

Impact of educational interventions and/or counselling on self-medication practices in low- and middle-income countries: A structured literature review

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ABSTRACT: This study evaluated the impact of educational interventions and/or counselling on self-medication practices among individuals aged 18 and above in low- and middle-income countries (LMICs) through a quantitative structured literature review (SLR). Evidence from LMICs indicates that such interventions may effectively address issues related to self-medication, but a comprehensive synthesis is necessary to guide future strategies and policymaking. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a systematic search was conducted across four databases: PubMed, CINAHL, MEDLINE, and Google Scholar, using predefined search terms and inclusion/exclusion criteria. Studies published in English from 2013 to 2023 were considered, and eligible studies were critically appraised using the Joanna Briggs Institute (JBI) checklist. Five studies met the inclusion criteria. The interventions assessed ranged from drug information and one-on-one counselling to structured health education sessions, some of which were supplemented with printed materials and follow-up phone calls. These interventions led to improved knowledge regarding self-medication, reduced engagement in unsafe self-medication practices, and a lower incidence of certain illnesses and medication-related side effects. The effectiveness of these strategies was influenced by variables such as geographic location, participants' educational levels, the duration of the intervention, and funding availability. Overall, the findings suggest that well-structured educational and counselling efforts can significantly mitigate the adverse outcomes associated with self-medication in LMICs. Nonetheless, future research should take into account local economic realities and national medication use policies to enhance both the contextual relevance and long-term sustainability of such interventions.

Keywords: Counselling, educational interventions, health outcomes, low- and medium-outcome countries (LMICs), self-medication practices.

INTRODUCTION

Self-medication refers to the practice of individuals independently diagnosing and treating their health conditions, often using medications without professional guidance from healthcare providers (Alduraibi and Altowayan, 2022; Linskey, 2023). This practice is widespread globally (Agarwal *et al.*, 2021; Baracaldo-Santamaria *et al.*, 2022), with a global prevalence

estimated at 67%, as reported in a systematic review and meta-analysis of 69 studies on self-medication practices published between 2000 and 2018 (Ghasemyani *et al.*, 2022). However, the prevalence of self-medication varies significantly across regions. For example, a systematic review of 158 studies on global self-medication practices by Limaye *et al.* (2017) revealed prevalence rates ranging

from 0.1% in high-income countries to 100% in low- and middle-income countries (LMICs). It is important to note that the classification of medications as prescription or non-prescription drugs differs between countries, meaning that identical drug usage may constitute self-medication in some contexts but not in others.

The outcomes of self-medication can vary widely depending on the context and manner in which it is practised. When practised irresponsibly, self-medication can pose significant health risks. Conversely, responsible self-medication may offer benefits, particularly in managing minor ailments. Despite concerns about potential risks, self-medication is recognised as an integral component of healthcare systems worldwide (Taylor, 2011). Evidence from high-income countries suggests that, when practised appropriately, self-medication can effectively manage minor ailments without the need for visits to healthcare facilities (Bennadi, 2013; Yusuff *et al.*, 2021). For instance, the United Kingdom has implemented policies to encourage pharmacy-assisted self-medication as a strategy to reduce healthcare costs associated with minor ailments (Paudyal *et al.*, 2011). Furthermore, a targeted review of 17 studies by Noone and Blanchette (2018) demonstrated that self-medication can yield cost savings and enhance productivity for patients, healthcare payers, and employers. The authors also noted that responsible self-medication could support preventive healthcare strategies, particularly for conditions such as cardiovascular diseases and osteoporosis (Noone and Blanchette, 2018). Inspired by these successes in high-income countries, some experts advocate for similar guided self-medication strategies in low-resource settings (Yusuff *et al.*, 2021). However, while responsible self-medication has demonstrated positive outcomes in countries with robust healthcare infrastructures, its efficacy in resource-limited settings remains under-researched (Yusuff *et al.*, 2021). A systematic review of 25 surveys on self-medication practices in developing countries identified persistent challenges with irresponsible self-medication and associated health risks, such as drug abuse and antimicrobial resistance (Parulekar *et al.*, 2016). Factors such as low literacy levels, limited access to healthcare services, and the affordability of medicines contribute to barriers to responsible self-medication in these regions (Parulekar *et al.*, 2016).

Researchers have consistently emphasised the need for targeted interventions to empower individuals, particularly in resource-limited settings, to make informed decisions regarding medication use (Bennadi, 2013; Shrivastava *et al.*, 2022). Growing evidence suggests that health education and counselling can play a pivotal role in enabling individuals in LMICs to make rational self-medication choices (Shrivastava *et al.*, 2022). For example, a study conducted in Nepal by Shrivastava *et al.* (2022) engaged 25 experts from academic, medical, pharmacy, and public health fields to rank interventions for preventing inappropriate self-medication using an Analytical Hierarchy Process model. The findings identified awareness programmes,

health education, strong healthcare professional-patient relationships, and one-on-one counselling as among the most effective interventions for promoting responsible self-medication. Other interventions highlighted by Shrivastava *et al.* (2022) include improving access to healthcare services, establishing regulations for prescription and non-prescription drug dispensing, building pharmacist capacity, and providing health insurance. Although this study was limited to Nepal and lacked comprehensive evidence from a systematic review, it underscores the critical role of health education and counselling in promoting responsible self-medication in low-resource settings.

While further research is needed to explore the role of health literacy in promoting responsible self-medication in LMICs, studies from high-income countries suggest that health education and targeted counselling can be valuable tools (Paudyal *et al.*, 2011; Muflih *et al.*, 2022). This highlights a significant gap in the literature - the lack of structured literature reviews assessing the impact of health education and counselling on self-medication practices in LMICs. To address this gap, a search was conducted on September 16, 2023, in PROSPERO, MEDLINE (via PubMed), DARE UK, and Google Scholar. The search yielded no systematic reviews on the impact of health education and/or counselling on self-medication outcomes, nor any ongoing studies on this topic.

METHODOLOGY

This structured literature review (SLR) aimed to infer, from available evidence, the forms of educational interventions and/or counselling available to address problems of self-medication in LMICs, the factors influencing their selection, and the impacts these interventions produce, including their overall effects on the health outcomes of self-medicating individuals. For the purposes of this review, LMICs are defined as countries facing significant developmental challenges (Peters *et al.*, 2008). Residents of these countries are, on average, economically disadvantaged and often lack access to quality healthcare services (Peters *et al.*, 2008; World Bank, 2023). Consequently, medical care and prescription medications can be prohibitively expensive, which has been identified as a key driver of self-medication practices (Turner *et al.*, 2019).

