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Progress and Gaps in National Medicines Policy Implementation in SADC Member States: A Comprehensive Desktop Review

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ABSTRACT

A national medicine policy (NMP), previously known as a national drug policy (NDP), represents a governmental pledge and strategic framework designed to ensure that medicines are safe, effective, of reliable quality, accessible, affordable, and used rationally. This study provides the first comprehensive examination of how the 16 countries within the Southern African Development Community (SADC) have implemented various components of their NMPs over a ten-year period (2011–2021). Published materials from 2011 to 2021, including national pharmaceutical profiles, official governmental publications, datasets from WHO, HAI and the World Bank, as well as peer-reviewed research addressing implementation activities, were systematically assessed. Over the decade under review, the 16 SADC nations demonstrated notable advances in putting their NMPs into practice. Commonly executed components involved essential medicines policies, pricing mechanisms, and regulatory measures, while the integration of traditional and herbal medicine elements remained largely absent in most countries. The pharmacist-to-population ratio, measured at 1:2300, fell short of recommended benchmarks in every country, highlighting the need to strengthen human resources for pharmacy services within national health systems. Continued investigations into medicine pricing, affordability, and availability are crucial for the development of equitable pricing frameworks that enhance access to medicines across individual countries and the wider SADC region. Except for the Republic of Tanzania, all SADC member states need to promptly update their NMPs and consider incorporating modern approaches such as Health Technology Assessment (HTA). Establishing a robust evaluation culture with an international orientation is essential for embedding monitoring processes into policy development. As the first study to assess the implemented components of NMPs in the SADC context, these findings may help countries collectively address shared pharmaceutical challenges and strengthen their preparation for achieving universal health coverage (UHC). Further detailed cross-national investigations are recommended to thoroughly assess NMP implementation across the SADC region.

Keywords: National medicine policy, Monitoring and evaluation, Policy implementation, Southern African developing community

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Introduction

A National Medicine Policy (NMP), previously termed a National Drug Policy (NDP), represents a formal governmental commitment and strategic framework aimed at guiding the development of every component within the pharmaceutical sector [1–5]. Its primary purpose is to ensure that medicines are safe, effective, of assured quality, affordable, accessible, and used appropriately in order to address the healthcare requirements of the population. The NMP establishes an overarching structure for coordinating the actions of all parties engaged in pharmaceutical activities and outlines the specific responsibilities assigned to each stakeholder. Every country is encouraged to formulate its own National Medicines Policy to secure equitable access to essential medicines for all citizens [3].

The foundation of an effective NMP lies in the essential medicines concept, which emphasizes that adherence to standardized treatment guidelines leads to improved medicine availability, rational prescribing practices, and

reduced expenditure. Embedding the NMP within the broader national health system ensures that its aims are integrated into wider health strategies, including disease-focused initiatives and resource allocation mechanisms, thereby enabling the effective execution of policy goals [1, 3].

An NMP involves a wide array of stakeholders (**Figure 1**) who work together to ensure that medicines reach the intended patients. The processes of procurement, distribution, and dispensing are equally significant as the therapeutic outcomes achieved through medication use. As such, regulating this sector demands a deliberate, cohesive, and comprehensive strategy that encompasses all actors and sets clear rules for their activities [6]. Without such a guiding document, there may be no unified understanding of how to address population health needs, resulting in fragmented or conflicting governmental interventions due to unclear or overlapping mandates [1]. Moreover, as highlighted by Dukes [3], an NMP should articulate the government's commitment to fostering strong governance principles, including transparency and accountability.

