



Implementing HbA1c monitoring in sub-Saharan Africa: Lessons learnt from a pilot project in Mozambique

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ABSTRACT

Aims: We aimed to evaluate lesson learnt from a pilot project in Mozambique focused on point-of-care (POC) HbA1c testing for diabetes management in primary health care facilities.

Methods: Over a three-year period, several health centers were equipped with POC HbA1c testing machines. The evaluation involved 12 months of data collection, interviews with patients and staff, and regular supervision visits.

Results: The project screened over 22,000 individuals and provided HbA1c testing to 2362 diabetes patients. Among the analyzed results, 65.7 % had HbA1c levels below 7 %, 10.9 % between 7 % and 8.5 %, and 23.4 % above 8.5 %.

Conclusions: Limited access to HbA1c testing remains a challenge in African countries. The pilot project demonstrated the feasibility of POC HbA1c testing and highlighted the need for increased efforts to make it more widely available, leading to improved diabetes management and patient outcomes.

1. Introduction

Diabetes is a growing concern worldwide, with a significant impact on African countries. The World Health Organization (WHO) reports that diabetes is a leading cause of death and disability, and that the prevalence of diabetes is increasing globally, especially in low- and middle-income countries [1]. According to some authors, the areas expected to see the largest increase in the number of individuals with diabetes are the Africa region, with a projected growth rate of 140.7 % by 2040, and the Middle East and North Africa, with a 103.8 % increase by 2040; moreover it is estimated that approximately 66.7 % of all cases of diabetes in the African region remain undiagnosed [2].

Despite the high incidence of diabetes in Africa, the region remains largely unprepared to deal with the disease, with limited resources available for diabetes care and management. HbA1c testing has been limited in many parts of Africa and it was raised as one of the most crucial point in order to reach proper monitoring of patients with diabetes [3]. Some authors have noted the significant impact of limited

HbA1c testing access on diabetes management, underscoring the importance of point-of-care solutions to improve patient outcomes [4].

Few data are available about epidemiology of diabetes in Mozambique. The Global Burden of Diseases study shows that in 2019, Mozambique had 4711 deaths related to diabetes, making it the country with the highest rate of diabetes-related deaths in the region, excluding the Republic of South Africa [5].

A pilot project has been implemented in the country to test the feasibility of HbA1c testing in primary health care facilities.

2. Context and methods

The DREAM program in Mozambique, with funding from Italian Agency for Cooperation and Development and in collaboration with the Mozambican Ministry of Health and Doctor with Africa CUAMM and AIFO, implemented a project aimed at reinforcing the national response to non-communicable diseases (NCDs), including diabetes.

The project was conducted over a three-year period, several public

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primary health centers across the country were supported to provide enhanced diabetes screening and care services. In addition to the running services, four health centers located in the Maputo province supported by the DREAM program were equipped with point-of-care HbA1c testing machines (Abbott Afinion 2 Analyzer), as part of a pilot initiative, in accordance with national and local health institutions. The staff involved in the centers received training about HbA1c testing and its utility in clinical practice.

It should be noted that HbA1c testing is not typically available at primary health care centers but rather at referral level. As a result, blood samples are often required to be sent to reference laboratories for testing, which can lead to logistic challenges and increased waiting times. Furthermore, the results are frequently returned to the health centers with significant delays, reducing their clinical utility.

The objective of this evaluation was to assess the use of point-of-care (POC) HbA1c testing and its impact on the management of diabetes patients. The analysis was carried out by personnel involved in the project independently from the activities of each health center. The evaluation was conducted over a period of 12 months and involved supervision visits every 2 weeks or monthly, during which patients and staff were interviewed and data was collected from clinical records.

3. Results

The results of the project showed that over the three-year period of the project, more than 22,229 people were screened for diabetes using random blood glucose testing, and 2362 patients with diabetes were able to access HbA1c testing in the year examined. Out of the 2363 test executed, only 1496 results were available for analysis, 983 (65.7 %) had an HbA1c level below 7 %, 163 (10.9 %) had a level between 7 % and 8.5 %, and 350 (23.4 %) had a level above 8.5 %.

