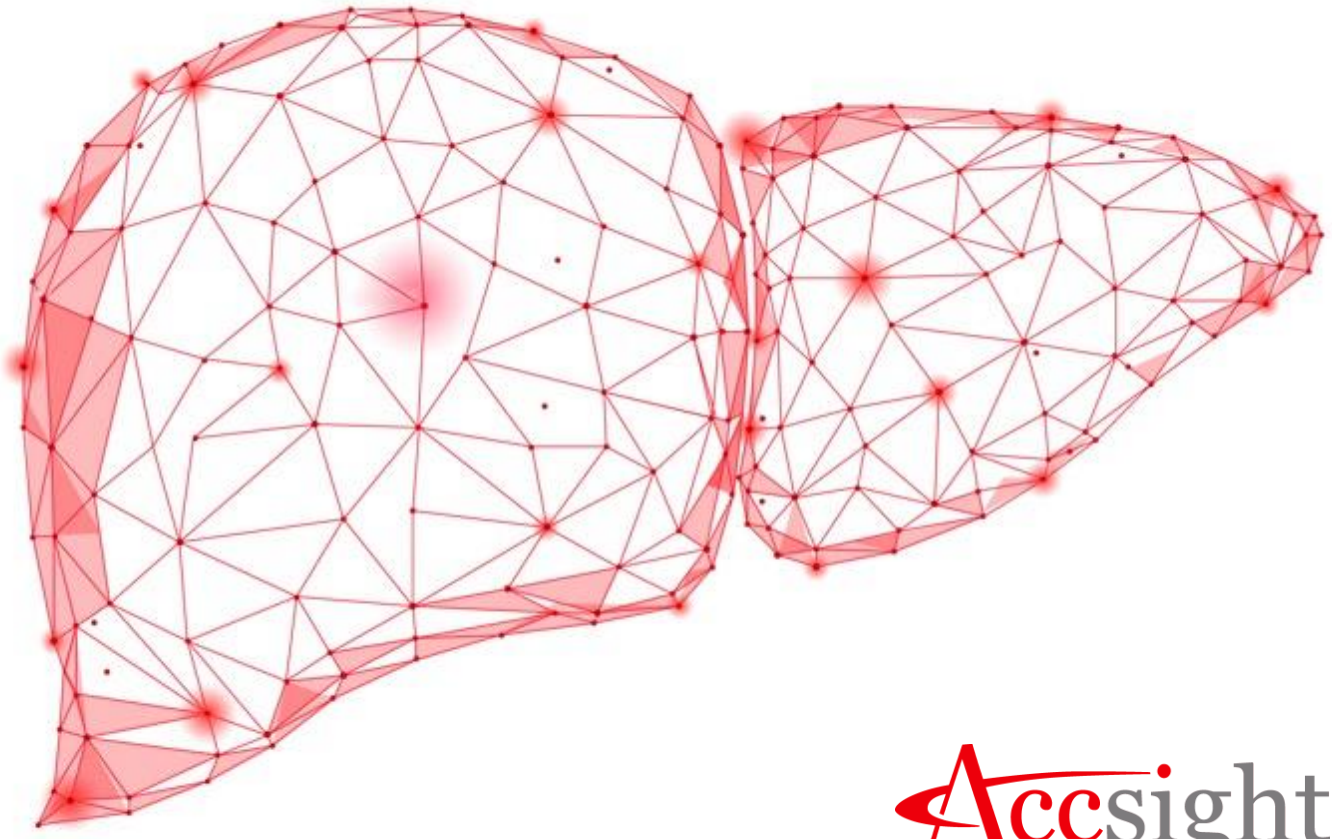


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The Economical Evaluation of the Nationwide Initiative for Screening and Eradication of HCV in Egypt

Prepared for
The Ministry of Health and Population (MOHP)

١٠٠ مليون صحة
مبادرة رئيس الجمهورية لدعم صحة المرأة المصرية

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PREFACE

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ABSTRACT

Background and Objectives:

Globally, Eradicating HCV has become a high-priority policy issue. WHO has announced that Egypt has overcome the HCV. In light of the "100 Million Healthy Egyptian" campaign, a presidential initiative for the universal screening and treatment of HCV patients began in Egypt in 2018. The purpose of this report is to demonstrate the economical evaluation of the HCV initiative in Egypt.