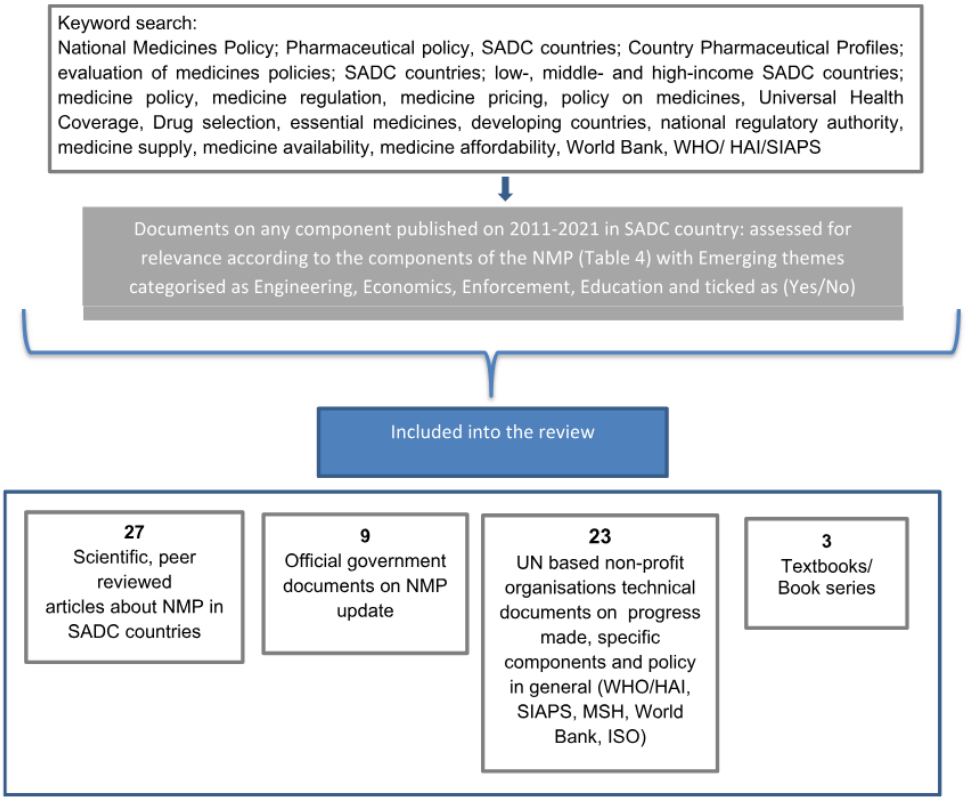

Figure 1. Schematic diagram of the literature selection and inclusion.

The national health policy and the overall structure of health service delivery within a country play a crucial role in shaping its medicines policy and determining the possible strategies available for adoption [1]. Conversely, the conditions of the pharmaceutical sector directly influence how healthcare services are provided. When health facilities lack consistent access to safe, good-quality medicines, or when medicines are prescribed inappropriately, the credibility of the entire health system is undermined. Implementing a strong medicines policy therefore helps reinforce public trust and encourages the effective use of health services [1]. It is challenging for any health policy to function successfully in the absence of an accompanying medicines policy. The specific aims and priorities set within a National Medicine Policy vary according to each nation's circumstances, broader health policy direction, and political agenda [1].

According to the 2001 guidelines issued by the World Health Organisation (WHO), a comprehensive NMP should encompass several fundamental components, including legislation and regulatory frameworks, quality assurance mechanisms, systems for managing the medicine supply chain, financial strategies for pharmaceutical services, affordability considerations, rational use of medicines, essential medicines selection, human resource development, and provisions for research, monitoring, and evaluation [3, 7] (**Table 1**).

The structure of these components can be further understood through four broad categories:
• Enforcement, which involves the legal and regulatory functions necessary to govern pharmaceutical activities, including inspections, investigations, licensing procedures, certification, and oversight.
• Education and training, which refers to initiatives promoting appropriate medicine selection and rational use through training programmes, guidelines, and dissemination of essential medicines lists.
• Engineering, which represents organisational and managerial approaches such as supply chain management, quality assurance systems, human resources planning, and activities related to monitoring, evaluation, and research.
• Economics, which encompasses financial policies and strategies, including pricing mechanisms and measures aimed at enhancing the affordability of medicines.

Table 1. Core components of a National Medicines Policy (NMP) (Adapted from WHO guidelines [3, 8] and Imai *et al*. [9])

Component	Key Elements and Sub-components
1. Legislative and Regulatory Framework	• Legislation and regulations • Independent drug regulatory authority • Medicine registration and licensing • Quality assurance, inspection, and enforcement • Pharmacovigilance system • Regulation of prescribing, dispensing, and distribution • Good governance and anti-corruption measures
2. Selection of Essential Medicines	• Evidence-based selection principles • National list of essential medicines updated regularly • Selection criteria: efficacy, safety, cost-effectiveness, and public health needs • Inclusion of traditional and herbal medicines when appropriate
3. Supply Management Systems	• Public and private sector procurement strategies • Local manufacturing when feasible • Efficient procurement, inventory control, and storage • Prevention of theft, leakage, and wastage • Safe disposal of expired/unwanted medicines
4. Affordability	• Removal or reduction of taxes and tariffs on essential medicines • Regulated pricing and distribution margins • Promotion of generic medicines and price transparency • Use of TRIPS flexibilities and competition-enhancing measures
5. Financing Strategies	• Sustainable pharmaceutical financing (government budget, health insurance, user fees, donor support) • Mechanisms to improve efficiency and reduce waste
6. Rational Use of Medicines	• National multidisciplinary body to coordinate policy • Clinical guidelines and essential medicines list as basis for training • Independent drug information • Prescriber and consumer education • Regulation of promotion and advertising
7. Human Resources Development	• Pre-service and in-service training of pharmaceutical personnel • National HR plan for the pharmaceutical sector • Continuing professional development and motivation strategies • Ethical codes of conduct
8. Monitoring and Evaluation	• Clear responsibilities and indicators • Regular national surveys and monitoring • Independent external evaluation every 2–3 years
9. Research	• Operational, clinical, and public-health pharmaceutical research • Promotion of local R&D where appropriate
10. Technical Cooperation Among Countries	• Information exchange and policy learning • Regional/sub-regional harmonisation of regulatory standards

Note: Imai *et al*. [9] reorganized these components into a practical framework of implementation areas to enable systematic cross-country comparison of national pharmaceutical policies and identification of gaps.

