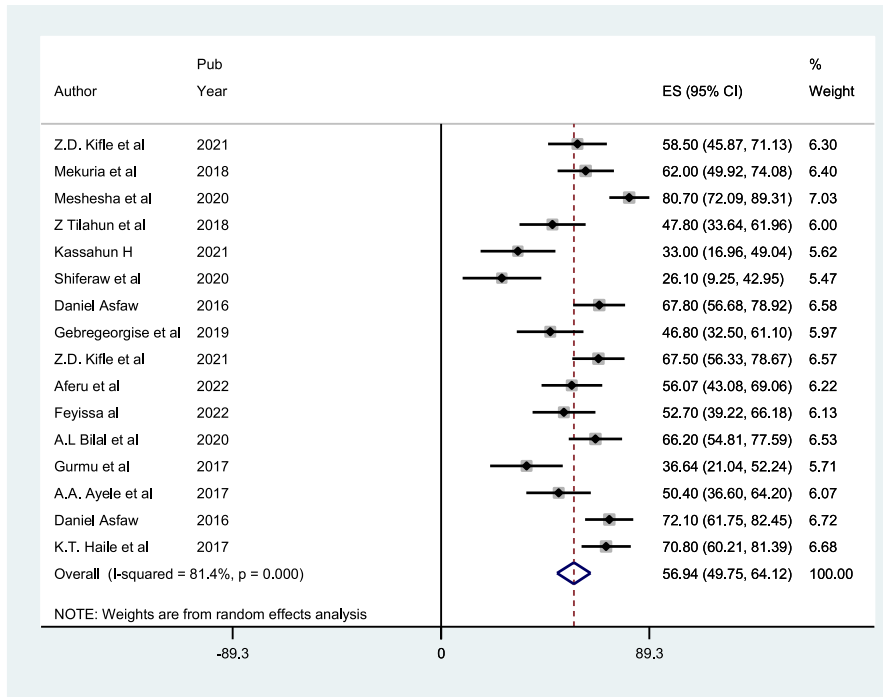Begg's rank test and Egger's regression intercept tests were carried

**Fig. 3.** Forest plot indicating pooled prevalence of herbal medicine use among patients with chronic diseases in Ethiopia.
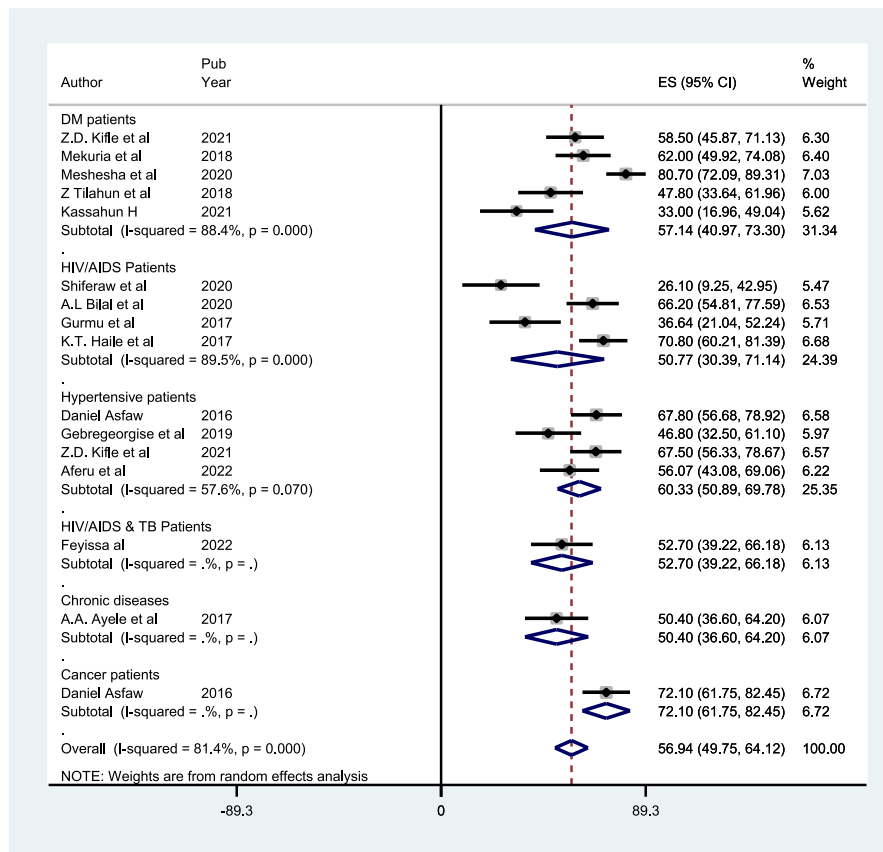