Several advantages were identified in the use of POC HbA1c testing. During interviews, the patients reported the benefit of receiving testing, treatment, and results all in one visit, that reduced costs and lost workdays. The rapid intervention in glycaemic fluctuations also prevented complications and improved patient quality of life.

For health staff, the improved planning of medical visits for stable patients, increased efficiency in the use of available drugs, and faster referral for additional consultations all resulted in better workload management and organization. On a larger scale, logistical and economic benefits were observed, such as reduced transportation of samples to reference labs, reduced demand and workload in reference labs, and more efficient results management.

However, the main limitations of the POC strategy were higher costs per test and the potential for lower test quality as was described by other authors [6–8].

4. Discussion

The HbA1c test is a crucial component in the management of diabetes as it gives information on a patient's average blood glucose levels over the past 2–3 months. This test is widely accepted as the gold standard for monitoring glucose control [8]. Despite its importance, access to HbA1c testing remains limited in many African countries. According to some authors, only 47 % of patients with diabetes in six African countries considered, were accessing HbA1c testing [9]. The significance of limited HbA1c testing in Africa is further highlighted by the results of our study. Our analysis revealed that 34.3 % of tested patients had an HbA1c level exceeding 7 %, indicating poor glycemic control.

In accordance with our findings, a study that reported data from the implementation of point-of-care HbA1c testing in a diabetic clinic in South Africa revealed a significant increase in patients achieving glycemic control, highlighting the importance of improved strategies for access to accurate diabetes monitoring [10].

The challenge of HbA1c testing access in Africa varies regionally,

affected by disparities in healthcare infrastructure and necessitating context-specific strategies. Urban areas often have better healthcare access compared to rural regions, which face pronounced resource limitations. Utilizing established networks for other health services (such as HIV care or prenatal care) might offer viable avenues for integrating HbA1c testing, particularly in underserved areas. Our study focuses on healthcare centers predominantly located in urban or semi-urban contexts. However, the adoption of POC testing machines represents a versatile solution that could be effectively implemented across various settings, including rural areas. Similar experiences have been reported in the context of a number of other health services in African countries [11]. The example of the POC test for CD4 is well known, which has proven effective in increasing access to this test in the African context and is now widely used [12,13].

Moreover, in the evolving African landscape, the interconnected nature of chronic conditions indicates the need of a comprehensive healthcare approach that includes diabetes monitoring as a routine part of health services in African contexts [14].

The severe consequences of limited healthcare infrastructure on accessing HbA1c tests in rural Africa [4], together with evidence from studies outside Africa, such as the use of point-of-care HbA1c testing to enhance diabetes management in rural Thailand [15], and the significant improvement in diabetes care with point-of-care testing in a South African clinic [10], underline the universal challenge and importance of improving access to diabetes care through innovative solutions.

Our study, focused on the Mozambican context, crucially demonstrates the feasibility of HbA1c testing in resource-limited settings, underlining the potential for effective diabetes management strategies in similar environments. While our findings specifically reflect the challenges and opportunities in Mozambique, they offer valuable insights for globally improving diabetes care, emphasizing the necessity of contextually adapted healthcare solutions. This not only highlights the importance of our study's outcome but also calls for further research to explore and adapt these strategies to diverse populations' unique needs. The limited direct applicability of our results outside Mozambique, due to different healthcare infrastructures, cultural norms, and economic conditions, underscores the need for detailed investigations across various contexts.

Our discussion advocates for a focused effort on contextualized, innovative healthcare models to improve access to HbA1c testing. This initiative is crucial for bridging the care gap and elevating diabetes management outcomes across the diverse healthcare environments of Africa and beyond.

5. Conclusion

Our pilot project aimed implement HbA1c testing in Mozambique. By using a POC strategy, we aim to make the test more widely available, leading to improved diabetes diagnosis and management. Although our results are limited, they highlight the feasibility and the need for increased efforts to make HbA1c testing available in sub-Saharan African countries. This could have numerous benefits for patients, healthcare staff, and the healthcare system as a whole.

Declaration of competing interest

None.

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