The final structure and emphasis of an NMP often differ from one country to another, influenced by historical circumstances such as the strength of national regulatory institutions, the government's ability to uphold its political priorities, the economic stability of the country, and available pharmaceutical expenditure. In general, an NMP is expected to remain valid for approximately ten years, allowing it to adapt to evolving national and global conditions, and it should be supported by scheduled monitoring reviews. For this reason, regularly updating the NMP in a comprehensive and integrated manner is essential, as its various components remain interconnected and evolve over time [4].

The WHO (2001) recommends that the formulation of an NMP should follow a structured process involving extensive consultations with all relevant stakeholders, as illustrated in **Figure 2**. The policy must be developed

with clearly stated objectives and priorities, alongside a strong commitment to implementation and ongoing follow-up. The NMP itself represents a multifaceted process encompassing policy development, execution, and monitoring, all of which must operate in a coordinated manner [7, 10]. Walt *et al*. [11] note that the Walt and Gilson policy analysis framework is a valuable approach for understanding the complex nature of policy processes. This model emphasises that policy development and implementation are shaped not only by the policy's content but also by contextual factors and the range of actors involved [7].

Although Monitoring and Evaluation (M&E) has traditionally been viewed as a stage applied only after a policy has been implemented, Gray [7] argues that M&E should begin at the very outset of policy formulation. This aligns with the perspectives of Hoebert *et al*. [4] and Almarsdottir [5], who contend that an NMP must remain adaptable and responsive to ongoing changes, making it essential to clearly outline the policy development pathway from the beginning. Doing so allows for the collection of baseline information before new policies are introduced, enabling countries to draw lessons from their own experiences and strengthen future pharmaceutical reforms.

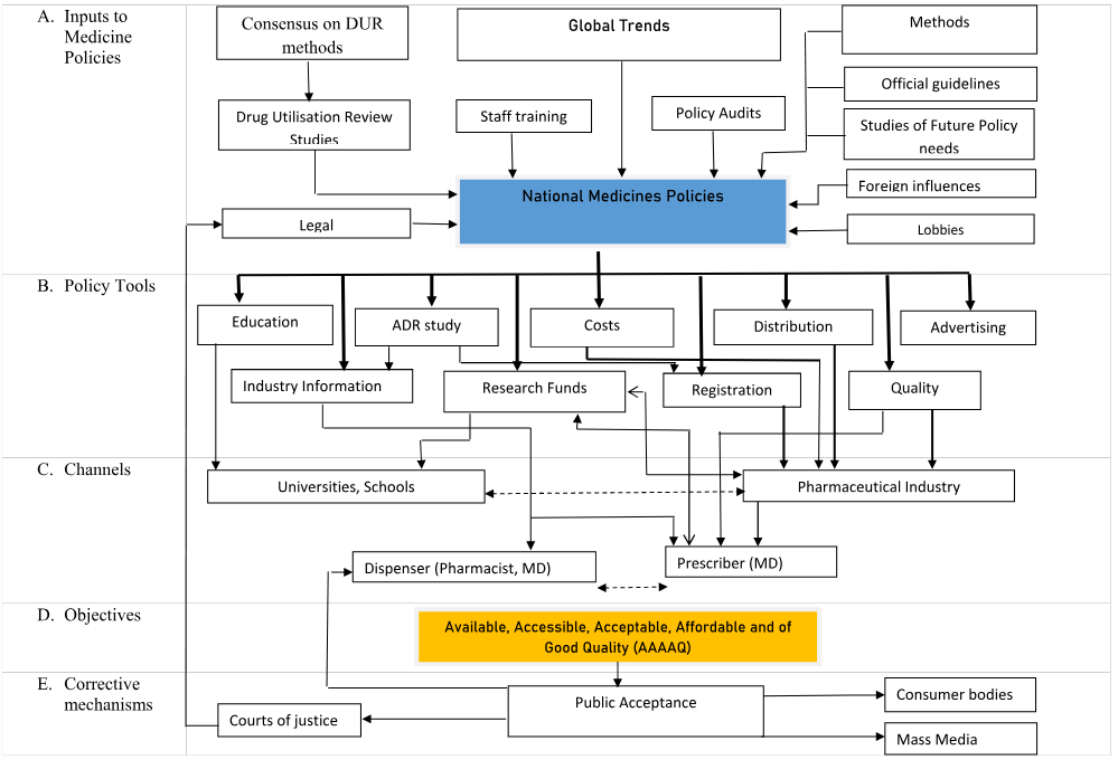

Figure 2. Structure of a complete medicine policy [3].

