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صحة طفلك من صحتك

The Economic Evaluation Report of the Presidential Initiative for Maternal and Fetal Health in Egypt

Prepared for
The Ministry of Health and Population (MOHP)

١٠٠ مليون صحة

مبادرة رئيس الجمهورية للعناية بصحة الأم والجنين

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PREFACE

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ABSTRACT

Background and Objectives:

In low-income countries, the pooled prevalence of HIV (5.2%), HBV (6.6%), and syphilis (3.3%) exceeds global levels, posing a significant public health challenge. Mother-to-child transmission (MTCT) is a primary route of infection for these diseases, with substantial implications for pregnancy outcomes and neonatal health. Eliminating MTCT is critical to achieving the WHO targets for HIV, hepatitis, and syphilis elimination by 2030. In response, Egypt launched a presidential initiative in 2020 to screen, detect, and treat HIV, HBV, and syphilis among pregnant women. This study aims to evaluate the long-term health and economic benefits of this nationwide initiative.

Methodology:

A Markov model was developed to compare the cost-effectiveness and economic benefits of a universal screening and treatment initiative versus a no-screening scenario. The analysis incorporated initiative costs, medical interventions, and comprehensive healthcare support, as well as life-years gained, quality-adjusted life-years (QALYs), and productivity loss averted due to premature mortality. A lifetime horizon was applied, factoring in the mean age at diagnosis and life expectancy in Egypt. Both costs and outcomes were discounted at an annual rate of 3.5%.

Results:

Between 2020 and 2023, 2,336,727 pregnant women were screened, with 3,682 cases identified as positive for HIV, HBV, or syphilis. The initiative resulted in total savings of EGP 1.8 billion, driven by life-years saved and the averted productivity loss. In the initiative scenario, the initiative achieved 60,464 life-years saved and 70,863 incremental QALYs gained compared to the no-initiative scenario.

Conclusion:

The findings demonstrate substantial clinical and economic benefits of Egypt's presidential initiative, with improved health outcomes reflected in life-years gained, QALYs, and significant economic returns. The initiative proved to be a dominant strategy, delivering a favorable return on investment (ROI) of 43%. These results underscore the value of nationwide screening programs in advancing public health and economic sustainability.

1. Introduction

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INTRODUCTION

Globally, the prevalence of HIV, hepatitis B virus (HBV), and syphilis in pregnant women remains a significant public health concern, particularly in low- and middle-income countries. The pooled global prevalence rates for pregnant women stand at 2.9% for HIV, 4.8% for HBV, and 0.8% for syphilis.

These infectious diseases pose severe risks through mother-to-child transmission (MTCT), a major route of infection that profoundly impacts pregnancy outcomes and neonatal health. Without intervention, the repercussions extend into long-term health complications, increased healthcare costs, and economic burdens.

The Health Impact of MTCT



HIV:

In the absence of antiretroviral therapy (ART), the risk of MTCT is estimated to be 30–45%. This risk drops significantly to <2% in breastfeeding mothers and <1% in non-breastfeeding mothers receiving ART.

Untreated HIV infection results in lifelong medical costs for opportunistic infections, acquired immunodeficiency syndrome (AIDS)-defining illnesses, and a significant loss of quality-adjusted life years (QALYs).



Syphilis:

Congenital syphilis occurs through vertical transmission at any stage of maternal infection and any trimester. Without appropriate treatment, maternal syphilis leads to severe adverse outcomes, including miscarriage, stillbirth, preterm delivery, low birthweight, and neonatal death.

In 2020 alone, untreated maternal syphilis caused approximately 143,000 early fetal deaths, 61,000 neonatal deaths, and 41,000 preterm births worldwide. These outcomes are preventable with timely diagnosis and appropriate antibiotics.

INTRODUCTION

HBV:

Perinatal HBV exposure is a major contributor to chronic hepatitis B. Approximately 90% of neonates infected perinatally develop chronic HBV, which significantly increases the risk of premature death from liver failure or hepatocellular carcinoma.

Without intervention, perinatal transmission rates are high, but active-passive immunoprophylaxis using hepatitis B vaccination and immunoglobulin can reduce chronic HBV infection rates to 4% or less among neonates exposed at birth.