Methodology:

To compare the costs and outcomes of " The universal screening and treatment campaign" and the "No screening" scenario, a 25-year Markov model was constructed. Direct medical costs, productivity loss and Life years gained were the primary outcomes. A discount rate of 3.5% was applied to all costs and outcomes.

Results:

The presidential initiative screened 49,630,319 individual and was able to discover and cure 1,532,340 patients. The early diagnosis and management of these cases resulted in savings of almost **16 Billion EGPs in direct medical costs. The initiative resulted in 6.9 Billion EGP averted productivity losses** due to reduced premature deaths, with a total of **1,108,042 life years gained** (LYGs).

Conclusion:

The results indicate that the presidential initiative has had considerable clinical and economic benefits. Due to mass screening and treatment, the initiative's impact on reduced HCV transmissibility was achieved.



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1. Introduction

INTRODUCTION

- Hepatitis C is a liver infection caused by the hepatitis C virus (HCV), which is a blood-borne virus. HCV infection is a short-term or acute illness, but for more than half of the people who become infected with HCV, it becomes a long-term, chronic infection. Chronic HCV infection is a serious disease that can result in long-term health problems, even death. (1)

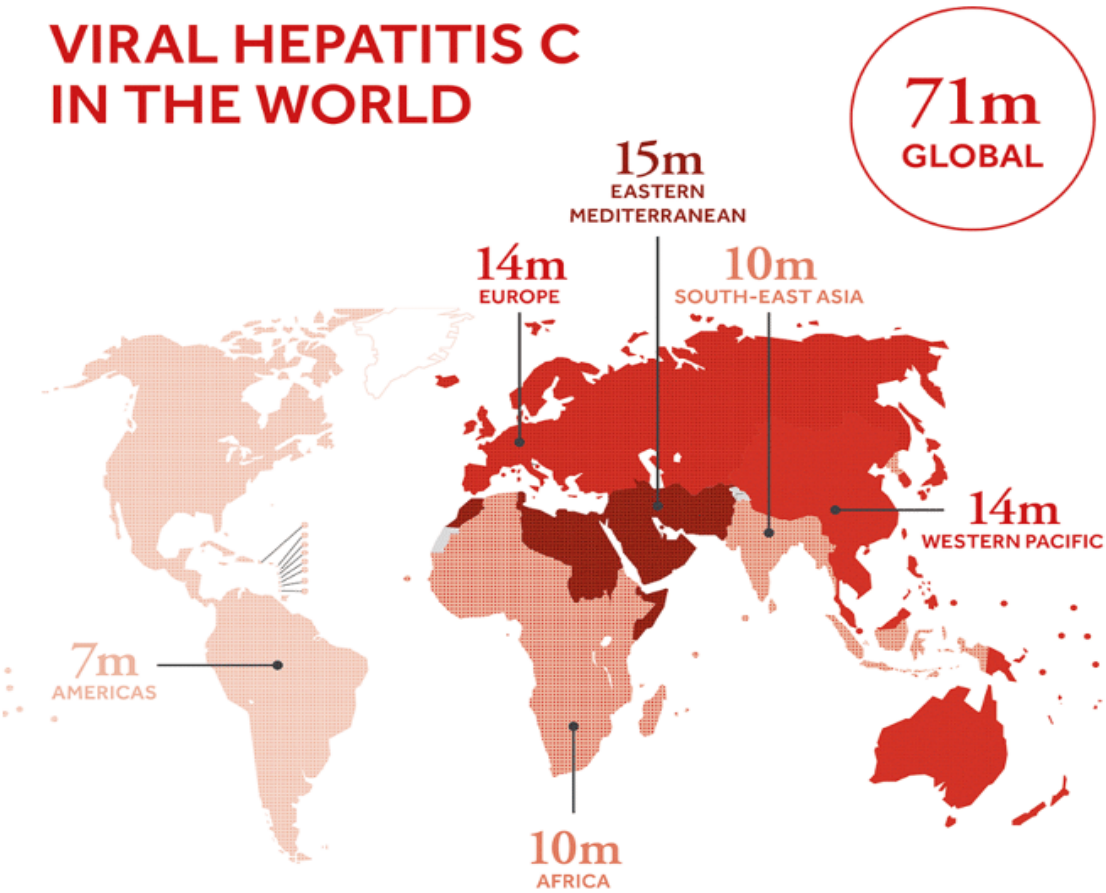
- Around 30% (15–45%) of infected people spontaneously clear the virus within 6 months of infection without any treatment. The remaining 70% of people (55-85%) will develop chronic HCV infection. those with chronic HCV infection, **the risk of cirrhosis ranges from 15% to 30% within 20 years.** (2)