Looking ahead, the World Health Organisation recommends that each NMP should be issued and published as an official governmental declaration that publicly expresses the country's goals, intentions, decisions, and commitments. Such formal presentation helps ensure coherence among different governmental actions and prevents new measures from contradicting existing ones. It also reinforces the need for all stakeholders to clearly understand their respective roles and responsibilities within the policy framework [5].

Countries may be driven by different circumstances when deciding to develop or revise their NMPs. In some cases, nations face comparable problems that extend beyond their borders, and these shared challenges can create opportunities for harmonising effective approaches at the regional level [5, 12]. Comparative assessments of NMPs allow governments to exchange practical governance strategies, adopt proven local solutions, foster trust, encourage transparency in data sharing, and establish policy benchmarks. Within the SADC region, cross-country comparative research is particularly important, as it can provide a deeper understanding of available options for policy design and analytical methodologies, similar to studies conducted elsewhere in sub-Saharan Africa.

An illustrative example is provided by Sehmi and Wale [13], whose case study highlighted Ghana's proactive decision to integrate Health Technology Assessment (HTA)—a framework for value-based, evidence-informed evaluation of medicines and health technologies—into its NMP. This development signaled strong governance and constructive international collaboration. Their findings offer a useful reference point for SADC member states seeking to adopt more global, interconnected approaches to policy analysis. Such efforts can help align regional pharmaceutical policies with the United Nations' Sustainable Development Goal on health (SDG 3), which emphasizes social protection and human rights. Comparative studies of this nature have the potential to improve understanding of the broader social and economic conditions affecting health systems, thereby addressing inequities and enhancing community well-being [11, 12, 14–17].

Although certain aspects of national medicines policies have been examined in previous research—for instance, the recent work by Persaud, Jiang, and Shaikh *et al*. [18]—there have been no published analyses assessing NMP implementation across the SADC region. Limited information is available on the region as a whole, partly because many international studies report aggregated findings for WHO member states grouped by continents rather than by regional communities [19]. Consequently, there is a pressing need to examine the SADC region specifically, keeping in mind that its member states share common priorities and collective goals for achieving the Sustainable Development Goals. This study represents the first attempt to evaluate how NMPs have been implemented across SADC countries and may provide an important foundation for strengthening the region's preparedness for planning and advancing universal health coverage (UHC).

The objectives of this paper are threefold:

1. to assess the progress made in implementing national medicines policies in SADC countries during the period 2011–2021;
2. to describe both regional trends and country-specific challenges, as well as similarities and differences in key NMP components across SADC member states; and
3. to identify effective practices within the region that may inform future directions for policy development, implementation, monitoring, and evaluation.

Table 2. Country-specific population, GDP per capita (in decreasing order), number of pharmacy personnel and NMP revision [19–25].

Country	Population	GDP/ capita	THE as a share of GDP	Number of pharmacists	PPR/ 100000	Number of Pharmacy Technicians	Date of NMP launch	Year of NMP revision	Time before last NMP revision	Time since the last NMP revision	Date of publication of any NMP-related component
Seychelles	98 462	12720	5.10 %	4	4	56	Not yet	N/A	0	0	2012
Mauritius	1 265 740	10230	5.80 %	497	39	1142	1996	N/A	0	0	2015
Botswana	2 351 625	6640	5.80 %	153	6.5	258	1987	2002	15	21	2018

South Africa	59 308 690	5410	8.30 %	15267	27	21713	1996	N/A	0	0	2016
Namibia	2 540 916	4520	8.00 %	239	9.4	137	1998	N/A	0	0	2007
Eswatini	1 160 164	3580	6.50 %	64	6	31	2000	2011	11	12	2018
Angola	32 866 268	2230	2.50 %	2300	7	Unpublished	2007	N/A	0	0	2018
Comoros	869 595	1450	4.60 %	15	2.5	26	1997	0	0	0	2004
Zambia	18 383 956	1190	4.90 %	1286	7	814	1999	N/A	0	0	2018
Lesotho	2 142 252	1100	9.30 %	30	0.16	59	1996	2005	9	18	2011
Zimbabwe	14 862 927	1090	4.70 %	1419	10	520	1995	2011	16	12	2018
Tanzania	59 734 213	1080	3.60 %	1194	2	1132	1993	2008	15	15	2018
Malawi	19 129 955	580	9.30 %	293	1.5	221	1991	2009	18	14	2008
Dem Republic of Congo	89 561 404	550	3.30 %	2686	3	212	Not yet	2005	0	18	2018

Madagascar	28 411 367	480	4.80 %	6	0.02	Unpublished	1998	2005	7	18	2012
Mozambique	31 255 435	460	8.20 %	103	0.32	1388	1985	1995	10	28	2013

Key: GDP = Gross Domestic Product, THE = Total Health Expenditure, PPR= Pharmacist-Patient Ratio, NMP= National Medicines Policy.