Egypt's Vision for Health and Development



To address these challenges and align with the WHO's global targets to eliminate MTCT by 2030, Egypt's Vision 2030 prioritizes equitable access to high-quality healthcare

Between 2018 and 2023, Egypt implemented multiple initiatives under its health sector reforms, with a focus on preventive care and universal access.

One of the most prominent programs is the "100 Million Health Presidential Initiative", which aims to provide comprehensive healthcare to all Egyptians.

Building on this success, a nationwide screening, early detection, and treatment initiative for HIV, HBV, and syphilis among pregnant women was launched in 2020. This program reflects Egypt's commitment to:

- Reducing MTCT rates through universal screening and treatment
- Improving maternal and neonatal health outcomes
- Ensuring economic sustainability by reducing healthcare costs and productivity losses.

١٠٠ مليون صحة

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INTRODUCTION

This report analyses the economic and health outcomes of Egypt's presidential initiative for screening and treating HIV, HBV, and syphilis in pregnant women from 2020 to 2023.

Using a robust economic modelling approach, it evaluates the cost-effectiveness, life years gained, quality-adjusted life years (QALYs), and productivity savings achieved through this intervention compared to no intervention.

By quantifying both the clinical and economic benefits of this initiative, the report highlights its role as a transformative step in achieving public health goals, improving neonatal outcomes, and ensuring the sustainability of Egypt's healthcare system.

2. The Presidential Initiative for Maternal and Fetal Health

INITIATIVE OBJECTIVES



The Presidential Initiative for Maternal and Fetal Health was launched to enhance maternal and child health outcomes by preventing mother-to-child transmission (MTCT) of **HIV, HBV, and Syphilis**.

Reducing Transmission Rates:

- Provide timely diagnosis and treatment of HIV, HBV, and Syphilis to pregnant women.
- Significantly lower transmission risks to newborns through standardized treatment regimens.

Improving Health Outcomes:

- Improve maternal well-being and neonatal health outcomes through early detection and intervention.
- Ensure follow-up care for both mothers and infants, including prophylaxis doses for newborns.

Economic Sustainability:

- Minimize long-term healthcare costs associated with untreated infections.
- Reduce productivity losses caused by illness and mortality in mothers and infants.

INITIATIVE PROTOCOL

The initiative follows a comprehensive protocol integrating health awareness, antenatal care, diagnostic testing, treatment, and follow-up services



Primary Screening and Health Assessment at Primary Healthcare Units

- Measure height, weight, blood pressure, and BMI.
- Screen for anemia, gestational diabetes, and basic health indicators.
- Test for ABO, RH, HIV antibodies, HBV surface antigen (HBsAg), and TP antibodies (Syphilis) using rapid diagnostic kits.

Referral and Confirmatory Testing

- Suspected cases undergo confirmatory testing:
  a) HIV: Referral to the National HIV Control Program for confirmatory HIV RNA testing.
  b) HBV: Referral to viral hepatitis treatment centers for confirmatory HBV DNA testing.
  c) Syphilis: Immediate initiation of treatment at Primary Healthcare Unit
- Additional screening for women with indicators of hypertension or gestational diabetes includes on-spot HbA1c testing.