Research perspective

The present SLR follows established systematic review methodology, which, according to Pericic and Tanveer (2019), enables a robust and comprehensive assessment of the current state of knowledge on a specific topic. As a quantitative structured review, it includes primary studies that generated numerical data. The review employs both numerical summaries and narrative synthesis to analyse the findings of the included research articles, in line with

recommendations by Rodgers *et al.* (2009). According to Rodgers *et al.* (2009), narrative synthesis is a widely used method in systematic reviews and can be employed alongside or in place of statistical meta-analysis, particularly when meta-analysis is not feasible or advisable. This approach is especially suitable for synthesising effectiveness data, as required in this study.

Literature search strategy

The literature search process adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page *et al.*, 2021). The search strategy was developed based on recommendations by Aromataris and Riitano (2014) and Bramer *et al.* (2018), utilising the PICO framework (Population, Intervention, Comparison, Outcome). The PICO framework, expanded to include "Problem" and "Patient" (Teesside University, n.d.), is a proven tool for constructing search strategies, particularly for locating quantitative studies (Methley *et al.*, 2014), as required for this review. The PICO framework was applied as follows:

Population and Context: Self-medicating individuals aged 18 years and above residing in LMICs, as defined by Peters *et al.* (2008) and the World Bank (2023).

Intervention: Educational and/or counselling interventions targeting self-medicating individuals.

Comparator: Not applicable for this review.

Outcomes: Increased knowledge about self-medication, reduced frequency of irresponsible self-medication practices, and a decreased incidence of diseases and/or medication side effects were each assessed using a framework proposed by Kozma *et al.* (1993), which evaluates healthcare interventions across three domains: economic, clinical, and humanistic outcomes.

Relevant articles reporting findings from primary studies conducted in LMICs were included if they assessed the impact of health education and/or counselling on self-medication outcomes among individuals aged 18 years and older. Although the age of adulthood varies across jurisdictions (Pinquart and Wahl, 2021), 18 years was chosen as the benchmark for this review, as it is widely recognised as the threshold for adulthood in many regions (Dyussenbayev, 2017). This age group was selected because adults are generally considered capable of making informed decisions regarding critical issues such as medication use (Consent, 2023).

Eligibility criteria for inclusion and exclusion of articles

The inclusion and exclusion criteria were established to

ensure the selection of high-quality and relevant articles, which, according to Meline (2006), enhances the transparency and robustness of the evidence synthesis.

Inclusion criteria

- Studies assessing the impact of educational and/or counselling interventions on self-medication practices among individuals aged 18 years and older residing in LMICs (as classified by Peters *et al.* (2008) and the World Bank (2023)).
- Studies reporting outcomes related to knowledge about self-medication, frequency of self-medication practices, and the incidence of diseases and/or side effects associated with self-medication.
- Articles published in English in peer-reviewed journals between January 2013 and October 2023.

Exclusion criteria

- Studies published before 2013.
- Studies focusing on self-medication practices among individuals below 18 years of age or pregnant women.
- Studies conducted outside LMICs.
- Articles published in languages other than English.
- Studies with inappropriately defined study populations.

Sources of information

Relevant articles were retrieved from four databases—PubMed, CINAHL, MEDLINE, and Google Scholar—to minimize database selection bias and ensure comprehensive coverage of the literature. Keywords used in the search included “self-medication,” “self-prescribing,” “self-prescription,” “self-care,” “health-seeking behaviour,” “educational intervention,” “structured health education,” “counselling,” “outcomes,” “low- and middle-income countries,” and “LMICs.” Boolean operators such as “AND” and “OR” were used to refine the search and identify the most relevant articles. Titles and abstracts of initially selected articles were screened to ensure they met the inclusion criteria, followed by a full-text review.

Assessment of the quality of included articles

The quality of included articles was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklists for quasi-experimental studies, randomised controlled trials (RCTs), and cross-sectional studies (Munn *et al.*, 2015; Tufanaru *et al.*, 2020). These checklists were used to evaluate the methodological strengths and weaknesses of the selected articles. Each item on the JBI checklist was

assessed individually, with responses recorded as “yes,” “no,” “unclear,” or “not applicable.” A score of 1 was assigned for “yes” responses, while “no” or “unclear” responses received a score of 0. The total appraisal score for each study was calculated by summing the scores for all items. Higher scores indicated higher methodological quality. The strengths and weaknesses of each study were discussed in detail, and decisions regarding inclusion or exclusion were made accordingly (Tufanaru *et al.*, 2020).

Data extraction tool

Data were extracted from included articles using a customised data extraction form developed in Microsoft Office Excel 2010®. Data charting was conducted independently, and the extracted data were organised into tabular formats for presentation in the results section.

Presentation and analysis of data

Meta-analysis was not performed in this review, as it typically addresses narrow research questions (Institute for Work and Health, 2007). Instead, the findings were presented in tabular formats, accompanied by numerical and narrative summaries. These summaries describe the relationships between the results and the research questions and objectives of the review, as detailed in the results section.

RESULTS

Search results and selection of included studies

A total of 923 articles were identified through keyword searches across relevant databases, including PubMed, CINAHL, MEDLINE, and Google Scholar. After removing duplicates and screening for eligibility, 541 articles remained. Following title and abstract screening, 263 articles were retained. Application of the inclusion and exclusion criteria resulted in the exclusion of 247 articles, leaving 16 articles for full-text review. Of these, three studies were excluded because they were published in languages other than English, two were excluded due to poor writing quality, three were excluded because their interventions targeted healthcare providers only, and three were excluded for reporting findings from studies conducted among students enrolled in health-related courses. Ultimately, five articles that met all inclusion criteria were included in the review (Figure 1).

Characteristics of articles included in the review

Selected studies and their geographical distribution

Table 1 presents the general characteristics of the five studies included in this review. Of these, four (80.0%) were

conducted in Asia, while one (20.0%) was conducted in Africa.