**Fig. 4.** A forest plot showing sub-group analysis based on study populations.
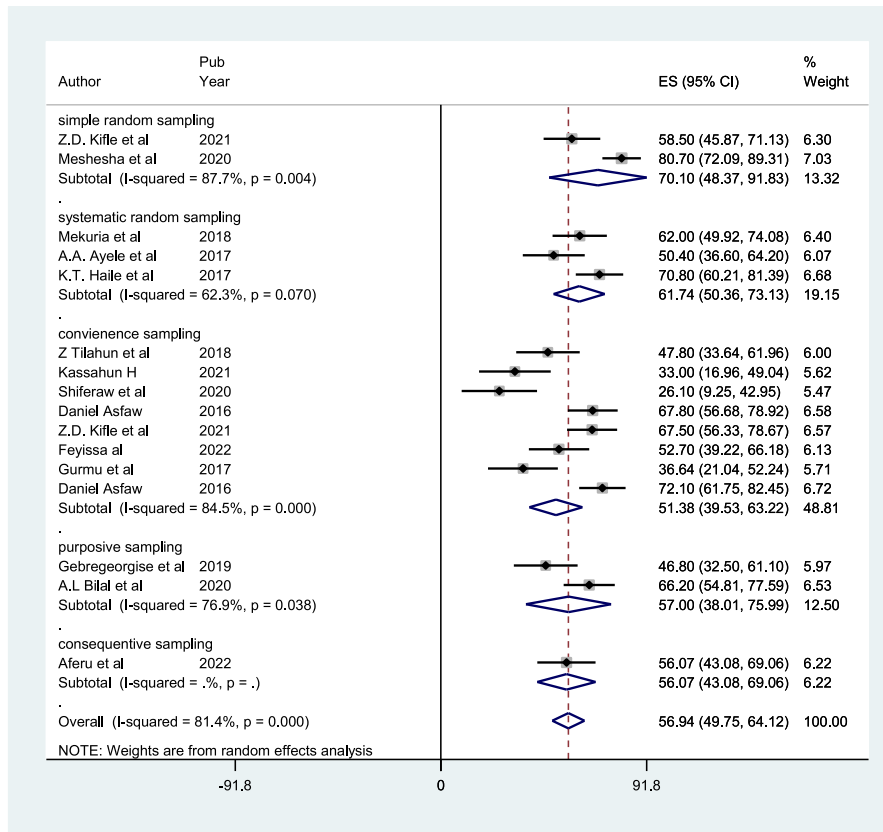
**Fig. 5.** A forest plot showing sub-group analysis based on sampling technique.
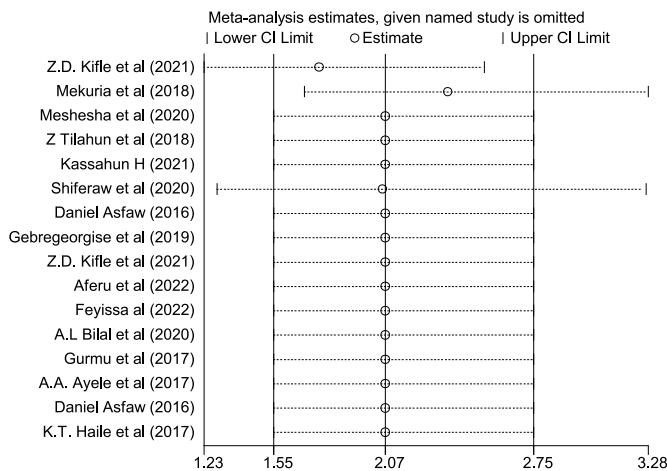


**Fig. 6.** Results of the sensitivity analysis of the 16 studies.

out to indicate the correlation between the effect sizes and sampling variance to determine publication bias. Based on Begg's and Egger's test results, the absence of significant publication bias was declared objectively (P > 0.114) and using subjective symmetrical observation of Funnel plot (Fig. 2).

### 3.5. Meta-analysis

The pooled estimate of herbal medicine use among patients with chronic disease in Ethiopia is found to be 56.94% (95% CI: 49.75, 64.12, P < 0.001). The meta-analysis showed substantial heterogeneity across the included studies with $I^2 = 81.4\%$, P < 0.001. As a result, the random

effect model was used to compute the pooled estimate of herbal medicine use (Fig. 3).