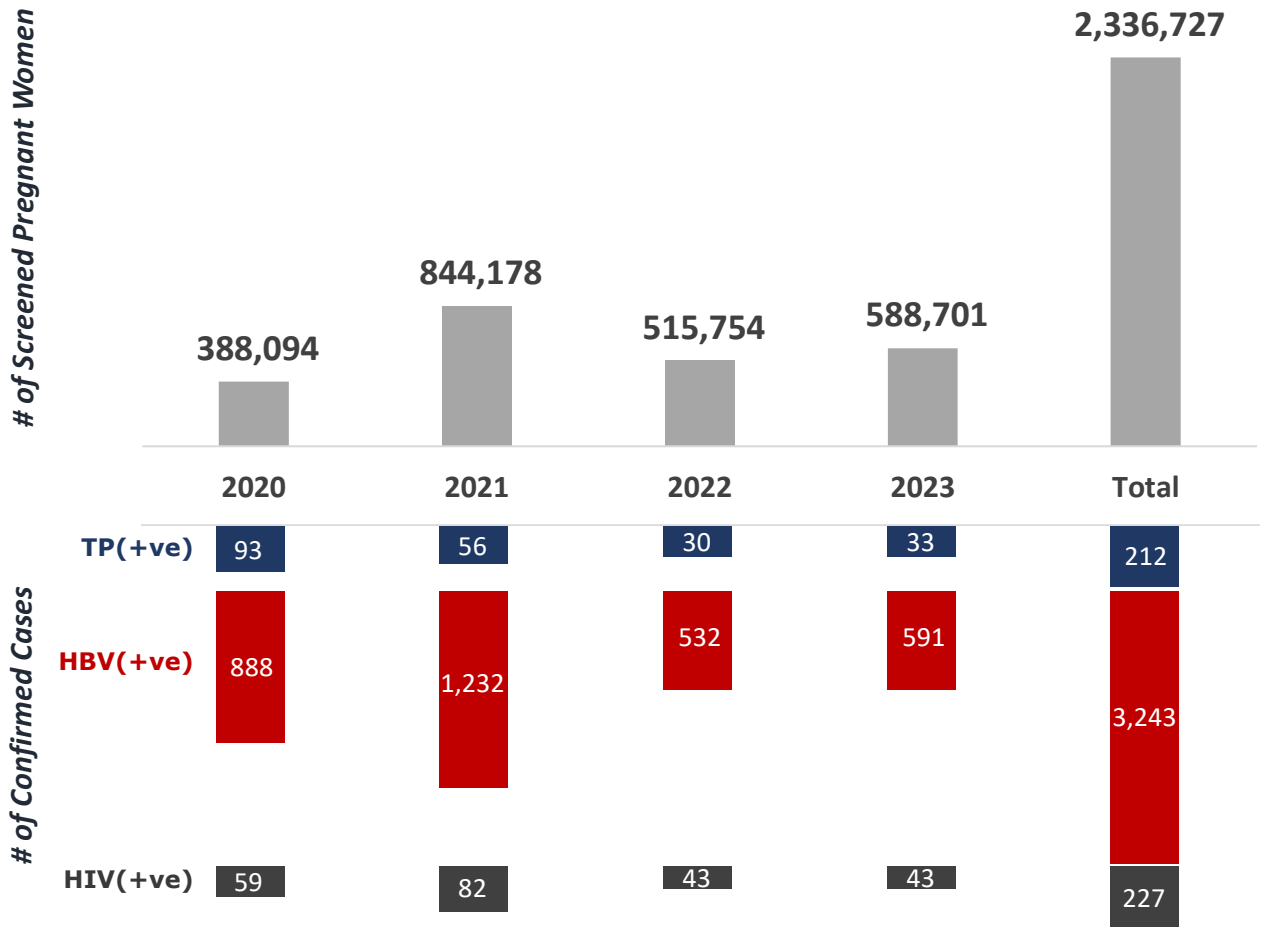
Treatment and Follow-Up

- Initiate treatment for positive cases and their spouses:
  a) HIV: Antiretroviral therapy (ART).
  b) HBV: Antiviral medications and neonatal immunoprophylaxis (vaccine and immunoglobulin).
  c) Syphilis: Benzathine penicillin injections for pregnant women.
- Follow-up for mothers and infants, ensuring prophylactic doses and continued care to minimize transmission risks.
- Treatment and follow-up are initiated for those with elevated blood pressure and blood glucose levels.
- Educational sessions are offered for obese women.

INITIATIVE OUTCOMES

The initiative's outcomes, analyzed over a four-year period (2020–2023), reflect significant clinical and economic benefits

2,336,727 pregnant women were screened across the 4 years, with



Treatments as per latest guidelines were secured and acquired via referral to National HIV control program for HIV, viral hepatitis treatment centers of NCCVH for HBV or primary care units incase of Syphilis.