Materials and Methods

This study employed a cross-sectional literature review to evaluate how the Southern African Development Community (SADC) countries advanced in implementing their National Medicines Policies (NMPs) between 2011 and 2021. The review encompassed publications from scientific journals, government institutions, and United Nations–affiliated agencies issued during this period. Foundational documents, including early launch materials, books, and textbook chapters outlining universal NMP principles, were also considered. Searches were conducted across major academic databases such as Google Scholar, PubMed, ScienceDirect, and Elsevier, specifically targeting material published from 2011 to 2021. Additional searches were performed within WHO/HAI and SIAPS (Systems for Improved Access to Pharmaceuticals and Services). Countries were categorized according to the World Bank Atlas income classifications, and supporting health-related information was retrieved from ISO and World Atlas databases.

A wide set of keywords was used to retrieve relevant literature, including “National medicines policy”, “national drug policy”, “SADC country-specific pharmaceutical profile”, “evaluation of medicine policies”, “implementation of national medicines policy”, “SADC countries”, and indicators related to developing countries such as LIC, LMIC, and HIC. These searches resulted in a diverse group of sources, spanning scientific publications, official government circulars, and databases belonging to WHO/HAI, SIAPS, ISO, and the World Bank. Sources were included if they met one or both of the following conditions:

(1) they described one or more components of an NMP as outlined in **Table 1**. These components were later organized into broader thematic categories, namely: medicines regulation (enforcement), availability of medicines (engineering), medicine pricing (economics), and medicine selection or essential medicines (education).

(2) they provided a summary or evaluation of NMP progress in SADC nations during 2011–2021, including aspects of NMP life-cycle management such as monitoring and evaluation, governance, and periodic policy updates.

Extracted information was marked in **Table 4** using the following classifications: Yes (implemented), SE (implemented to some extent or partially progressing), and No (not implemented or no available evidence). In total, 61 information sources were identified, consisting of 27 peer-reviewed articles, 22 organisational documents from entities including WHO/HAI, the World Bank and SIAPS, along with nine government-issued national reports and three books or book chapters. These sources are summarised in the schematic diagram presented below.

Most SADC member states introduced their NMPs during the mid-1990s. Although Seychelles (SYC) and the Democratic Republic of Congo (COD) did not formally publish NMP documents, both countries released relevant NMP-related components between 2012 and 2018 despite their markedly different economic statuses. Country codes for SADC members follow the ISO Alpha-3 standard as provided by the International Organization for Standardization (ISO). Codes for the region include AGO (Angola), BWA (Botswana), COD (Democratic Republic of Congo), COM (Comoros), LSO (Lesotho), MDG (Madagascar), MOZ (Mozambique), MWI (Malawi), MUS (Mauritius), NAM (Namibia), SYC (Seychelles), SWZ (Eswatini), TZA (Tanzania), ZAF (South Africa), ZMB (Zambia), and ZWE (Zimbabwe), determined from pharmaceutical profiles, WHO IRIS entries, SIAPS documents, and previously published research [23–47].

When examining total health expenditure (THE) as a percentage of GDP, upper-middle-income to high-income SADC countries (GDP per capita between 4096 and 12,695) such as SYC, MUS, and BWA typically report averages exceeding 5 %. In contrast, low-income countries (GDP per capita below 1085), including MOZ, MWI, and LSO, displayed nearly double this proportion, with THE around 9 %. Angola, which falls within the lower-middle-income category (GDP per capita approximately 2230), recorded the lowest health expenditure compared with all other SADC countries [20].

Table 3. Common implementation challenges and lessons learnt.

Observed Implementation Challenge	Key Insights	Take-Home Message (Actionable Recommendation)
Lack of understanding of the NMP structure (whether explicit or implicit)	Excludes active participation of non-pharmaceutical stakeholders, reduces accountability and limits policy scope	Clearly define and widely disseminate the NMP framework; explicitly assign roles and responsibilities to all stakeholders to eliminate conflicts of interest and strengthen accountability.
Limited public and non-pharmaceutical staff awareness of essential medicines principles	Creates unrealistic expectations, perpetuates irrational demands and hinders support for the policy	Launch ongoing public and professional education campaigns on the concept and benefits of essential medicines to shape perceptions and preferences.
Absence of regular multi-stakeholder engagement throughout development, implementation, monitoring and revision	Prevents negotiation of priorities, fails to address contextual changes and weakens policy adaptation	Institutionalise frequent, structured, transparent and documented multi-stakeholder consultations at every phase of the policy cycle.
No dedicated implementation team and no active implementation plan	Makes monitoring impossible, fosters a laissez-faire culture, conflicting priorities and lack of accountability	Establish a permanent, multi-disciplinary NMP implementation unit with a detailed, time-bound action plan and clear lines of accountability.
Lack of periodic monitoring and evaluation (M&E) mechanisms	Decisions for revision are made without evidence of impact; progress and gaps remain unknown	Design and fund both formative (ongoing) and summative (periodic) M&E frameworks with predefined indicators and independent external reviews every 2–3 years.
Insufficient political will, commitment and motivation of staff across the supply chain	Leads to poor execution, high staff turnover and weak enforcement	Secure high-level political sponsorship and integrate NMP objectives into Health Workforce reforms focused on retention, motivation and continuous professional development.
Inadequate trained staff, infrastructure and medicine availability	Directly undermines service delivery and rational use of medicines	Align training curricula, infrastructure investments and medicine procurement with patient-centred shared objectives across all prescribers and facility managers.
Heavy reliance on UN and external agencies for reporting and coordination	Erodes national ownership and institutional memory; jeopardises sustainability	Build internal capacity for policy leadership, data management and reporting to ensure country ownership and long-term continuity.