### 3.6. Sub-group analysis

A sub-group analysis was done based on study population which revealed that the highest prevalence of herbal medicine use is reported from cancer patients (72.10% (CI: 61.75, 82.45)) while the least is from patients with multiple chronic illness patients (50.40% (CI: 36.60, 64.20)) (Fig. 4). Another sub-group analysis was also done based on sampling technique. Accordingly the highest prevalence observed in simple random sampling (71.10%) while the lowest prevalence was in convenience sampling (Fig. 5).

### 3.7. Sensitivity analysis

The sensitivity analysis using the random-effect model revealed that no single study influenced the overall pooled prevalence of herbal medicine use (Fig. 6).

### 3.8. Associated factors

A total of four common factors were identified to predict the use of HM by chronic disease patients. They are being female, rural residence, duration of disease greater than 5 years and having complications. Our meta-analysis found that being female is associated with herbal medicine use. According to our finding, the random pooled odds of HM use in female participants were 2.06 times (POR = 2.06, 95% CI = 1.55, 2.75, $I^2 = 10.0\%$) higher as compared to male participants (Fig. 7). The random pooled odds of HM use among participants with rural residence were 2.80 times (POR = 2.80, 95% CI = 1.42, 5.52, $I^2 = 89.1\%$) higher as compared to participants with urban residence (Fig. 8). The random
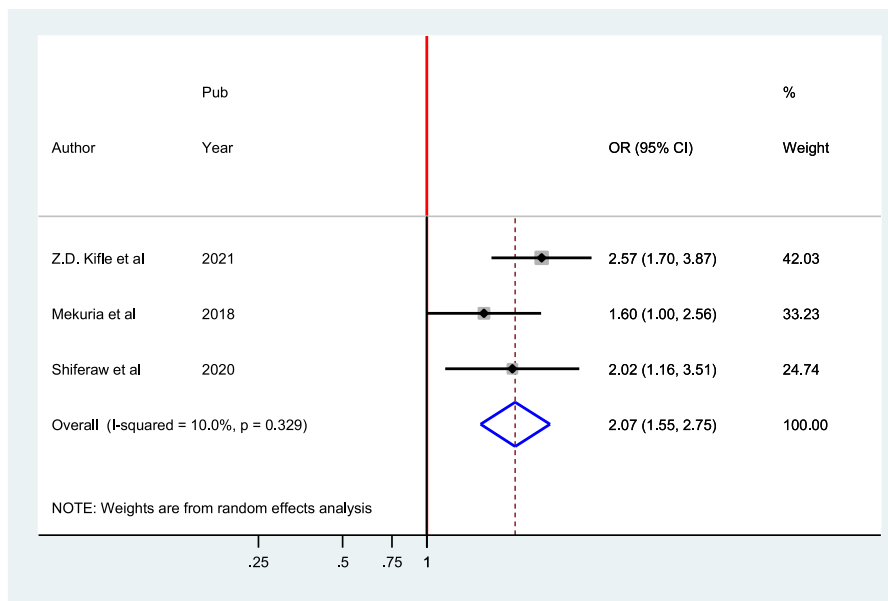
**Fig. 7.** Forest plot showing the pooled odds ratio of the association between being female and herbal medicine use.
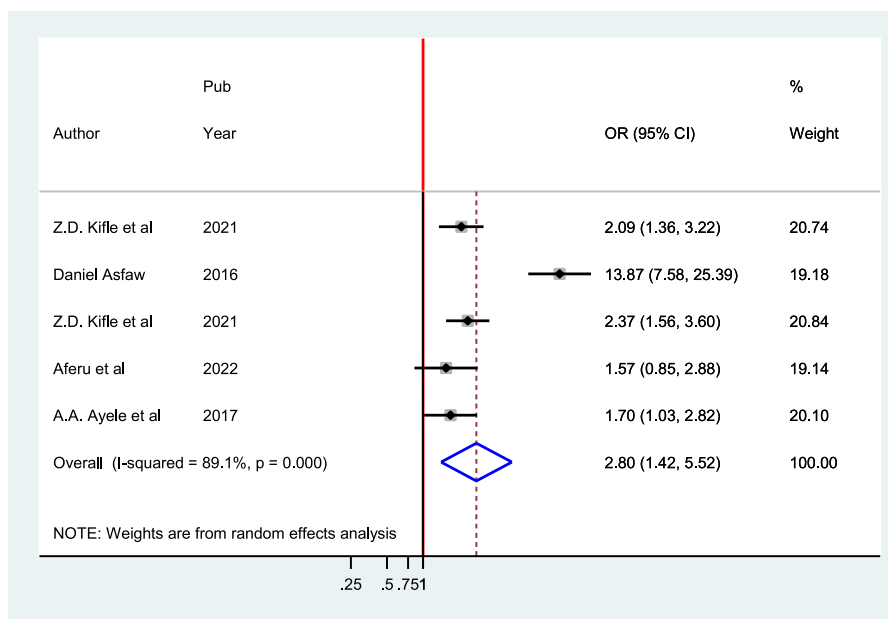