3. Initiative Economic Evaluation

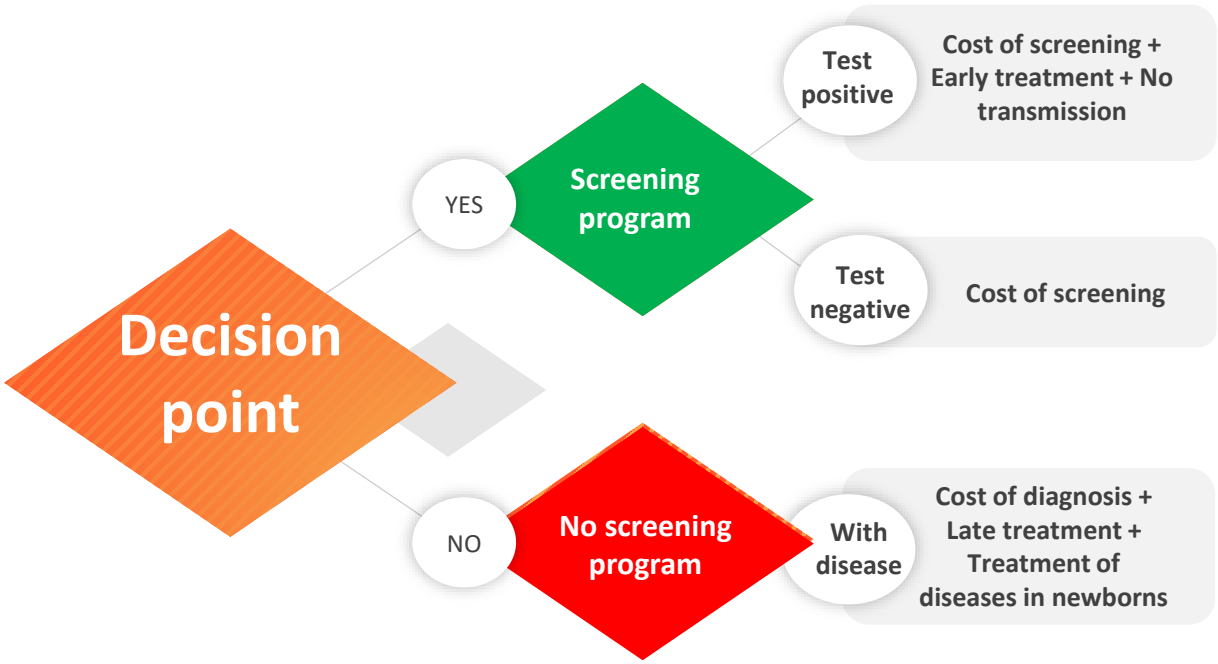
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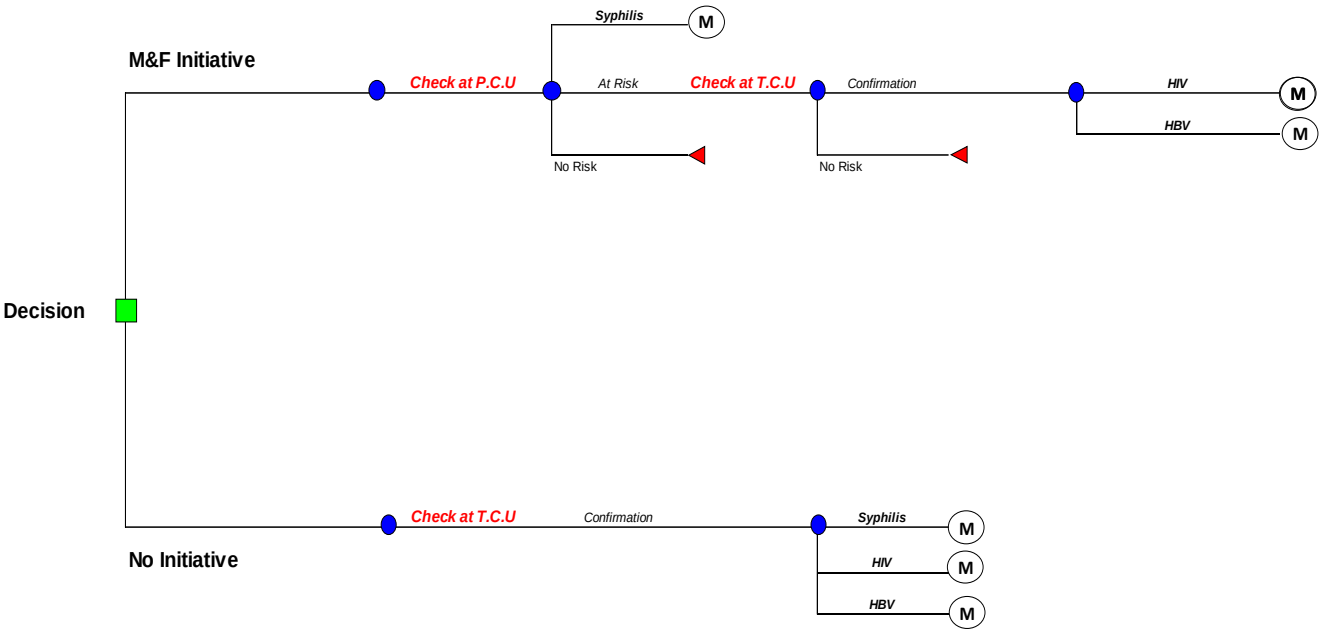
ECONOMIC EVALUATION