- Hepatocellular carcinoma (HCC) represents the sixth most common cancer worldwide. **It is considered as the most significant cause of cancer-related death and morbidity in Egypt and the fourth most prevalent cancer overall.** Since cirrhosis can **develop from HCV infection (93 % of cases)**, **HCV** is considered as **the key risk factor** for **HCC**. (3)

- Generally, HCC is typically prevented by early detection of Risk factors (primary prevention), treatment of risk factors (secondary prevention), and preventing or reducing HCC relapse following effective curative therapy (tertiary prevention). (3)

- Hepatitis C is a huge public health problem facing many countries in the world. It is estimated that 130 to 150 million people globally suffer from chronic hepatitis C[4] , which comprises about 3% of the world population .

- There are many variables that affect the rate of progression from fibrosis to compensated cirrhosis, decompensated cirrhosis, and HCC, such as age of the patient, gender, alcohol consumption, degree of inflammation and fibrosis on liver biopsy, and co-infection with HIV or HBV, and other comorbidities.[5]

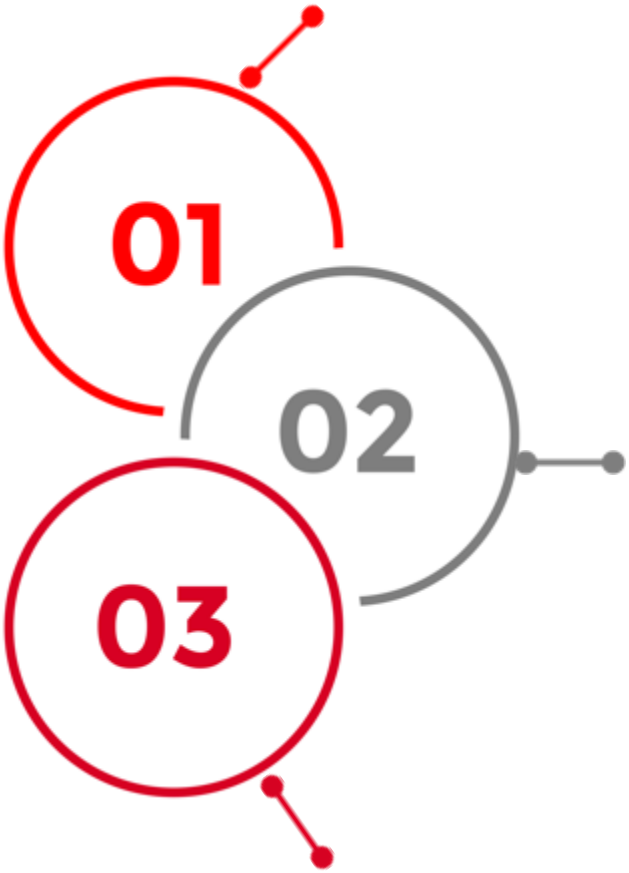


Adopted from the global hepatitis report, 2017.