**Fig. 8.** Forest plot showing the pooled odds ratio of the association between rural residence and herbal medicine use.

pooled odds of HM use among participants with >5 years duration of the disease were 6.42 times (POR = 6.42, 95% CI = 4.188, 9.84, $I^2$ = 48.3%) higher as compared to patients with <5 duration of disease (Fig. 9). The fixed pooled odds of HM use among participants who had complications were 4.65 times (POR = 4.65, 95% CI = 3.75, 5.77, $I^2$ = 0.0%) higher than in participants without complications (Fig. 10).

## 4. Discussion

To the best of our knowledge, this review is the first systematic review and meta-analysis in Ethiopia on the prevalence and associated factors of HM use among people with chronic disease in Ethiopia. Variation in the operational definition of HM use presented a major challenge in pooling the prevalence through a meta-analysis to put an evidence on the magnitude of HM and associated factors in Ethiopia.

This systematic review and meta-analysis revealed that the pooled prevalence of herbal medicine use among patients with chronic illnesses in Ethiopia was 56.94% (95% CI: 49.75, 64.12, P < 0.001) which was consistent with studies conducted in Nigeria 65.2% [38], Maynamar 53.2% [39] and India 63.9% [40]. However, the finding of this meta-analysis was higher than previous systematic review studies done in Sub-Saharan Africa (38.6%) [41], Bangladesh 32.8% [42], Thailand 35.9% [43], Cambodia 44.5% [18] and Africa 50% [44]. On the other hand, our finding is lower than study conducted in Lagos, Nigeria 66.5% [45]. The possible justification for this discrepancy might be due to difference in the study period, age group of the population studied, type of chronic disease, operational definition of outcome variable, study setting, and study population.

According to our finding, the random pooled odds of HM use in female participants were higher as compared to male participants. The
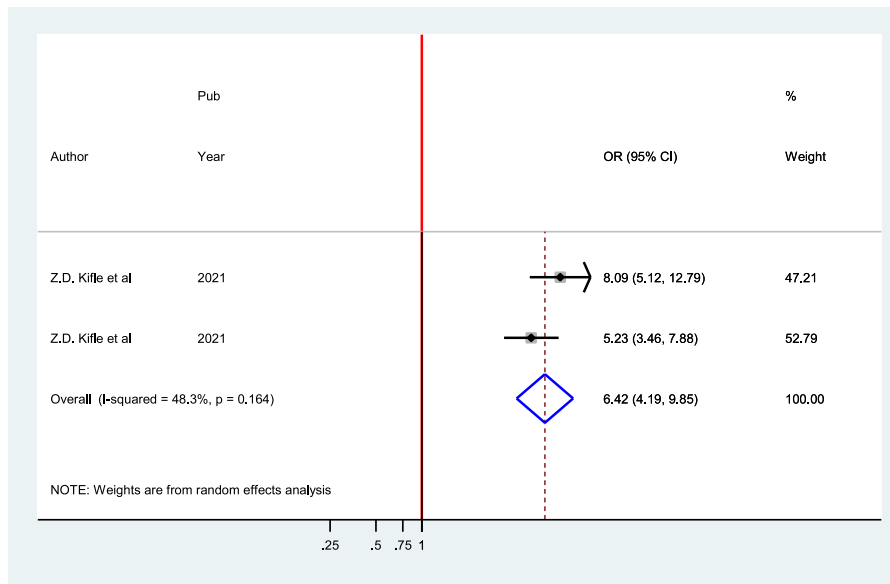
**Fig. 9.** Forest plot showing the pooled odds ratio of the association between duration of the disease and herbal medicine use.
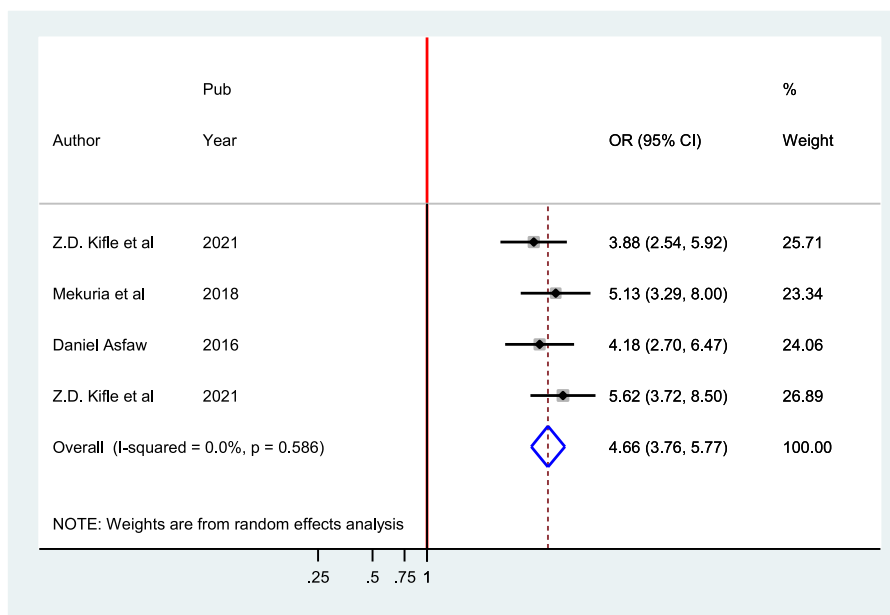