A Model assessing the cost effectiveness and benefit of the clinical and economic consequences of running HIV, HBV & Syphilis screening and treatment of pregnant women and versus no initiative

I. Study Methodology:

- The economic analysis used a decision tree approach to determine the cost-effectiveness and benefits of the initiative.
- The study compares 2 strategies scenarios "screening and treatment strategy" versus "no-screening strategy and treatment upon detection".





Decision Tree

II. Markov Model:

- A Markov model was constructed for each disease; HIV, HBV, and Syphilis to track the health states of mothers and neonates over their lifetime.
- Each model simulates disease progression, treatment outcomes, and associated costs annually, with a one-year cycle.

HIV

Health States: Healthy → Early/Latent HIV → Tertiary HIV → Death.

ART reduces mother-to-child transmission rates to <1%, with most perinatally infected neonates remaining healthy during early childhood under the screening arm.

ECONOMIC EVALUATION



HBV

Health States: Inactive Carrier → Active Chronic HBV → Cirrhosis → Decompensated Cirrhosis → Hepatocellular Carcinoma → Liver Transplantation → Death.

Without immunoprophylaxis, 28% of neonates are infected at birth, (vaccine + immunoglobulin) reduces this risk to less than 4%.

Long-term health risks manifest after age 20, including cirrhosis and liver failure.

Neonates born to HBsAg-positive women receive active-passive immunoprophylaxis.

Neonates born to HBsAg-negative women receive a birth dose of hepatitis B vaccine before hospital discharge or at nearest health unit (within 24 hours of birth) followed by completion of the hepatitis B vaccine series similar to all neonates in Egypt.



Syphilis

Health States: Healthy → Early/Latent Syphilis → Tertiary Syphilis → Death.

Early treatment with benzathine penicillin reduces vertical transmission risk by 98%, preventing adverse birth outcomes such as stillbirth, neonatal death, and congenital syphilis.

III. Model Assumptions and Inputs:

Population Cohort

- Starting age for the cohort: 25 years (mean age of pregnancy in Egypt).
- Time horizon: Lifetime, with outcomes projected until life expectancy.
- Discount rate: 3.5% for both costs and outcomes, aligned with Egyptian guidelines

Economics Input

- **Direct Costs:** Screening, diagnosis (confirmatory testing), treatment protocols, and follow-up care.
- **Indirect Costs:** Productivity loss averted, calculated based on minimum Monthly Wage (2021) in Egypt and unemployment rates by gender.
- **Utilities:** QALY weights were derived from global literature, accounting for disease burden and progression.

IV. Outcomes Assessed

1/ LYS
Years gained through early detection and treatment.

2/ QALYs
Incremental QALYs gained by preventing disease progression and reducing complications

3/ Cost Savings
Cost reductions through timely treatment, lower complications, and reduced long-term healthcare expenses.

4/ ROI
Long-term gain or loss relative to investment

Health Outcomes
Economic Outcomes

ECONOMIC EVALUATION

V. Study Inputs:

Variables	Input
Total Number of Screened Women	**2,336,727**
Number of Cases	**3,682**
Confirmed HBV DNA, Viremia	**3,243**
Confirmed HIV RNA, Viremia	**227**
Syphilis	**212**

HIV	
Mortality Rates	
HIV>500 Asymptomatic	**1.3%**
HIV Symptomatic	**4.9%**
AIDS ≤200 (ART)	**34%**
Transition Probabilities	
Asymptomatic to symptomatic	**13.6%**
Symptomatic to AIDS, no ART	**39.5%**
Symptomatic to AIDS, ART	**6.2%**
Transmission Rates	
Transmission to newborn while not on ART	**45%**
Transmission to newborn while on ART	**1%**
Utilities	
Diagnosed asymptomatic HIV infection(1st year)	**0.84**
Diagnosed asymptomatic HIV infection (2nd year)	**0.89**
Symptomatic (untreated) HIV infection	**0.79**
HIV infection during HAART	**0.83**
AIDs	**0.73**