Table 4. The components implemented in the national medicines policies per country from WHO

	ENFORCEMENT				EDUCATION					ENGINEERING				ECONOMICS		
Country	MRA	Inspections	Licensing	Registrations	EML	RMU	PV	TM	Research	HRD	SCM	M&E	TC	Medicines Affordability	Finance strategy	Pricing structure
Angola	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES	NO	NO
Botswana	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	NO	NO	SE	YES	YES	YES
Comoros	NO	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES	NO	YES	YES	SE	NO
Democratic Republic of Congo	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES	YES
Eswatini	SE	YES	YES	NO	YES	YES	NO	NO	SE	YES	YES	YES	YES	NO	NO	NO
Lesotho	SE	NO	NO	NO	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES
Madagascar	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Malawi	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO
Mauritius	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO
Mozambique	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	NO
Namibia	NO	NO	YES	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO
Seychelles	YES	YES	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	YES	SE	YES	NO
South Africa	YES	YES	YES	YES	YES	YES	YES	SE	NO	YES	YES	NO	YES	YES	YES	YES
Tanzania	YES	YES	YES	YES	YES	YES	YES	SE	NO	YES	YES	YES	YES	YES	YES	YES
Zambia	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	NO	YES	NO
Zimbabwe	YES	YES	YES	YES	YES	YES	YES	SE	NO	YES	YES	NO	YES	YES	YES	YES

Key: yes data available some extent (SE) /implementation occurring, = no data available;

Abbreviations: EML/EMP- Essential Medicines List, IRIS= Institutional Repository Information Sharing, HRD= Human Resource Development, MRA= Medicine Regulatory Authority, M & E = monitoring and evaluation, RMU= Rational Medicine Use, PV= pharmacovigilance, SCM= Supply Chain Management, TC= Technical cooperation with other countries, TM= Traditional medicines

The achievements in the implementation of the national medicines policies in the SADC region

Although low- and middle-income countries were early supporters of the National Medicines Policy (NMP) following the Nairobi Conference of 1985, many of them became some of the slowest to put these policies into practice, often delaying revisions for long periods [26]. Numerous factors contribute to this lag, including economic instability, shifting political priorities, limited motivation among healthcare personnel, and competing health sector demands. According to the WHO 2004 World Medicines Situation report [48], fourteen of the sixteen SADC member states (88 %) succeeded in launching and implementing NMPs between 1987 and 2011, with the Democratic Republic of Congo and Seychelles being the only exceptions, as indicated in **Figure 3**. Globally, of the 165 countries surveyed in the WHO 2004 report [48], 133 (81 %) already had an NMP in place. However, only 97/155 (62.6 %) had operational implementation plans, and a mere 55/165 (33 %) had updated or revised their NMP within five to ten years of initial adoption. Although a five-year revision cycle was recommended, only 27 out of the 55 countries (50 %) adhered to this recommendation, while the remainder either lacked an NMP altogether or did not revise it.

In contrast to this trend, the United Republic of Tanzania established the essential medicines concept as early as 1970 and has consistently demonstrated sustained progress in adopting NMP interventions, supported by frequent policy updates [27, 49]. Tanzania also became the first African nation to attain WHO National Regulatory Authority (NRA) maturity level 3 in 2018, marking a significant regulatory milestone [50]. This level of advancement differs sharply from over 90 % of SADC states, many of which continue to depend extensively on UN-affiliated organisations for technical support in generating pharmaceutical data and still struggle to produce updated NMP drafts [24].

Across the SADC region, several NMP components are commonly implemented, though their extent varies. Essential medicines, pricing strategies, and regulatory frameworks are among the most consistently adopted elements, except in the cases of Seychelles, Zambia, and Namibia **(Table 4)**. Regarding traditional and herbal medicine, the WHO Regional Office for Africa reported in 2011 that Madagascar was the only SADC country actively advancing this component, with ongoing research efforts. This aspect of the NMP represents a largely untapped source of knowledge across Africa and holds potential for strengthening healthcare diversification and integration.

Since NMP components are often implemented in a non-linear manner and not always within the planned timelines, close communication among policy custodians and all affected parties is essential. Regular updates and

consultation help clarify priorities, enhance coordination, and contribute to sustaining an accurate and relevant policy document.