**Fig. 10.** Forest plot showing the pooled odds ratio of the association between complication of the disease and herbal medicine use.

finding is consistent with the systematic review done in Africa among DM patients [44] and Cambodia [18]. This could be because women are more likely to view favorably on HM, utilize healthcare services more frequently, and participate more in treatment and self-care than males [46]. Another explanation for this could be that women are higher users of health care services in general, including CAM and acupuncture, have more opportunities to use CM for promoting health during pregnancy and maintaining regular menstruation, and they are also more likely to be the primary decision-makers in their families [47].

The random pooled odds of HM use among participants with rural residence were higher as compared to participants with urban residence. The finding is consistent with the systematic review done in Africa among DM patients [44]. The increased likelihood of HM utilization among rural people in this review may be explained by the concentration of various HM kinds in the rural area and the population's limited

access to modern medications [48].

The random pooled odds of HM use among participants with >5 years duration of the disease were higher as compared to patients with <5 duration of disease. The finding is similar with the study done in Africa [44]. It is hypothesized that when a chronic illness progresses in length, gets more difficult to control, and develops more complications, patients may shift increasingly to traditional, complementary, and alternative medications [49].

The fixed pooled odds of HM use among participants who had complications were times higher than in participants without complications. The finding is similar with the study conducted in Bahrain [50]. This is not surprising, since people may shift to HM as a proactive means of managing their disease and relieving complications if they have tried modern therapy and found it insufficient and unsatisfactory.

## 4.1. Limitations

All the included studies were cross-sectional which undermines the assessment of risk factors. Therefore, further studies are needed through incorporating studies done using cohort and randomized methods when available in the future. The study included only studies conducted from four regions and have accessible full text which can affect the overall prevalence and representativeness of HM use in the country. Some factors that might have strong association with HM use are analyzed in our review due to inconsistent categorization and different classification ways.

## 5. Conclusion

The study found a high prevalence of HM use among patients living with chronic disease. Being female, rural residence, duration of disease greater than 5 years and having complication were factors that are significantly associated with HM use. The prevalence of HM use among patients with chronic illness in Ethiopia presents significant implications for healthcare practice. Healthcare professionals need to adopt a patient-centered strategy that promotes open, judgment-free discussions about HM usage. This proactive communication is essential to optimize treatment safety by mitigating potential herb–drug interactions and adverse effects that might arise from the concurrent use of traditional remedies and conventional chronic disease medications. Moreover, fostering cultural competence is paramount; healthcare providers must demonstrate respect for patients' cultural beliefs and traditions surrounding HM. By incorporating these principles into their practice, healthcare professionals can achieve a more comprehensive and effective chronic disease management strategy. Moreover, a detailed experimental study on commonly used herbs to establish the efficacy, safety, interactions with conventional medicine and side effects of these herbs to ensure the well-being of patients would be recommended.

## Funding

Not applicable for this systematic review and meta-analysis.

## Ethics approval and consent to participate

Ethical approval not applicable since it is systematic review and meta-analysis study.

## Informed consent

Not applicable.

## Availability of data and materials

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Declaration of competing interests

We, the authors of this article declare that we have no any competing interest.

## CRediT authorship contribution statement

**Worku Chekol Tassew:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. Ayale Ferede, Agerie Mengistie Zeleke and Getaw Wubie Assefa : data curation, visualization and review of final draft.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.metop.2024.100280.

## Abbreviations

| | |
|---|---|
| DM | Diabetes mellitus |
| HTN | Hypertension |
| HM | Herbal Medicine |
| TM | Traditional Medicine |
| CI | Confidence interval |
| POR | Pooled Odds Ratio |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analysis |

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