ECONOMIC EVALUATION

V. Study Inputs:

HBV	
Mortality Rates	
Chronic Hepatitis B	**2.5%**
Compensated cirrhosis	**4%**
Decompensated cirrhosis	**39%**
Hepatocellular carcinoma	**56%**
Liver transplant (1year)	**15%**
Liver transplant (2year)	**1.5%**
Transition Probabilities	
Inactive carrier to chronic HBV	**7.3%**
Chronic HBV infection to inactive	**17%**
Chronic HBV infection to cirrhosis	**5%**
Chronic HBV infection to Decompensated cirrhosis	**3.18%**
Chronic HBV infection to Hepatocellular carcinoma	**0.5%**
Cirrhosis to Decompensated cirrhosis	**5.4%**
Cirrhosis to Hepatocellular carcinoma	**2.4%**
Decompensated cirrhosis to Hepatocellular carcinoma	**2.4%**
Decompensated cirrhosis to Liver transplantation	**1.8%**
Hepatocellular carcinoma to Liver transplantation	**4.6%**
Transmission Rates	
Risk of transmission with active-passive immunoprophylaxis	**3.4%**
Risk of transmission in positive pregnant woman	**28%**
Utilities	
Inactive carrier	**0.904**
Chronic Hepatitis B	**0.868**
Compensated cirrhosis	**0.845**
Decompensated cirrhosis	**0.722**
Hepatocellular carcinoma(stage A,B)	**0.675**
(stage C,D)	**0.428**
Liver transplant(1st year)	**0.69**
Liver transplant(subsequent year)	**0.79**

ECONOMIC EVALUATION

V. Study Inputs:

Congenital Syphilis	
Transition Probabilities	
% Healthy /Recover to Early /latent	**23.6%**
% Early /latent Syphilis to tertiary	**33%**
% Tertiary Syphilis to death	**11%**
Pregnancy Outcomes	
IUFD	**0.028**
Neonatal Death	**0.014**
Preterm Delivery	**0.241**
Congenital Syphilis	**0.50**
Utilities	
Early/latent disutility	**0.84**
Tertiary disutility	**0.89**
Congenital Syphilis	**0.79**

Other Input	
Unemployment Rate	**0.15**
Annual Wage, EGP	**48,000**
Discount rate	**0.035**
Total Screening Costs	**51,407,994**
Annual cost of Chronic HB	**2,427**
Annual cost of Compensated cirrhosis	**2,920**
Annual cost of Decompensated cirrhosis	**3,248**
Annual cost of Hepatocellular carcinoma	**19,045**