Study participants, study settings, study designs, and results of the critical appraisal of included articles

A total of 1,188 participants aged 18 years and above were included across the five reviewed studies, with sample sizes ranging from 39 to 730. Movahed *et al.* (2022) evaluated the effectiveness of a Health Belief Model (HBM)-based educational programme in preventing self-medication among 200 randomly selected women aged 20 years and above, recruited from ten health facilities in Urmia, Iran, in 2018. Participants were randomised into intervention and control groups, each comprising 100 individuals. Setiadi *et al.* (2019) assessed the impact of community-based training on responsible self-medication among 129 participants (mean age: 42 years) from four districts in East Java, Indonesia, in 2016. In a follow-up study, Setiadi *et al.* (2020) investigated the effectiveness of a spiral education model delivered by pharmacists to 39 participants (mean age: 40 years) residing in the Ngawi community of East Java. In Fasa, Iran, Kouhpayeh *et al.* (2017) examined the influence of an HBM-based educational intervention on self-medication practices among 90 mothers (mean age: 42 years), allocating them into intervention and control groups of 45 participants each. The study by Bello and Bello (2013), conducted between 2011 and 2013 in a rural community in Kwara State, Nigeria, explored the role of community pharmacists in influencing self-medication behaviours among 730 individuals aged 30 years and above, all of whom had been patrons of the community pharmacy for over a decade. Of the five included studies, two (Kouhpayeh *et al.*, 2017; Movahed *et al.*, 2022) focused exclusively on female participants, while the remaining three (Bello and Bello, 2013; Setiadi *et al.*, 2019; Setiadi *et al.*, 2020) involved both males and females. Notably, Bello and Bello (2013) was the only study conducted in a rural setting - the others were carried out in urban areas. All studies assessed self-medication practices before and after the implementation of their respective interventions. Regarding study design, Movahed *et al.* (2022) employed a randomised controlled trial (RCT), Kouhpayeh *et al.* (2017), Setiadi *et al.* (2019), and Setiadi *et al.* (2020) used pre-post quasi-experimental designs, and Bello and Bello (2013) adopted a cross-sectional approach. All included studies were deemed to be of acceptable methodological quality for this review, with scores from the critical appraisal using the JBI criteria (Tufanaru *et al.*, 2020) ranging from 67% to 88% (Table 2).

Interventions encountered in the included studies

The included studies adopted varying numbers of interventions in addressing self-medication among the study participants. While 2 of the 5 studies reviewed

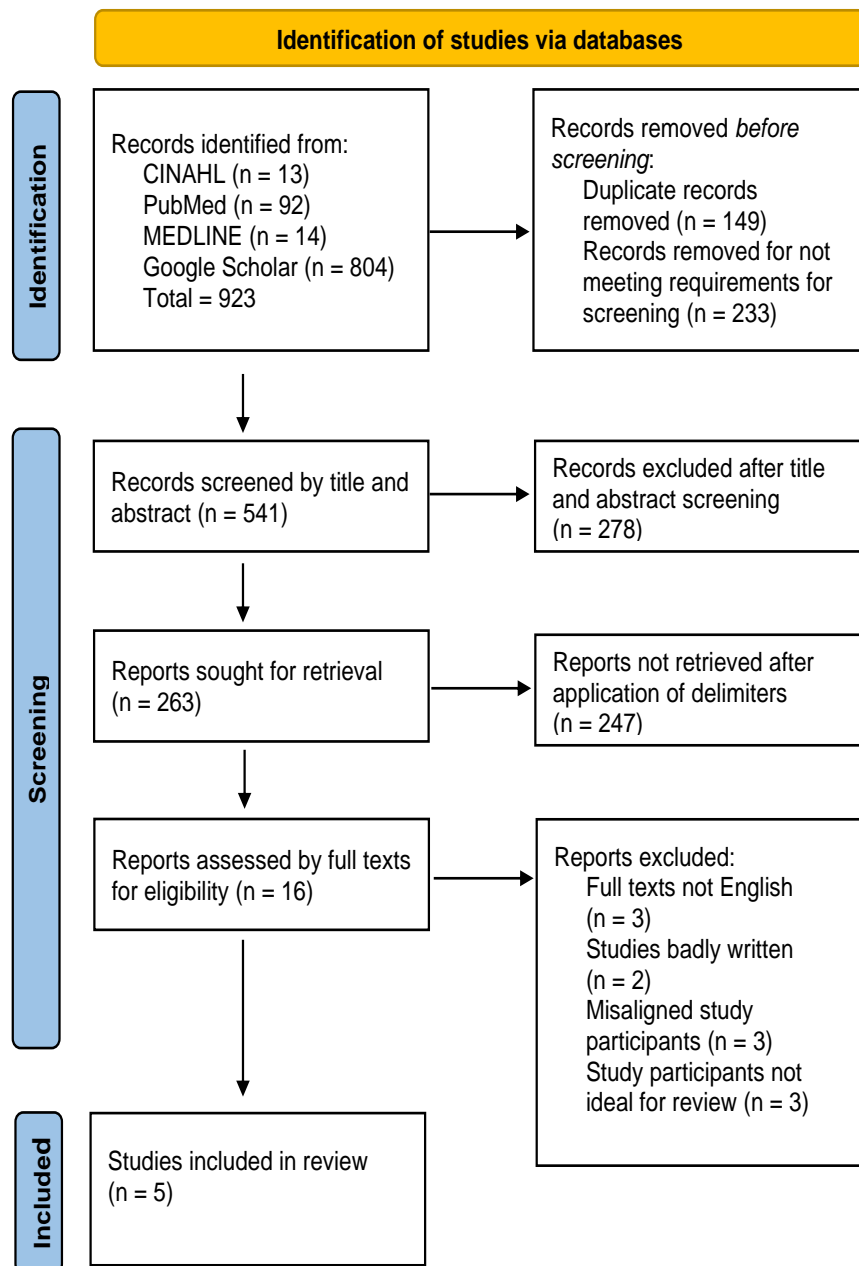


Figure 1. PRISMA Flow Chart (Adapted from: Page *et al.* (2021)).

Table 1. Origin of articles included in the review.

Article (N = 5)	Number of studies (%)
Region of LMICs	
Africa	1 (20.0)
Asia	4 (80.0)
Country of origin and authors (year of publication)	
Nigeria (Bello and Bello, 2013)	1 (20.0)
Indonesia (Setiadi <i>et al.</i> , 2019; Setiadi <i>et al.</i> , 2020)	2 (40.0)
Iran (Kouhpayeh <i>et al.</i> , 2017; Movahed <i>et al.</i> , 2022)	2 (40.0)

N, number of all included articles; n, number of observations.

Table 2. Summary of articles included in the review.

