







# HBA1C POINT-OF-CARE TESTING FOR DIABETES CONTROL IN LOW-INCOME REMOTE AREAS: A COST-PARITY ANALYSIS

EE412

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#### **BACKGROUND**

The therapeutic approach and glycemic control are crucial to prevent complications and maintain the quality of life in patients with diabetes. Glycated hemoglobin (HbA1c) is a sensible predictor of the long-term complications of diabetes, such as cardiovascular disease, nephropathy, retinopathy, and premature mortality. The HbA1c can be determined by conventional laboratory tests or point-of-care (POC) devices. POC tests are more expensive, but might be useful in low-income community, in which laboratory tests are not available.

#### **OBJECTIVE**

To evaluate the demand for point-of-care (POC) HbA1c tests necessary to achieve cost-parity with conventional tests in small municipalities in Brazil.

### **METHODS**

POC tests are more expensive than conventional tests, but many small municipalities do not have a laboratory in loco. In theses places, other costs are associate to the acquisition of a conventional test. The demand necessary to achieve cost-parity between tests was calculated. Economic costs for each test alternative were estimated from the societal perspective over a 5-year time horizon. The costs included were associated to training, equipment, test supplies, materials, fees for conventional tests, displacement, food, and opportunity costs. The cost of POC devices was calculated assuming a 10% depreciation rate and an opportunity cost of investment at an interest rate of 4.75%. All values were presented as PPP-USD (1.00BRL=0.47PPP-USD).

## RESULTS

The costs of the conventional tests varied between 32.44 and 54.66 PPP-USD, depending on the municipality and its distance from the regional metropolis where the laboratory is located (**Table 1**). The average cost of the POC tests depends on the number of tests conducted. The total costs associated with 1,076 POC tests were 96,247.42 PPP-USD, an average of 89.45 PPP-USD. The variable costs, though, were only 21.85 PPP-USD.

These tests are more expensive than the conventional tests if the demand is not large enough to compensate for the fixed costs in remote areas. Cost-parity would be achieved if the demand is between 247 and 771 over five years (**Table 2**).

#### **CONCLUSION**

The use of the POC devices provides time-sensitive access to HbA1c results and, therefore, might contribute to the glycemic control of diabetic patients in remote areas. The number of tests required to achieve cost-parity is relatively small, even for remote municipalities in low- and middle-income countries. In this scenario, the technology could be recommendable.

Table 1. Costs of the conventional tests depending on the municipality.

| Municipality          | Cost of test<br>(PPP-USD) | Cost of displacement (PPP-USD) | Cost of food<br>(PPP-USD) | Opportunity cost (PPP-USD) | Total unitary<br>cost<br>(PPP-USD) |
|-----------------------|---------------------------|--------------------------------|---------------------------|----------------------------|------------------------------------|
| Ataléia               | 3.72                      | 14.94                          | 7.09                      | 11.23                      | 36.98                              |
| Ladainha              | 3.72                      | 17.73                          | 7.09                      | 11.23                      | 39.77                              |
| Frei Gaspar           | 3.72                      | 10.4                           | 7.09                      | 11.23                      | 32.44                              |
| Itaipé                | 3.72                      | 16.31                          | 7.09                      | 11.23                      | 38.35                              |
| Novo Oriente de Minas | 3.72                      | 17.78                          | 7.09                      | 11.23                      | 39.82                              |
| Crisólita             | 3.72                      | 32.62                          | 7.09                      | 11.23                      | 54.66                              |
| Catuji                | 3.72                      | 13.9                           | 7.09                      | 11.23                      | 35.94                              |
| Setubinha             | 3.72                      | 27.94                          | 7.09                      | 11.23                      | 49.98                              |
| Ouro Verde de Minas   | 3.72                      | 17.02                          | 7.09                      | 11.23                      | 39.06                              |

Table 2. Number of tests necessary to achieve cost-parity.

| Municipality          | Total unitary cost (PPP-USD) | # of test for efficiency parity |
|-----------------------|------------------------------|---------------------------------|
| Ataléia               | 36.98                        | 538                             |
| Ladainha              | 39.77                        | 454                             |
| Frei Gaspar           | 32.44                        | 771                             |
| Itaipé                | 38.35                        | 493                             |
| Novo Oriente de Minas | 39.82                        | 452                             |
| Crisólita             | 54.66                        | 247                             |
| Catuji                | 35.94                        | 578                             |
| Setubinha             | 49.98                        | 288                             |
| Ouro Verde de Minas   | 39.06                        | 472                             |