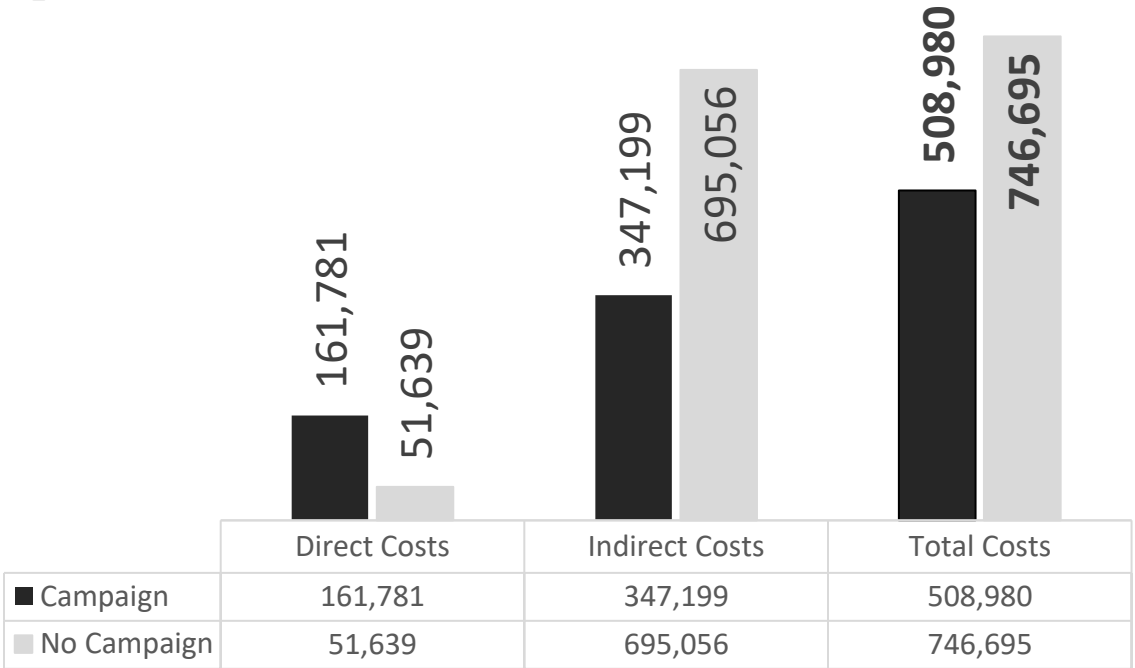
4. Initiative Results

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INITIATIVE RESULTS

The study measured the difference in the life-time costs and outcomes of both scenarios

HIV



	Direct Costs	Indirect Costs	Total Costs
Campaign	161,781	347,199	508,980
No Campaign	51,639	695,056	746,695

Cost Comparison in Thousands EGP

Economic Benefits

237 millions EGP Savings

47% ROI

Clinical Benefits

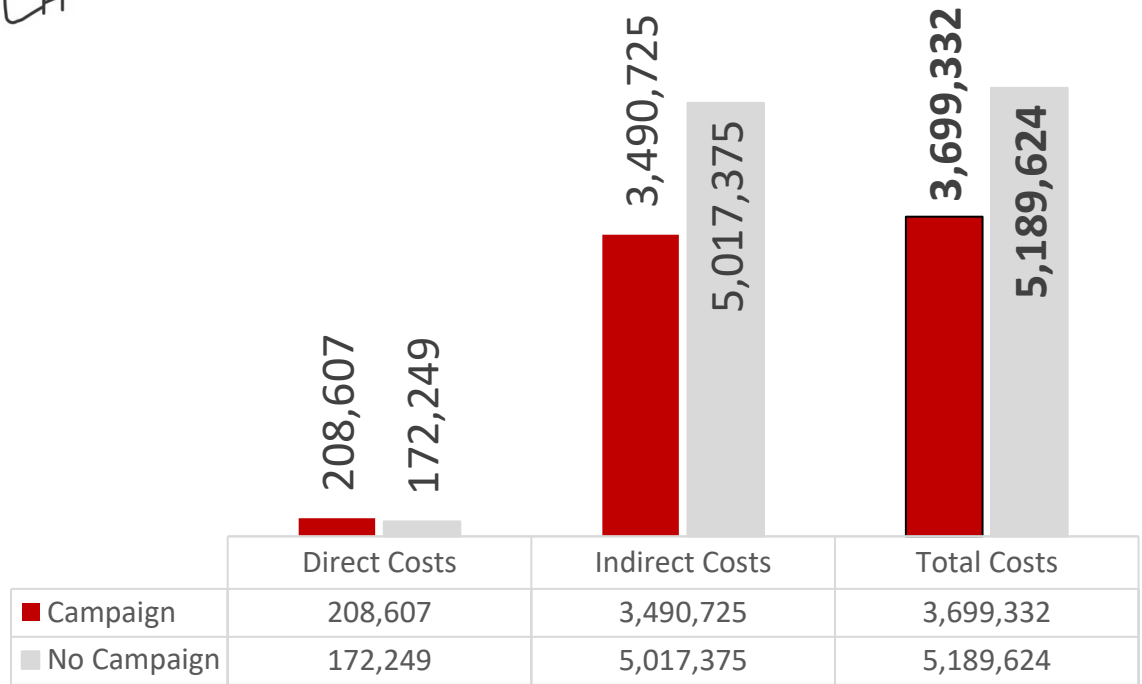
11,288 Life years saved

2,976 QALYs gained

INITIATIVE RESULTS

The study measured the difference in the life-time costs and outcomes of both scenarios

HBV



	Direct Costs	Indirect Costs	Total Costs
Campaign	208,607	3,490,725	3,699,332
No Campaign	172,249	5,017,375	5,189,624