S/No.	Author (Year of publication)	Title	Sample size/study population	Location and year(s) the study was conducted	Study design and critical appraisal score (%)
1.	Movahed <i>et al.</i> (2022)	Effectiveness of the application of an educational program based on the Health Belief Model (HBM) in Adopting Preventive Behaviours from Self-Medication among Women in Iran. A Randomised Controlled Trial	200 women (100 in the intervention group; 100 in the control group) aged 20 years and above attending clinics in 10 health centres.	Urmia, Iran 2018	RCT (85%)
2.	Setiadi <i>et al.</i> (2020)	The role of pharmacists in community education to promote responsible self-medication in Indonesia: an application of the spiral educational model	39 consenting individuals of average age of 40±1.0 years residing in a community.	A community in Ngawi, East Java, Indonesia 2018	Pre-post study design (67%)
3.	Setiadi <i>et al.</i> (2019)	Evaluation of a community-based training to promote responsible self-medication in East Java, Indonesia	129 study participants of average age 42±9.3 years, drawn from 4 districts/cities	Blitar, Ngawi, Nganjuk and Sumenep districts/cities in East Java, Indonesia 2016	Pre-post study design (67%)
4.	Kouhpayeh <i>et al.</i> (2017)	Effect of an educational intervention based on the model of health beliefs in self-medication of Iranian mothers	90 women (45 in the intervention group; 45 in the control group of average age 42.16±2.81 and 40.86±3.16, respectively) attending clinics at 2 health centres.	City of Fasa, Iran 2016	Pre-post study design (88%)
5.	Bello and Bello (2013)	Impacts of Community Pharmacists on Self-medication Management among Rural Dwellers, Kwara State Central, Nigeria	730 rural residents aged 30 years and above, who have been patronising a rural community pharmacy for over 10 years.	Kwara State Central, Nigeria 2011 - 2013	Cross-sectional study design (67%)

Articles with critical appraisal scores less than 50% were considered as low-quality publications.

evaluated a single-component intervention, the other 3 evaluated multi-component interventions. Setiadi *et al.* (2019) and Setiadi *et al.* (2020) each evaluated interventions with a single component, while Bello and Bello (2013) and Kouhpayeh *et al.* (2017) evaluated interventions with 2 components each. Movahed *et al.* (2022), on their part, evaluated interventions with 3 components. More specifically, the health education session was the only intervention type reported by Setiadi *et al.* (2019) and Setiadi *et al.* (2020) in their studies. Meanwhile, in addition to health education sessions, Kouhpayeh *et al.* (2017) reported the

distribution of leaflets/pamphlets to study participants, while Bello and Bello (2013) reported the provision of drug information to study participants in addition to counselling. Movahed *et al.* (2022) reported the distribution of leaflets and booklets on health education and making phone calls to study participants in addition to targeted health education sessions as the forms of interventions adopted in their study (Table 3).

The health education intervention described by Setiadi *et al.* (2019) was implemented among self-medicating participants, predominantly women (87%), most of whom had formal education (90%)

and were employed (99%) urban residents. The intervention involved a two-day, community-based training-of-trainers model: on the first day, selected pharmacists and pharmacy staff received training; on the second day, they delivered targeted 30-minute educational sessions to study participants across four sites. The effectiveness of the intervention was assessed by comparing participants' knowledge of self-medication practices before and after the sessions. Similarly, Setiadi *et al.* (2020) conducted a single 30-minute health education session guided by the spiral educational model, delivered by eight pharmacists to eight

Table 3. Included articles, their objectives, the intervention implemented, their impact on self-medication, and their outcomes based on the ECHO model.

Study	Objectives	Characteristics of study participants	Intervention type/description/duration	Impact of intervention	Outcomes (ECHO model)
Movahed <i>et al.</i> (2022)	To evaluate the effectiveness of the application of an educational program based on the Health Belief Model (HBM) in Adopting Preventive Behaviours from Self-medication among Women in Iran	Females (100% in both intervention and control groups). *Mostly educated (78% in intervention group; 81% in control group). Mostly not working (74% in intervention group; 70% in control group). All residing in the city.	*4 sessions on health education comprising lectures using whiteboard and posters and including questions and answers sections. Each lasted 45 minutes. *Distribution of pamphlets and booklets. *Study participants were followed up over a period of 3 months using phone calls to reinforce intended message regarding self-medication.	*Knowledge gained in terms of self-medication increased following intervention. *The interventions diminished frequency of self-medication practice among study participants.	*Improvement in humanistic outcome.
Setiadi <i>et al.</i> (2020)	To evaluate a revised module (applying a spiral model approach) to guide community training as part of the 'Smart Use of Medications Campaign	Female (72%) and male (28%) study participants, mostly educated (98%), employed (47%), and residing in a city	Health education sessions conducted by 8 pharmacists for 39 consenting community members in Ngawi, Indonesia. 8 manageable groups of approx. 5 participants were formed, each facilitated by a pharmacist. Health education sessions for study participants were preceded by training of trainers, the previous day. Each of the training sessions lasted 30 minutes.	*Knowledge gained by study participants regarding responsible self-medication practice increased after intervention.	*Improvement in humanistic outcome.
Setiadi <i>et al.</i> (2019)	To explore pharmacist/ pharmacy staff trainers' perspectives on conducting community-based training to promote responsible self-medication, and to evaluate knowledge gained among community representatives participating in the training	Mostly women (87%), mostly educated (90%), almost all (99%) are employed, and reside in cities.	Health education sessions, each lasting 30 minutes, were conducted by pharmacists and pharmacy staff at each of the 4 study sites followed by evaluation of knowledge gain. Day 1: Training of trainers. Day 2: Health education for study participants.	*Intervention noted to improve knowledge gained in respect of responsible self-medication.	*Improvement in humanistic outcome.

groups comprising 39 community members. The participants included 28 females (72%) and 11 males (28%), nearly all of whom had formal education (98%), with 47% employed and all residing in an urban area. In the study by Kouhpayeh *et al.* (2017), the HBM was used to evaluate self-medicating behaviours among

selected women following a three-month intervention consisting of 60-minute weekly education sessions supplemented by the distribution of leaflets and pamphlets. Most participants had formal education (96% in the intervention group; 98% in the control group), though they were largely unemployed (31% in the

intervention group; 36% in the control group) and resided in an urban setting. Bello and Bello (2013) assessed the impact of drug information and pharmacist-led counselling on self-medication practices and disease prevalence among rural dwellers, comprising 508 females (70%) and 222 males (30%), the majority of whom were uneducated

Table 3. Contd.