INTRODUCTION



The highest prevalence of HCV infection is present in Egypt, with 92.5% of patients infected with genotype 4, 3.6% of patients with genotype 1, and 1% of patients with other genotypes.[6]



The mass HCV treatment program started administering pegylated interferon and ribavirin between 2007 and 2014. However, the response to pegylated interferon and ribavirin was not satisfactory and was associated with many adverse events. [7,8]

In Egypt, widespread HCV infection was caused by a mass-scale treatment campaign of intravenous antischistosomal injections executed between 1950 and 1980 [8].In 1996, the HCV seroprevalence was > 40% among adults, whereas in 2008, the Demographic Health Survey (DHS) showed a seroprevalence of 14.7% and a viremic prevalence of 9.7% in 15-59-year-old patients.[9,10]



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HCV Screening and Eradication

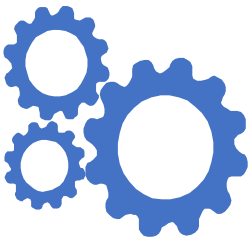
CAMPAIGN BACKGROUND



Screening Target

The Ministry of Health set goals to screen everyone in **Egypt** **18 years of age** or older (a target population of **62.5 million**)

.



Screening Phases

The country was divided into **three** **screening phases**, each to be screened over a period of 2 or 3 months. Each phase included **7 to 11** states, **100 to 150** administrative divisions, and a screening target population of **17.9** million to **23.3** million.



Sites and Staff

Screening was conducted in all Ministry of Health hospitals; all primary and rural health units; Egyptian Health Insurance Organization–managed clinics, university hospitals, and military and police hospitals; and all youth centers in all screened areas. Mobile screening teams in specially outfitted vehicles augmented the screening efforts by visiting crowd.



Current Versus Previous Campaign

This campaign has the highest participation rate compared to the previous screening campaigns, with a participating rate equals to approximately **79.4%** of target population participating in screening. Higher in females than in males in total, in each age group, and across rural and urban areas.[11]

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3. Economic Evaluation



STUDY METHODOLOGY

To quantify the economic benefit, Decision tree followed by Markov models, estimating clinical outcomes and averted costs were designed

1 Patient Journey

The decision tree (**fig. 1**), visualizes the patient journey during the current screening campaign. All eligible patients (18 years and older) first undergo The World Health Organization (WHO) approved rapid diagnostic test (SD Bioline HCV, Abbott). In case they tested positive, they proceed to a confirmatory screening test, the real-time quantitative polymerase chain reaction (PCR) assay (Cobas AmpliPrep /Cobas TaqMan HCV Test, Roche Diagnostics).