Cost Comparison in Thousands EGP

Economic Benefits

1,490 millions EGP Savings

40% ROI

Clinical Benefits

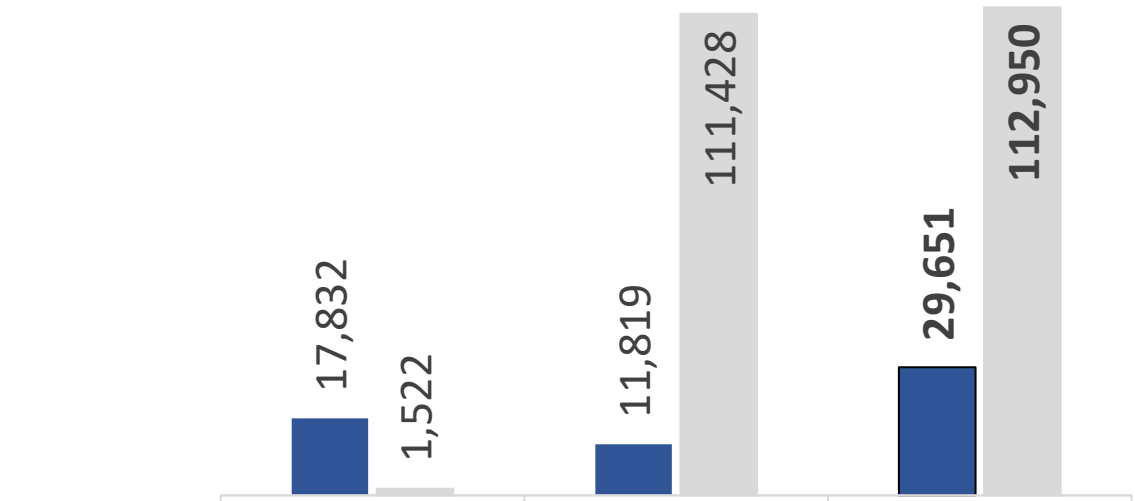
45,606 Life years saved

66,236 QALYs gained

INITIATIVE RESULTS

The study measured the difference in the life-time costs and outcomes of both scenarios

Syphilis



	Direct Costs	Indirect Costs	Total Costs
Campaign	17,832	11,819	29,651
No Campaign	1,522	111,428	112,950

Cost Comparison in Thousands EGP

Economic Benefits

83 millions EGP Savings

281% ROI

Clinical Benefits

3,570 Life years saved

1,651 QALYs gained

INITIATIVE RESULTS

The study yielded more clinical outcome in terms of 71,000 incremental more QALYs and 60,000 incremental more life years saved with less cost with a net saving of 1.8 billion EGP over the evaluation period, thus The initiative arm demonstrated dominance over the no-initiative arm, delivering superior outcomes at reduced costs..

Economic Benefits

1.8 Billions EGP

Savings

43% ROI



A return of 1.43 EGPs for every 1 EGP spent on the initiative

Clinical Benefits

+60K

Life years saved

+71K

QALYs gained

CONCLUSION

The Presidential Initiative for Maternal and Fetal Health has proven to be a transformative public health intervention in Egypt, delivering substantial clinical and economic benefits.

Over 4 years (2020–2023), the initiative screened more than 2.3 million pregnant women, detecting and treating cases of HIV, HBV, and syphilis.

By preventing mother-to-child transmission (MTCT), the program successfully saved life years and generated incremental QALYs, while achieving direct cost savings and averting productivity losses equivalent.

The initiative's success highlights its effectiveness in reducing disease transmission and improving maternal and neonatal health outcomes, establishing itself as a dominant, cost-effective public health strategy.

Moving forward, program continuity is essential to sustain these achievements and further reduce MTCT rates.

Additionally, integrating public awareness initiatives will empower pregnant women and families to seek early screening, fostering greater participation and engagement in the initiative.

The success of this program underscores its role as a cornerstone of Egypt's maternal and child health strategy and its alignment with Vision 2030 and WHO's global goals to eliminate MTCT of HIV, HBV, and syphilis by 2030.

By prioritizing continued funding, policy integration, and ongoing evaluation, the initiative will not only safeguard future generations but also contribute to the long-term sustainability of Egypt's healthcare system, ensuring healthier outcomes for mothers, children, and society as a whole.

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