Expenditure on health

A country's economic context, reflected in its GDP per capita and total health expenditure (THE), is influenced by factors such as population ageing and the emergence of new health conditions, which in turn increase the demand for essential medicines. **Figure 4** highlights a notable disparity between low-income SADC countries, including MOZ, MWI, and LSO (GDP per capita <1085), which allocate nearly double the proportion of their GDP to health (around 9 %), and upper-middle- to high-income countries such as SYC, MUS, and BWA (GDP per capita 4096–12,695), which spend comparatively less. Angola, classified as a lower-middle-income country with a GDP per capita of 2230, recorded the lowest health expenditure in the region at only 2.5 % of GDP [22].

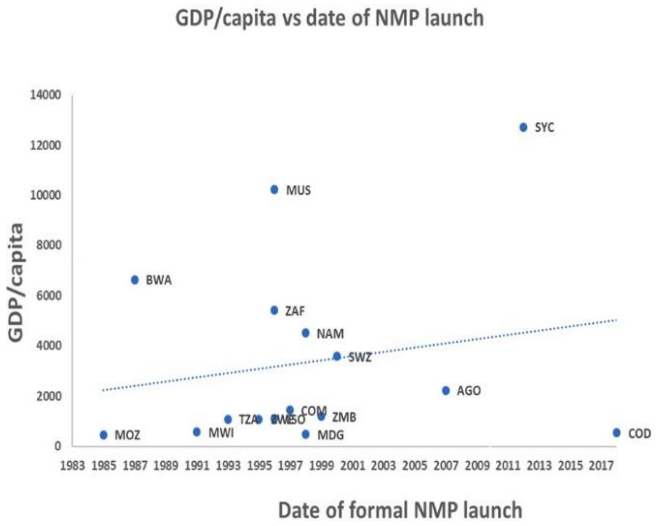

Figure 3. GDP/capita and the formal date of NMP publication per country [20, 21, 22, 26].

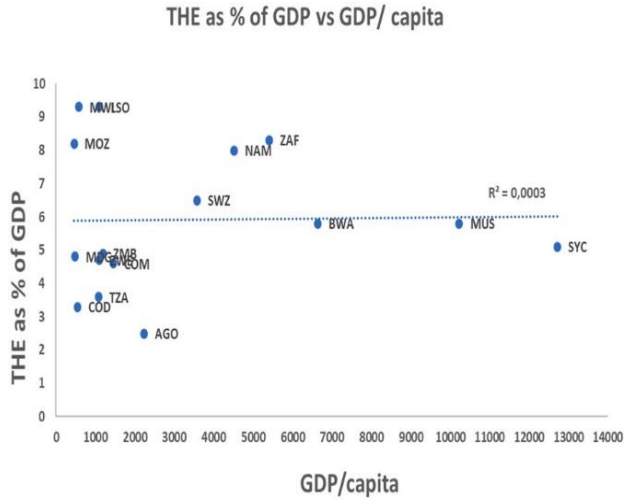

Figure 4. GDP/capita vs percentage of Total Health Expenditure (THE). [22]

Pharmaceutical expenditure

It is essential for countries to establish clear medicine pricing policies and systematically monitor pharmaceutical expenditure. While the relationship between overall health spending and pharmaceutical costs remains poorly defined, WHO/HAI pricing surveys provide insights into price variations and medicine affordability. Studies conducted in Comoros, Eswatini, South Africa, and Tanzania highlighted challenges such as high median price

ratios (MPR) exceeding international reference prices and limited affordability [29, 51–53]. Although preliminary, these findings offer valuable guidance for policymakers and stakeholders in SADC countries, emphasizing the urgent need to strengthen domestic pricing policies and manage pharmaceutical spending. Effective strategies in this area could improve medicine availability, affordability, and accessibility, thereby reducing disease burdens and enhancing population health.

Human resources

Across all SADC countries, the pharmacist-to-patient ratio (PPR) and pharmacist/pharmacy personnel-to-patient ratio (PPPR) fell below the WHO recommended benchmark of 43 per 100,000 population (equivalent to 1:2,300). These ratios were calculated using the number of registered pharmacists or pharmacy technicians relative to the population, excluding other prescribing healthcare professionals due to unavailability of data. Among the countries studied, Mauritius had the highest PPR at 39 **(Table 2)**, indicating relatively adequate pharmaceutical service coverage. Understanding the PPR is critical for evaluating the quality of pharmaceutical care provided and for optimizing professional pharmacy services within the healthcare system.