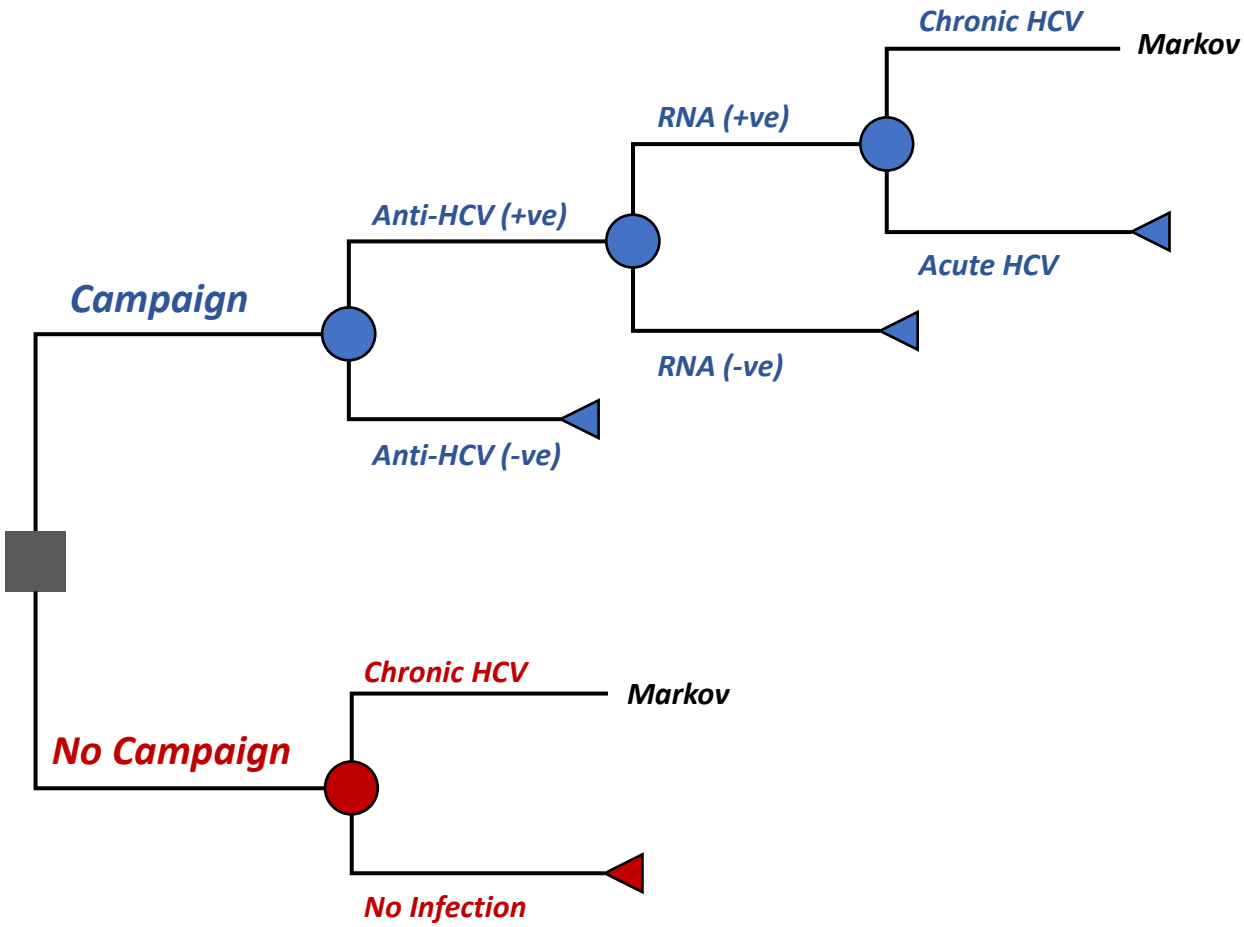


Figure 1. Campaign Decision Tree Diagram

2 Markov Modelling

A Markov model for a **time horizon of 25 years** was built to assess the difference in costs and outcomes between the "Universal screening scenario" versus "No screening" scenario. Data on the prevalence of various HCV states in the population from the campaign, were compared to historical data records of patients who were diagnosed and treated at any MOH affiliated center.

The model assumes that patients will transit between 7 health states during the model time horizon (fig 2). Patients diagnosed at early stages (FIB-4 <1.45, FIB-4 1.45-3.25) would not progress to later stages under the current campaign management practice. According to the global literature, patients diagnosed at later stages of the chronic HCV course (FIB-4 > 3.25) will progress to worse clinical stages. According to published data, patients in the "no screening" scenario will start progression from early stages.

Quality-adjusted life years (QALYs) were calculated based on the disutility associated with each HCV state, obtained from literature. Life years gained were calculated based on the average life expectancy in Egypt, as well as the survival rate for each state. Productivity loss was estimated according to the minimum monthly wage in Egypt in 2021, until retirement age. All outcomes and costs were subjected to a discount rate equal to 3.5% for the entire study time horizon.