Study	Objectives	Characteristics of study participants	Intervention type/description/duration	Impact of intervention	Outcomes (ECHO model)
Kouhpayeh <i>et al.</i> (2017)	To determine the effect of education based on the model of health beliefs in self-medication of women in Iran	Females (100% in both intervention and control groups) Mostly educated (96% in intervention group; 98% in control group), employed (31% intervention group; 36% in control group), and residing in the city.	4 sessions on health educational intervention conducted by pharmacists and entailing: *giving speeches and holding group discussion, and *handing out leaflets/pamphlets on health education to study participants. The intervention was for a 3-month period, each session lasting 60 minutes.	*Intervention noted to improve knowledge gained in respect of responsible self-medication. *Intervention noted to diminish frequency of self-medication practice.	*Improvement in humanistic outcome.
Bello and Bello (2013)	To assess the impact of rural community pharmacist interventions on self-medication and disease prevalence among rural dwellers	Female (70%) and males (30%), majorly uneducated (88.1%) rural residents who are majorly into farming and trading (89%).	Drug information and one-on-one counselling on medication use were provided to study participants by community pharmacists at baseline and bimonthly over a period of 18 months.	*Dyspepsia and insomnia cases reduced. *Prevalence of side effects from certain medications reduced.	*Improvement in humanistic outcome. *Improvement in clinical outcome.

*Outcomes in this review were categorized using the ECHO model (Kozma *et al.*, 1993; Deng *et al.*, 2023), which evaluates healthcare interventions based on three domains: clinical (e.g., disease prevalence, medication side effects), humanistic (e.g., knowledge, behavior, quality of life), and economic (e.g., cost, resource use) domains.

(88.1%) and engaged in farming and trading (89%). Movahed *et al.* (2022), also using the HBM framework, examined self-medicating behaviour among selected women exposed to a multi-component intervention over three months. Unlike Kouhpayeh *et al.* (2017), their intervention included four 45-minute targeted education sessions, distribution of educational materials, and a series of follow-up phone calls. Participants were mostly educated (78% in the intervention group; 81% in the control group), predominantly unemployed (74% in the intervention group; 70% in the control group) females residing in urban areas (Table 3).

Outcomes of interventions

All studies reported positive impacts following the interventions. Setiadi *et al.* (2019) and Setiadi *et al.* (2020) observed statistically significant increases in mean knowledge scores among participants,

from 14.11 ± 2.68 to 15.70 ± 2.21 ($p < 0.001$) and from 12.43 ± 1.59 to 13.44 ± 1.37 ($p < 0.001$), respectively. Similarly, Movahed *et al.* (2022) reported an improvement in mean knowledge scores from 15.82 ± 3.70 to 20.94 ± 2.60 ($p < 0.01$), alongside a significant reduction in the frequency of self-medication from 18.52 ± 3.99 to 14.71 ± 2.31 ($p < 0.001$). Kouhpayeh *et al.* (2017) found that the intervention led to an increase in knowledge scores from 37.34 ± 20.12 to 76.24 ± 15.13 ($p < 0.001$), and a reduction in self-medication frequency from 58.36 ± 21.34 to 29.55 ± 18.14 ($p < 0.001$). In their study, Bello and Bello (2013) reported improvements in general health status as evidenced by reductions in the prevalence of dyspepsia (from 220 to 53; $p < 0.05$) and insomnia (from 42 to 5; $p < 0.05$) following pharmacist-led interventions. They also noted a significant decrease in the prevalence of medication side effects due to self-medication, declining from 220 to 53 ($p < 0.05$) post-intervention (Table 4).

Although inherently subjective, the impacts of the interventions reported in the studies by Kouhpayeh *et al.* (2017), Setiadi *et al.* (2019), Setiadi *et al.* (2020), and Movahed *et al.* (2022) appeared to influence only the humanistic component of the ECHO model. In contrast, the study by Bello and Bello (2013) demonstrated effects on both humanistic and clinical outcomes. None of the included studies reported findings related to the economic component of the ECHO model, as no economic data were generated from the interventions implemented (Tables 3 and 4).

Ethical approval and funding considerations

All (Kouhpayeh *et al.*, 2017; Setiadi *et al.*, 2019; Setiadi *et al.*, 2020; Movahed *et al.*, 2022) but one (Bello and Bello, 2013) of the included studies provided information on ethical approval by relevant bodies. Meanwhile, only 3 (Kouhpayeh *et*

Table 4. Scores of variables relating to self-medication practice extracted from included articles before and after interventions.

Author and variable measured	Pre-intervention (Mean ± SD)	Post-intervention (Mean ± SD)	p-value
Movahed <i>et al.</i> (2022)			
Knowledge gained (n = 100*)	15.82±3.70	20.94±2.60	p<0.01
Frequency of self-medication (n = 100*)	18.52±3.99	14.71±2.31	p<0.001
Setiadi <i>et al.</i> (2020)			
Knowledge gained (n = 39)	12.43±1.59	13.44±1.37	p<0.001
Setiadi <i>et al.</i> (2019)			
Knowledge gained (n = 129)	14.11±2.68	15.70±2.21	p<0.001
Kouhpayeh <i>et al.</i> (2017)			
Knowledge gained (n = 45*)	37.34±20.12	76.24±15.13	p<0.001
Frequency of self-medication (n = 45*)	58.36±21.34	29.55±18.14	p<0.001
	(No. of observation)	(No. of observation)	
Bello and Bello (2013)			
Health status			
Dyspepsia (n = 730)	220	53	p<0.05
Insomnia (n = 730)	42	5	p<0.05
Side effect of medication			
Dyspepsia (n = 220)†	220†	53†	p<0.05

*Sample size of intervention group; †Dyspepsia was identified as a side effect of self-medicating with certain analgesics belonging to the class known as non-steroidal anti-inflammatory drugs (NSAIDs) in the study by Bello and Bello (2013); scores presented are summation of numerical values attached to responses given by study participants in respect of relevant self-medication questions asked in questionnaires administered.

al., 2017; Setiadi *et al.*, 2019; Setiadi *et al.*, 2020) of all included articles acknowledged receipt of funding for their studies, and none of the funding sources cited is suggestive of introducing bias to the derived results owing to lack of vested commercial interest.

