

Achieving impactful treatment for pediatric endocrine disorders through primary care in low to middle-income countries: a scoping review

Hannah E. Olson¹

Abstract

Background: Endocrine disorders affect over 5% of the world's population, with an additional 5% undiagnosed. Despite the increasing prevalence of endocrine disorders, especially cases in low to middle-income countries, limited research offers comprehensive guidance on treating this complex medical field.

Objective/Aim: To provide evidence-based recommendations for efficient, effective, and accessible treatment of pediatric endocrine conditions in low to middle income countries.

Method: We used the Arksey and O'Malley methodological framework for scoping reviews to analyze health care administration approaches in low to middle-income countries. These approaches included primary care, specialized care, government intervention, and mobile health initiatives. Evaluation criteria focused on measuring levels of efficiency, efficacy, and accessibility.

Results/Findings: After reviewing primary care, specialized care, government intervention programs, and mobile care initiatives within developing countries, primary care emerged as the best approach for treating pediatric endocrine disorders.

Conclusion: In summary, despite recommendations favoring specialized care or government interventions, primary care proves to be the most effective, efficient, and accessible method for treating pediatric endocrine conditions. Given limited healthcare funding in low to middle income countries, implementing primary care initiatives can achieve optimal outcomes while maximizing resources.

Key Words: low to middle-income countries, pediatric, endocrine, health care, treatment methods

Introduction:

Endocrine disorders impair millions of lives, affecting 5% of adults in the United States alone (1) and 33.66% of individuals in low to middle-income countries (2). Alarming, global awareness of these conditions is diluted because nearly 5% of all cases remain undiagnosed (3). When left untreated, endocrine disorders may cause impaired heart function, infertility, fluctuations in body weight, hindered brain development in adolescents, and the overall diminishment of one's quality of life (3). Despite these glaring facts, insufficient healthcare funding and resource deficiencies in LMICs have resulted in ineffective and limited treatment options for endocrine-impaired individuals. Options may include, but are not limited to, government intervention programs, specialized care

facilities, mobile care initiatives, and primary healthcare. Ultimately, discovering and implementing effective, efficient, and accessible treatment strategies for individuals with endocrine conditions in these countries can save and enhance the lives of thousands.

A recent study assessing collaborative efforts between the Tanzanian government and external organizations in treating Type 1 diabetes revealed the inadequacy of Tanzanian health care administration (4). These findings necessitate substantial improvement to ensure adolescents receive proper glycemic control (4). Another study examining the availability of essential medications for pediatric endocrine care in Mexico, Central and South America, and the Caribbean displayed how necessary medications were accessible in less than 39% of the region's

poorest countries (5). This study emphasizes the need to refocus efforts toward ensuring LMICs have access to essential medications. Research across this subject highlights the significance of establishing an effective, cost-effective, and accessible healthcare administration method for those with endocrine disorders.

Prior research investigated the efficacy of various health care administration methods when treating chronic pediatric diseases in developing countries (6). One scoping review identified the disease landscape in LMICs, evaluated newly implemented service approaches, and discussed outcomes related to patient's health improvement (6). For years, the World Health Organization allocated its funding and workforce toward researching and treating endocrine disorders, especially in LMICs. However, despite research separately analyzing the benefits of specialized care (7), government interventions (8,9), mobile health initiatives (10,11), and primary care (4,8,12-15) when treating endocrine conditions in LMICs, a gap remains when comparing the outcomes of these studies. This scoping review aims to fill this gap by evaluating these four treatment options and determining which one yields the best healthcare results for individuals with endocrine conditions.

The objective of this scoping review is to provide evidence-based recommendations for implementing the most efficient, effective, and accessible treatment option for pediatric endocrine conditions in LMICs. Unlike previous studies, this review addresses the question, "What is the optimal healthcare administration method for treating endocrine conditions in low-income countries?" by quantitatively and qualitatively assessing the success of various methods and identifying the most effective one. After evaluating primary care, specialized care, government intervention, and mobile care initiatives in low to middle-income countries, results indicate primary care produces the best outcomes. Ultimately, this scoping review fills the gap in

the literature by comparing endocrine-care treatment options, calling attention to a previously neglected group of people, and providing policymakers in developing countries with valuable data to implement accessible health care initiatives and maximize their limited health budget.

Methods:

This scoping review aimed to provide evidence-based recommendations for efficient, effective, and accessible pediatric-endocrine treatment in low to middle-income countries. This study abided by both the five stages of a scoping review described by Arksey and O'Malley and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist. A scoping review can be broadly defined as a method of synthesizing large bodies of research regarding one topic to identify gaps in the literature or observe developments within the topic of inquiry (16,17). Additionally, through scoping reviews, researchers can identify where to orient future inquiries. This method of analyzing existing literature to draw connections and reveal disparities is key when examining the efficacy, efficiency, and accessibility of health care treatment methods in low to middle-income countries (17).