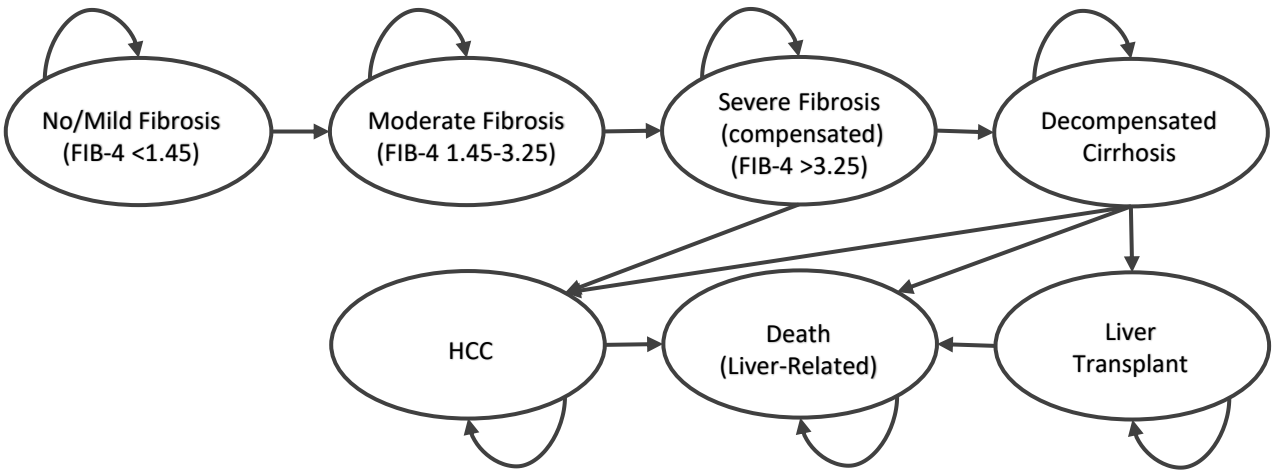


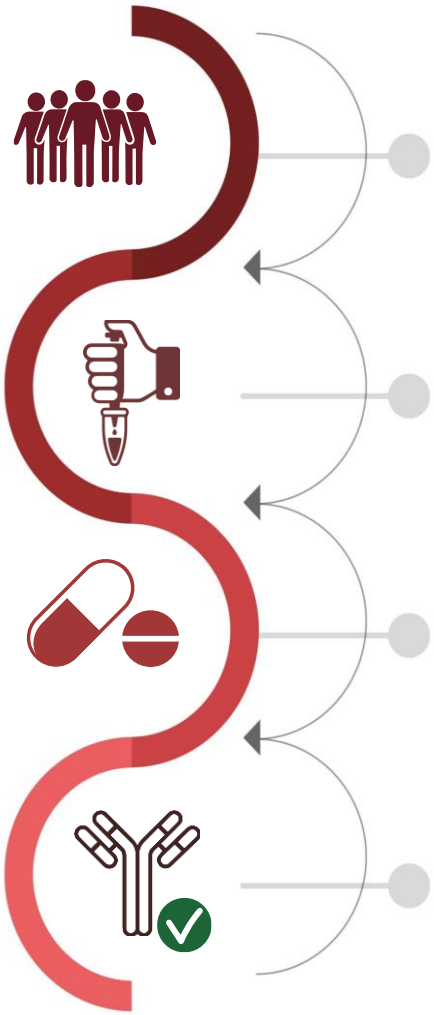
***Figure 2**. Markov Model States and Transitions*