Synthesis of studies included in the review

As previously noted elsewhere in this report, the present review employed numerical summaries and narrative analysis in synthesising results of included articles, as statistical meta-analysis was not done. The possibility of included studies having publication bias and the obvious variations in study designs (in connection to heterogeneity), as previously mentioned above, are the major factors considered for not conducting a meta-analysis for this review in keeping with suggestions in reports by Rodgers *et al.* (2009) and Higgins *et al.* (2019). There are variations in the designs of the included articles – one RCT (Movahed *et al.*, 2022), three pre-post studies (Kouhpayeh *et al.*, 2017; Setiadi *et al.*, 2019; Setiadi *et al.*, 2020), and one cross-sectional study (Bello and Bello, 2013). The only included RCT (Movahed *et al.*, 2022) assessed the effectiveness of an educational programme based on HBM on self-medication practice among selected women (intervention group, n = 100; control group, n = 100) in Iran. There was an improvement in the mean score of knowledge of self-medication from

15.82±3.70 to 20.94±2.60 (p<0.01) and a reduction in frequency of self-medication practice from 18.52±3.99 to 14.71±2.31 (p<0.001) among study participants following interventions, comprising health education sessions, distribution of health educational materials, and phone calls. The pre-post study conducted by Kouhpayeh *et al.* (2017) evaluated the effect of education based on the HBM among selected self-medicating women (intervention group, n = 45; control group, n = 45) in Iran. This study reported an increase in self-medication knowledge gained (37.34±20.12 to 76.24±15.13; p<0.001) and a reduction in the frequency of self-medication practice (58.36±21.34 to 29.55±18.14; p<0.001) in the intervention group who were offered education sessions and health educational materials. Using a pre-post study design, Setiadi *et al.* (2019) recorded an increase in knowledge gained (14.11±2.68 to 15.70±2.21; p<0.05) about responsible self-medication among 129 individuals selected from 4 districts/cities in East Java, Indonesia, following community-based training, entailing exposing participants to sessions of health education. Similarly, in another pre-post study by Setiadi *et al.* (2020), the spiral educational model offered to 39 self-medicating participants drawn from a community in Ngawi, East Java, Indonesia, led to an increase in knowledge about self-medication (12.43±1.59 to 13.44±1.37; p<0.001). These findings highlighted above suggest that, aside from improving knowledge gained about self-medication, educational interventions for behavioural modification and those

employed in combinations (Kouhpayeh *et al.*, 2017; Movahed *et al.*, 2022) may have the additional benefit of preventing the practice of inappropriate self-medication, thus preventing associated poor outcomes in humans. Meanwhile, the only cross-sectional study by Bello and Bello (2013), which assessed the impact of drug information and one-on-one counselling on self-medicating 730 study participants attending a pharmacy in a rural setting in Kwara State, Nigeria, observed improvement in general health status. This was measured as a reduction in the prevalence of cases of dyspepsia and insomnia associated with self-medication, from pre- to post-intervention, from 220 to 53 ($p < 0.05$) and from 42 to 5 ($p < 0.05$), respectively. Additionally, the prevalence of medication side effects resulting from self-medication decreased from 220 (pre-intervention) to 53 ($p < 0.05$) post-intervention.

The included studies reported participants' level of education, their location, as well as duration of interventions (Tables 2 and 3) and availability of funds for programmes implemented. These, although subjective, appeared to be those factors likely to have influenced the selection of relevant interventions highlighted above.

Generally, in this review, the implemented interventions entailing health education sessions, phone calls, and distribution of leaflets, pamphlets and booklets appear to improve the humanistic component of the applied ECHO model. On the other hand, the intervention implemented by means of combination of drug information and one-on-one counselling appears to affect, positively, the clinical component of the ECHO model. However, none of the interventions encountered appeared to influence the economic component of the ECHO model, as no data on economic measurements relating to self-medication were derived.

DISCUSSION

Overview of findings from the review

Generally, findings from this review highlighted that health educational intervention and/or counselling do have a positive impact on self-medication practice with probable modification of health outcomes among the 1,188 study participants assessed. In all, specific interventions identified included sessions of health education, distribution of health educational materials, phone calls, provision of drug information, and one-on-one counselling. It was observed that these interventions are likely to be influenced by certain factors, including participants' level of education, location of participants, duration of intervention, and availability of funding for the programme. Of all interventions identified, the health education implemented in sessions was the most encountered, and it was employed either as a stand-alone intervention or in combination with other forms of intervention, both in health-

care facilities and community settings. Other forms of intervention were, essentially, used in combinations, mostly with sessions of health education. The frequent use of health education among the reviewed interventions highlights its potential importance in mitigating self-medication practices, especially when integrated with complementary strategies.

In the present review, knowledge gained about responsible self-medication practice generally improved among study participants following interventions, which were implemented at designated healthcare settings and communities. Moreover, those interventions designed to modify self-medicating behaviours were observed to particularly produce a noticeable reduction in the frequency of self-medication practice among the subjects studied. In addition, one of the studies (Bello and Bello, 2013), which provided drug information and one-on-one counselling to self-medicating participants patronising a community pharmacy in a rural setting, reported a reduction in the prevalence of certain diseases and certain side effects previously associated with self-medication practice among the participants studied. This suggests that educational intervention and/or counselling can help control self-medication practice and address associated negative outcomes in LMICs.

Overall, the interventions implemented appear to generally improve the humanistic and clinical health outcomes among the subjects studied. Meanwhile, whilst interventions reported appear to be effective, we do not know whether they are cost-effective, as there is no economic evidence presently. This review lacks information on economic health outcomes in relation to self-medication practice, as none of the included studies incorporated data that could be utilised in the measurement of this outcome in their designs.

Overview of methodological quality and limitations of included articles

All of the included studies were found to be of high quality using the JBI checklists (Munn *et al.*, 2015; Tufanaru *et al.*, 2020). Gebrye *et al.* (2023) opined that it is important to ensure that articles included in a review are of quality capable of producing evidence with minimal tendencies to draw biased conclusions. Among all 5 included articles, one (Movahed *et al.*, 2022) was based on an RCT design, which is a high-quality study design (Tufanaru *et al.*, 2020). The randomisation inherent in the RCT design helps control for potential confounding biases (Christie *et al.*, 2020). In essence, randomisation contributes to the validity of findings of a study (Pratoa *et al.*, 2013; Thiese, 2014). Another 3 of the studies (Kouhpayeh *et al.*, 2017; Setiadi *et al.*, 2019; Setiadi *et al.*, 2020) included in the review were based on pre-post study design, which in terms of quality, are inferior to the RCTs (Thiese, 2014). Meanwhile, like RCTs, pre-post study designs have been

noted to demonstrate temporality and have found usefulness in studies exploring the impacts of interventions (Thiese, 2014). The fifth study by Bello and Bello (2013), although employing a cross-sectional study design, was able to detect and report changes caused by the implemented interventions. It is, however, important to note that, in terms of quality, especially in relation to controlling for biases, cross-sectional studies have been established to be inferior to both RCT and pre-post studies (Thiese, 2014).