Stage 1: Identifying the Research Question

The Arksey and O'Malley framework highlights the importance of identifying a research question to provide parameters for the review. This scoping review asked the question, "What is the optimal healthcare administration method for treating endocrine conditions in low to middle-income countries?" Optimal healthcare administration is defined as efficient, effective, and accessible care, measured both qualitatively and quantitatively. Qualitative measurements include improved quality of life, current treatment analyses, and future projections conducted by healthcare specialists within the corresponding study. Quantitative measurements include a treatment plan's studied and projected Disability Adjusted Life

Years (DALYs), and a patient's Average Life Expectancy (ALE).

Stage 2: Identifying Relevant Studies

This scoping review identified peer-reviewed articles and studies from major medical and non-medical databases such as Google Scholar, PubMed, and MEDLINE. This search was limited to studies and articles published in English. Additionally, studies included in this review focused on pediatric endocrine disorders in low to middle-income countries. However, due to the limited body of literature on this topic, this review included studies analyzing other specialized, chronic, non-communicable diseases (e.g. fibromyalgia syndrome, nephrological conditions, asthma). The search included key words relating to endocrine disorders, thyroid conditions, pediatric health, treatment options, low to middle income countries, chronic diseases, and the care administration methods studied in this review. Between September of 2023 and October of 2023, we identified twelve relevant articles that fit all listed criteria.

Stage 3: Study Selection

The eligibility criteria for each article are as follows:

- Study setting: The primary study setting was low to middle-income countries, with some studies from higher income countries included for contextual comparison.
- Intervention: pediatric chronic diseases and/or endocrine conditions
- Study design: qualitative measurements examining patient's quality of life and care evaluations; quantitative measurements analyzing efficiency (cost-effectiveness), efficacy (DALYs and ALE), and accessibility.
- Time: studies published since 2018
- Research articles, review articles, and systematic reviews

Exclusion criteria:

- Studies focusing solely infectious diseases

- Studies highlighting specialized terminal diseases such as cancer
- Studies only measuring elderly populations
- Studies published in another language other than English
- Studies conducted during the COVID-19 pandemic

This scoping review only examined government intervention programs, specialized care programs, telemedicine or mobile care resources, and primary care initiatives. While other treatment options exist – community-based education programs and self-regulatory initiatives – these are the four most highlighted treatment options available to individuals in low to middle-income countries. Additionally, we only included articles in this scoping review if their results section identified the direct quantitative and/or qualitative effect of a certain health care initiative on patients' quality of life.

Stage 4: Charting the Data

Researchers extracted data and included the following characteristics, as according the Arksey and O'Malley framework: author, year of publication, study location, intervention type, duration of intervention (if applicable), study population, aims of the study, methodology, outcome measures, and important quantitative and qualitative findings. Data was finally compiled into an excel spreadsheet.

Stage 5: Data Summary and Synthesis

The final stage of the Arksey and O'Malley scoping review layout summarizes and reports findings (18). Findings are described in the following section.

Findings:

The findings below do not constitute a full scoping review as I only review twelve articles, and I do not qualify these findings as comprehensive. However, if I were completing a comprehensive scoping review, I would first identify more peer-reviewed journal articles

relevant to pediatric endocrine disorders in low to middle-income countries (at least twenty-five). Then, I would synthesize these findings in a chart as the Arksey and O'Malley scoping review framework describes. Additionally, I would compile data into an excel spreadsheet for validation and coding.

This article reveals the findings from twelve different articles related to health care in low to middle-income countries. In this section, I highlight articles relating to my original research question: "What is the optimal healthcare administration method for treating endocrine conditions in low to middle-income countries?" Each study presented attempts to analyze the outcomes of various health care methods on endocrine condition maintenance in low to middle-income countries.

Concentrating efforts and funding toward primary care can improve one's access to care:

Regarding the treatment of endocrine disorders with specialized care, research reveals how many countries prefer to focus their health care funding toward supplying endocrinologists (7). However, further research indicates an incredible shortage of endocrinologists in LMICs (7). This lack of physicians in the endocrine field significantly limits one's access to their care (6,7).

Regarding treating endocrine disorders via government initiatives, research demonstrates many countries are moving away from this approach due to poor communication between the community and the government, resulting in limited accessibility (6). Without proper back-and-forth communication between the government and community members, receiving adequate and accessible care is difficult.

LMICs also attempt to treat endocrine disorders via tele-medicine. This approach provides improved accessibility as patients may receive notifications regarding extended clinic hours and medication delivery, and

easily access their physicians via phone call (11). However, studies indicate mobile care has only made a significant impact toward treating maternal illnesses and infectious diseases, therefore inaccessible to those impaired by endocrine disorders (11).