Implementation of key NMP components

A generally slow and incomplete adoption of NMP components was observed across the 16 SADC countries over the ten-year period from 2011 to 2021, as summarised in **Table 2**. Implementation varied according to four core pillars:

- Enforcement: The WHO Global Benchmarking Tool (GBT) Revision VI offers a systematic method for strengthening National Regulatory Authorities (NRAs), classifying them into maturity levels (ML) from ML1 (partial regulatory functions) to ML4 (advanced, continuously improving systems) [54–56]. Approximately 80 % of SADC countries had an NRA with varying core functions, except Comoros, Eswatini, and Lesotho **(Table 4)**. South Africa and Tanzania are the only SADC countries globally recognised with NRAs at maturity level 3 [50]. Advancing all SADC NRAs to ML4 could enhance regional harmonisation and improve access to medicines.
- Education: All countries adopted the essential medicines concept, although 50 % still lacked operational pharmacovigilance centres. Madagascar emerged as a leader in implementing traditional and herbal medicines, supported by active research in Africa **(Table 4)**. A comparative study of 137 essential medicines lists, including some SADC countries, by Persaud, Jiang, and Shaikh *et al*. [18], underscored the need for regular revision, validation, and publication of these lists to reflect national healthcare priorities accurately.
- Engineering: Published supply chain practices were reported in 69 % of countries to address medicine availability, but only half of these included rudimentary monitoring and evaluation (M&E) of medicine stock management. Most SADC countries, due to limited resources, relied on technical assistance from UN-based organisations, with Botswana being a notable exception **(Table 4).**
- Economics: Nine out of sixteen countries (56 %) had a financial strategy for medicines, with or without a pricing framework. South Africa stands out with a transparent, internationally benchmarked pricing structure. Evaluations of this system by Bangalee & Suleman [57], Wouters *et al*. [58], Moodley & Suleman [59], and Perumal-Pillay [60] demonstrated that regulated pricing mitigated excessive price increases, enhancing affordability. Conversely, a pharmacoeconomic study in Comoros by Kassim, Alolga, and Assanhou *et al*. [51] revealed that high procurement costs contributed to poor medicine availability in the public sector. These findings highlight the importance of conducting pricing studies in developing countries to guide efficient allocation of resources, improve access to medicines, and reduce financial inequities within populations.

Revision of the national medicines policy

Half of the SADC countries updated their NMPs within ten years of initial adoption during the period 2011–2021. The revision timelines varied widely, spanning from seven to eighteen years post-launch, despite the recommended five-year revision cycle. Interestingly, some countries published information on specific implemented components without performing a comprehensive policy revision. This incomplete documentation

aligns with observations by Gligo [61], WHO [2], and Erasmus *et al*. [62], highlighting gaps in policy oversight and missed opportunities to assess evolving NMP trends, including the relationship between GDP, healthcare systems, and medicine budgets. Regular revisions of NMPs could provide critical insights into the effectiveness of implemented programs both at the national level and across the SADC region.

Observed challenges associated with implementation within the SADC region

The literature review identified several recurring challenges affecting NMP implementation in SADC countries. These challenges, along with potential insights and implications, are summarised in **Table 3** [6, 12, 14, 17, 30].

Limitations and research gaps on NMP implementation

This study has several limitations. Data were sourced from a variety of repositories, including WHO/HAI, the World Bank, and World Atlas databases, which may be prone to errors. Judgements were sometimes required to resolve ambiguities in the data, relying on additional literature to validate inclusion. A lack of recent, peer-reviewed, publicly accessible studies limited the comprehensiveness of the review, making it difficult to fully capture the successes and challenges of each country's NMP.

The review period (2011–2021) coincided with different stages of NMP implementation across countries, meaning the findings reflect current implementation rather than the full extent of progress toward each country's objectives. Furthermore, included studies varied in scope, covering either overall policy analysis, cross-country comparisons, or assessments of specific policy components. As such, the results cannot be generalised to represent the entire policy environment in each country. While this study focused exclusively on SADC nations, future research would benefit from comparisons with other sub-Saharan countries to better understand the broader African context of NMP implementation.

Identified research gaps include insufficient data on policy design, methodological approaches, and cross-country comparative studies of NMP components, particularly in relation to countries' income levels. These gaps are consistent with findings from Rida & Ibrahim [6], Perehudoff, Alexandrov & Hogerzeil [12], Nikfar *et al*. [14], and Amaya, Bagapi & Choge *et al.* [30]. Future work should validate and update existing datasets and provide information on how countries are operationalising their NMPs, contributing to a comprehensive global database of NMPs.

Policy implications

Rising medicine prices, increasing disease burdens, and the effects of ageing populations place substantial pressure on countries' ability to implement, monitor, and evaluate NMPs consistently. Failure to evaluate NMPs not only undermines national accountability but also hinders regional harmonisation and the sharing of best practices within the SADC, limiting the optimal use of resources for advancing universal health coverage.

Conclusion

This review represents the first comprehensive desktop analysis of NMP implementation progress in SADC countries over time. The most widely adopted components included the essential medicines concept, medicine pricing, and regulation, while traditional and herbal medicine components were the least implemented. Cross-country and global benchmarking studies are crucial for enhancing the effectiveness of NMP implementation. These findings underscore the urgent need for SADC countries to revise and strengthen their NMPs, providing a clear overview of implementation trends and informing future policy development in the region.

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