Strengths and limitations of the SLR

Strengths

The present review was conducted in line with guidelines for conducting systematic reviews and reported using guidelines contained in the PRISMA statement. The PRISMA statement, an updated version of which was published by Page *et al.* (2021), was primarily aimed at ensuring accurate and reliable systematic review of studies evaluating the efficacy and safety of healthcare interventions (Liberati *et al.*, 2009; Page *et al.*, 2021) on which the present review is premised. Thus, clarity and transparency in the presentation of findings were ensured. In addition, having this review structured in line with the guidelines for systematic reviews helps ensure that a rigorous approach was adopted and that attention was given to details regarding the robustness of evidence generated. It was ensured that none of the included studies had conflicts of interest, as this could introduce bias to the evidence generated, which would have negatively affected conclusions made. Importantly, all research questions contained in the present review, which were informed by the PICO concept, were adequately addressed by evidence generated from the included articles.

Limitations

A major limitation of the present review is that it only included studies which assessed the impact of educational and/or counselling interventions on self-medication practice in LMICs. No consideration was given to other important drivers of self-medication practice, which, according to Moonajilin *et al.* (2020) and Yeika *et al.* (2021), have been identified to include local policies regarding medication prescribing and dispensing, economics of drug utilisation, and socio-cultural beliefs, amongst others. Moreover, restrictions adopted in determining eligibility for inclusion implied that certain articles that might have qualified for inclusion could have been excluded or not encountered. These might include relevant articles not published in the English language, articles present in other databases not searched, and sources of grey literature, which were not consulted. In

addition, included studies adopted relatively short follow-up periods for implemented interventions, thereby leaving no room for measurement of the extent of sustainability of effects.

Studies with different types of designs were included in this review. Only 1 was an RCT, considered the gold standard of healthcare intervention studies, as RCTs have been noted to generate credible evidence (Charrois, 2015). The other 4 were non-randomised studies (NRS). According to Reeves *et al.* (2023), NRSs, compared with RCTs, are likely to be potential sources of bias in reviews evaluating the effects of interventions, as is the case in the present review. Nonetheless, it should be noted that not all research questions can be answered by RCTs, in which case there may be justification for the inclusion of NRS in certain situations (Reeves *et al.*, 2023). Furthermore, the dearth of RCTs may necessitate inclusion of available NRS in a review (Charrois, 2015), as was done in the present review.

Lastly, studies included in this review were from only three countries – Indonesia, Iran, and Nigeria – which implies that findings from this review may not be generalised to other countries constituting the LMICs. This is because what obtains in terms of availability of medications and policies guiding their prescribing and dispensing, including robustness of the available healthcare systems, obviously, would differ from one country to the other.

Comparisons of findings from the review with the current knowledge base

Altogether, a limited number of articles, i.e., 5 studies, were found eligible for inclusion. This is suggestive of a dearth of availability of literature regarding the assessment of the impact of educational intervention and/or counselling on outcomes of self-medication practice among individuals residing in LMICs. The foregoing has been previously noted in a similar review by Wali *et al.* (2016), in which published articles assessing interventions targeted at improving medication use information among low health literate individuals were systematically reviewed. In that review, only 5 of all 47 studies that were retrieved for evaluation were from LMICs (Wali *et al.*, 2016). More precisely, Cuevas *et al.* (2021), in their systematic review of interventions aimed at improving antibiotic use in LMICs, posited that most of the evidence on the effectiveness of implementation of interventions to improve medication use has been from high-income settings. These imply that more interventional studies on rational use of medications are required in low-and middle-income regions of the world, since these, according to Limaye *et al.* (2017), are regions with high rates of self-medication practices. Meanwhile, whilst there is no fixed number of articles required for inclusion in a review, researchers (Lefebvre *et al.*, 2022) are of the opinion that having enough manageable quantities of included articles

that allow for comprehensiveness of the process should be the aim of a review.

Overall, all included studies presented findings indicating that appropriately implemented educational interventions and/or counselling would encourage responsible self-medication, thus improving health outcomes in society. These findings were generally reported as improved knowledge of appropriate self-medication practice, reduction in frequencies of inappropriate self-medication practices, as well as reduction in episodes of diseases and medication side effects associated with irresponsible self-medication. More importantly, the interventions identified as producing the above were noted to include sessions of health education, distribution of health educational materials, phone calls, provision of drug information, and one-on-one counselling offered to study participants.

In the present review, it was observed that broader impacts on self-medication practice were produced when interventions were employed in combinations compared to when used as stand-alone. In the study by Kouhpayeh *et al.* (2017), in which behavioural modification was assessed among self-medicating individuals, it was observed that, in addition to achieving increased knowledge gained about self-medication practice, it could be possible to record a reduction in the frequency of self-medication practices among the subjects studied by combining health education sessions with the distribution of health educational materials. Similar results were derived in the study by Movahed *et al.* (2022) in which the implemented sessions of health education were combined with the distribution of health educational materials and follow-up study participants with phone calls. In the same vein, the study by Bello and Bello (2013), which adopted a combination of drug information and counselling, not only recorded reduced episodes of certain diseases associated with self-medication, but also a reduction in episodes of side effects of medications utilised for self-medication. These observations are similar to findings from a systematic review on improving antibiotic use in LMICs, which was conducted by Cuevas *et al.* (2021). In that review, it was observed that multi-faceted interventions, compared to a single type, had a more positive effect on the appropriate use of antibiotics.

As already noted above, it appeared that certain factors might have influenced the selection of relevant interventions used in addressing self-medication problems in the studies included in this review. These included participants' level of education, location of participants, duration of interventions, and availability of funding for programmes. Meanwhile, it should be noted that deciding on the right intervention may not be that straightforward when several criteria are being considered simultaneously. In addressing a similitude of the foregoing in relation to the selection of health interventions, Vermeulen and Krabbe (2018) acknowledged the importance of employing elaborate public discussion, as this allows for the facilitation of societal consensus regarding available

criteria and health policy arguments. This is because it has been noted that no limited set of criteria would consistently take precedence in all situations in view of the large number of optional criteria required for decision-making for health interventions (Vermeulen and Krabbe, 2018).