Finally, many LMICs utilize primary care initiatives to treat endocrine disorders. Research indicates primary care is the foundation for increasing one's accessibility to the health care system (15, 20, 21). Due to pre-existing primary care facilities and physicians in LMICs, it is feasible to impart knowledge and understanding of endocrine disorders to primary care physicians (6). There is a large supply of primary physicians in LMICs, meaning these doctors are more accessible to endocrine-impaired patients compared to specialized treatment options (6). Harnessing this approach allows patients with endocrine disorders to experience improved access to their physicians. However, there remains a lack of resources in LMICs, preventing the training of primary care physicians with specialized skills needed to treat endocrine disorders (6). This significantly limits the use of primary care in LMICs. Yet, unlike specialized care and government initiatives, studies reveal how medication prescribed and administered at the primary care level allow endocrine patients to receive crucial treatment, regardless of their barriers(13).

Primary care is the most effective and efficient option for treating individuals with endocrine disorders:

Regarding government intervention programs, studies display varying levels of efficacy. While reduced infant mortality, improved infectious disease control, and overall community satisfaction are results from several general government initiatives in Pakistan (9), limited research reveals the efficacy and efficiency of government programs when treating endocrine disorders. Furthermore, researchers describe how the corruption of the system resulted in ineffective treatment outcomes overall (9).

Treatment via tele-medicine is generally efficient as endocrine-impaired patients can effortlessly notify their doctors of symptoms and developments in their condition (6,10). However, efficacy varies between studies as several reviews indicate trends of misdiagnosis, improper treatment recommendations, and overall misleading information (19).

When considering specialized care, one study within Tanzania described efforts to increase the supply of pediatric endocrinologists to treat Type 1 Diabetes. However, the study also reveals how only eight pediatric endocrinologists have entered the Tanzanian medical field as fully trained specialized physicians (4). With an estimated one million individuals with diabetes, one of many endocrine-related disorders, this study shows the incredible lack of endocrinologists in the field. This treatment option is extremely inefficient and therefore ineffective as many endocrine-impaired individuals in LMICs struggle to see an endocrinologist in their area at all.

Regarding primary care, research suggests primary care significantly reduces mortality and allows for quick detection of chronic conditions like endocrine disorders (6,21). This data implies primary care produces the most efficient and effective option for treating individuals with endocrine disorders. Several studies project implementing primary care initiatives in LMICs could significantly decrease a country's Disability-Adjusted-Life-Years and exponentially increase Life-Expectancy when compared to other treatment options (14, 20). By harnessing efforts and health care funding in LMICs toward primary care facilities and procedures, endocrine-impaired individuals may receive quicker and more impactful treatment outcomes.

Discussion:

Using the results from previous studies highlighting individual health care options, I conducted a scoping review to compare this data and choose the best care administration method.

With the limited research compiled, this review reveals the importance of comparing health care treatment methods in LMICs to determine the best option. The information presented highlights the strengths and shortcomings of various health care administration methods in LMICs. After extensive research, I determined the importance of prioritizing primary care initiatives in LMICs. Despite recommendations favoring specialized care, government interventions, or mobile medicine, primary care proves to be the most effective, efficient, and accessible method for treating pediatric endocrine conditions. Ultimately, as my findings indicate, primary care is highly accessible to endocrine-impaired individuals, it promotes quick and accurate diagnoses, and it leads to positive impacts in the patient's quality of life. Ultimately, given limited healthcare funding in LMICs, implementing primary care initiatives can achieve optimal outcomes while maximizing resources.

Further research should analyze more literature regarding treatment of specialized and chronic conditions (asthma, autoimmune disorders, etc.) in LMICs and incorporate more treatment options into their study. This way, research may be more comprehensive.

This review has strengths and limitations. This review qualitatively and quantitatively compares the benefits and shortcomings of various health care administration methods in LMICs when treating endocrine disorders, filling a considerable gap in the literature. Furthermore, my incorporation of both qualitative and quantitative data diversifies my results. This review also equips policymakers with basic and valuable knowledge to implement accessible health

care initiatives for those with endocrine disorders. With the data presented, policymakers can shift their focus to prioritizing primary care improvements and maximize their health care spending.

The first limitation to this review is the lack of literature included, as it is by no means comprehensive. Lack of data in this subject area implies my results lack full reliability. Additionally, from my experience, literature regarding this topic is limited as few studies dive into the purely quantitative effects of various health care administration methods (DALYs and ALE). As a result, this study was

forced to rely mostly on the qualitative evaluations from previous researchers, potentially leaning into their personal biases.

Ultimately, the studies reviewed in this article demonstrate how effective and efficient health care saves the lives of millions. Therefore, the importance of quantitatively and qualitatively examining health care initiatives to determine the best option for treating endocrine disorders is imperative to improving the quality of life for thousands of endocrine-impaired individuals in LMICs. This review illustrates that primary care achieves this goal.

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