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4. Results



STUDY RESULTS



Total Number Of Screened Population

49,630,319

Total Confirmed HCV Positive by PCR

2,207,000

4.44%

Completed 3 months Treatment protocol

1,554,098

70.4%

Achieved Remission / Cure

1,532,340

98.6%

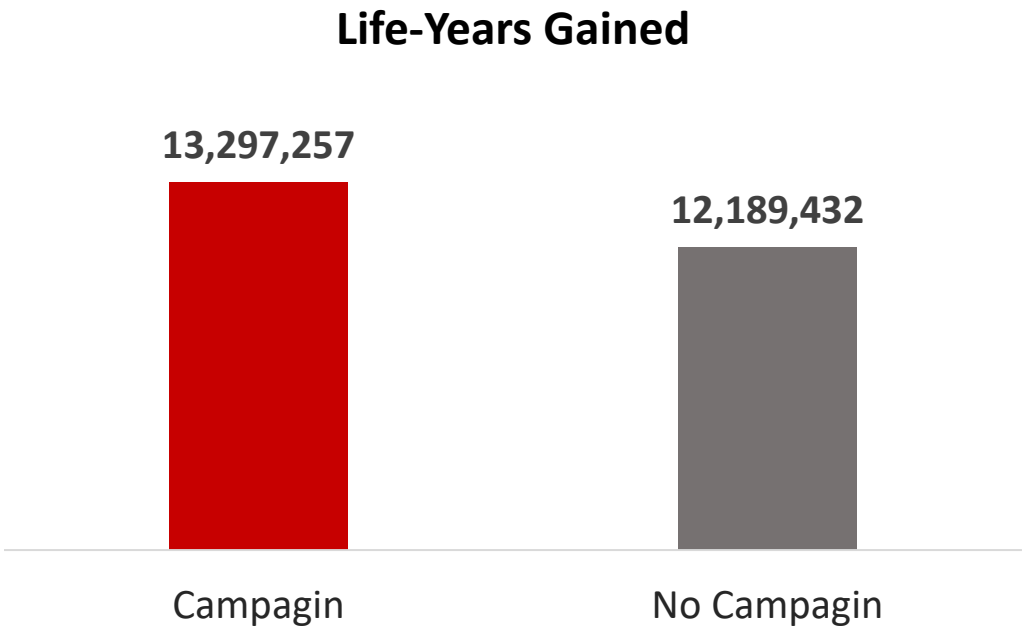
- The results indicate that the presidential initiative has had significant clinical and economical benefits. Due to mass screening and treatment, the initiative's impact on reduced HCV transmissibility was achieved. The campaign accounted for a total **savings of EGP 15.9 Billions** in direct medical costs over the model time horizon.
- The campaign returned a **3.59 EGP for each 1 EGP** spent, a **significant high value of ROI.**

359% ROI

A return of 3.59 EGPs for every 1 EGP spent on the campaign

- The campaign averted productivity loss equals to ***6.9 Billion EGP*****,** that would have occurred if **"no screening"** scenario was applied.

- **Productivity loss is** due to liver-related premature death, among population under 60 years old. **The economic evaluation estimated the impact of the life years gained (LYGs) within the two proposed scenarios.**



Clinical Benefits

+1 Million

Life years saved

Economic Benefits

+23 Billions EGP

Savings

RECOMMENDATIONS

The initiative has achieved a leap in eradicating the HCV globally and in Egypt, further monitoring and evaluation plans could be set to retain the initiative's gains.

Additionally, Infection control measures and challenges associated to primary prevention, such as limiting HCV transmission through IV drug use and barbershops, also need to be fully assessed.

A monitoring plan should further be established for those with cirrhosis to encourage early diagnosis of Hepatocellular Carcinoma.

ANNEX

1. **HCV:** hepatitis C virus is a bloodborne virus that causes acute and chronic liver inflammation.

2. **QALY:** quality adjusted life year, a generic measure of disease burden, including both the quality and the quantity of life lived. 1 QALY is interpreted as 1 life year lived in perfect health state.

2. **Cost-Effectiveness Analysis**: a form of economic analysis that compares the relative costs and outcomes of different interventions.

3. **ICER**: incremental cost-effectiveness ratio, is a summary measure representing the economic value of an intervention, compared with a comparator. It is usually the main output or result of an economic evaluation, it's ICER is calculated by dividing the difference in total costs by the difference in outcomes.

4. **ROI**: Return on investment, is a mathematical formula to evaluate investments in a program or project and judge how well the investment has performed compared to others or compared to not doing the investment.

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