With the application of the ECHO model to findings reported above, it was observed that the interventions encountered in the studies reviewed generally appeared to improve the humanistic and clinical health outcomes among the participants studied. None had relevant economic data; hence, no report was made on the economic component of the model. Nonetheless, it is known that a change in a domain of the model may also affect outcomes in other domains (Barry and Hughes, 2019). Notwithstanding the above, Paterson *et al.* (2009) have opined that caution should be exercised in applying the 'outcomes' concept when assessing the impacts of health interventions.

Implications for policy and practice in society

As already mentioned elsewhere, inappropriate self-medication is known to impact the health of individuals and society negatively, and this has been noted to be prevalent in LMICs (Limaye *et al.*, 2017). In the present review, the interventions encountered in the studies evaluated were generally effective in increasing subjects' knowledge about self-medication. They were also effective in reducing the frequency of irresponsible self-medication practice and improving health status, especially when used in combinations and when designed to modify self-medicating behaviours of the study participants. The above implies that the reported findings do hold significant implications for both policy and practice in the healthcare systems of LMICs, particularly in the public health domain.

At the policy level

On the policy level, the findings from the present review suggest that targeted interventions would be effective in addressing problems of self-medication practice in LMICs. However, it is not known if this would be cost-effective presently. This is because no relevant information regarding the subject matter has been published in LMICs (Yusuff *et al.*, 2021) compared to successes reported in developed climes where professionally assisted self-medication practice has been integrated into their healthcare systems (Association of the European Self-Medication Industry, 2004; Paudyal *et al.*, 2011). Nonetheless, relevant interventions for the LMICs should be designed bearing in mind the peculiarities of each member country. These interventions should help increase public awareness regarding the potential risks associated with irresponsible self-medication. Importantly, the interventions should promote rational use of medications by emphasizing the importance of consulting relevant

healthcare professionals in the event of a need to self-medicate. In addition, healthcare providers should be encouraged to collaborate with relevant stakeholders in society to map out strategies to address self-medication problems among the people. In all, relevant authorities in the LMICs can help by putting in place regulations that would ensure that prescription-only medications are made available to people only on presentation of genuine and duly signed prescriptions and that over-the-counter medications are used under the guidance of suitably qualified professionals.

Implications for practice

In the present review, changes recorded among the self-medicating participants seen were brought about by an array of specific interventions, which may require inputs from individuals from different backgrounds. This implies that an interdisciplinary approach may have a role to play in helping to address self-medication problems in LMICs. This approach should enable collaboration among suitably qualified individuals, such as prescribers and dispensers of medications, nurses, public health professionals, community educators, and other relevant stakeholders who are expected to work towards empowering people to be able to make appropriately informed decisions on their health and to refrain from engaging in irresponsible self-medication. The importance of the above-mentioned was noted in a systematic review by Zheng *et al.* (2023) in which self-medication practice among people, with no restriction in population and location, during the COVID-19 pandemic was reviewed. In that review, it was reported that the pharmacists, physicians, nurses, and psychologists, amongst others, all played important roles in ensuring that responsible self-medication was practised during the pandemic. It is therefore necessary for future healthcare providers to receive adequate education early in their professional training, so they are well-prepared to promote and support responsible self-medication practices.

CONCLUSION

The present review was specifically aimed at determining what can be inferred from the available evidence regarding the forms of educational intervention and/or counselling that are employed in addressing self-medication problems among individuals residing in LMICs. Additionally, factors influencing the selection of these interventions, their impacts/effectiveness, and their overall impact on health outcomes of the self-medicating individuals studied were assessed. Importantly, all articles that were retrieved and eventually reviewed were those that met the eligibility criteria, which were set to help meet the objectives of the review. In all, 5 eligible studies were evaluated, and certain educational and counselling interventions with impacts on

self-medication practices were identified. These include sessions of health education, employed either as a stand-alone intervention or in combination with others, such as the distribution of health educational materials and phone calls. These interventions generally increased knowledge about the health implications of self-medication practice. Importantly, they were found to decrease the frequency of irresponsible self-medication practice when employed in combinations and were designed to affect medication use behaviour among the participants studied. In addition to the above-mentioned, the encountered intervention, which combined the provision of drug information and counselling, was found to decrease episodes of diseases and medication side effects associated with inappropriate self-medication. More importantly, the encountered interventions were found to be likely influenced by participants' level of education, location of participants, duration of intervention, and availability of funding for the interventional programme. Overall, the interventions implemented appeared to generally improve the humanistic and clinical health outcomes among the subjects studied.

That the present review identified only one RCT among all articles retrieved for evaluation from sources searched is an indication for more high-quality studies measuring outcomes of interest to be conducted in LMICs. This is in addition to the fact that a limited number of relevant articles were eventually included and reviewed. In all, more studies evaluating health education and counselling interventions in addressing self-medication practice in LMICs are required. These studies should also take into consideration local policies regarding medication use, the economics of drug utilisation and other important drivers of self-medication practice in society. To this end, it is important to note that findings from the present SLR may not be extended to all LMICs, given the obvious limitations highlighted above and elsewhere in this work.

In summary, in view of the observations made and gaps identified, findings from this review can help develop appropriately designed and more effective educational and counselling interventions targeted at addressing self-medication problems among diverse individuals in LMICs with the aim of enhancing their health and overall well-being. In many LMICs, medical care and prescriptions can be expensive, and so it is understandable why people self-medicate. However, this can cause poor outcomes. Beyond targeted education and counselling, making available affordable and accessible health services and medications, regulation of medication use and addressing beliefs and practices that encourage irresponsible self-medication are among the modalities recognised as interventions that can help address inappropriate self-medication.

Recommendations for further research in the future

Irresponsible self-medication can pose a threat to the

health and well-being of society. Fortunately, findings from the present review revealed that there are interventions, such as health education and/or counselling, that can help discourage irresponsible self-medication while encouraging responsible self-medication in LMICs. However, the follow-up periods adopted by the studies included in the present review were relatively short and may not be able to ascertain the sustainability of the impacts of the implemented interventions over time. Therefore, it is recommended that future research should consider more follow-up points or a longer time horizon for follow-up so that the extent of sustainability can be measured. Additionally, aside from assessing only educational interventions and/or counselling as they affect self-medication practice, future research would benefit from considering qualitative studies and studies that also assess local policies on drug prescribing and drug dispensing, economics of drug utilisation as well as other important drivers of self-medication practice to give a holistic evaluation of factors capable of modifying self-medication behaviour among people in LMICs.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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