Making an economic case for Egypt's population-wide screening for Non-Communicable Diseases

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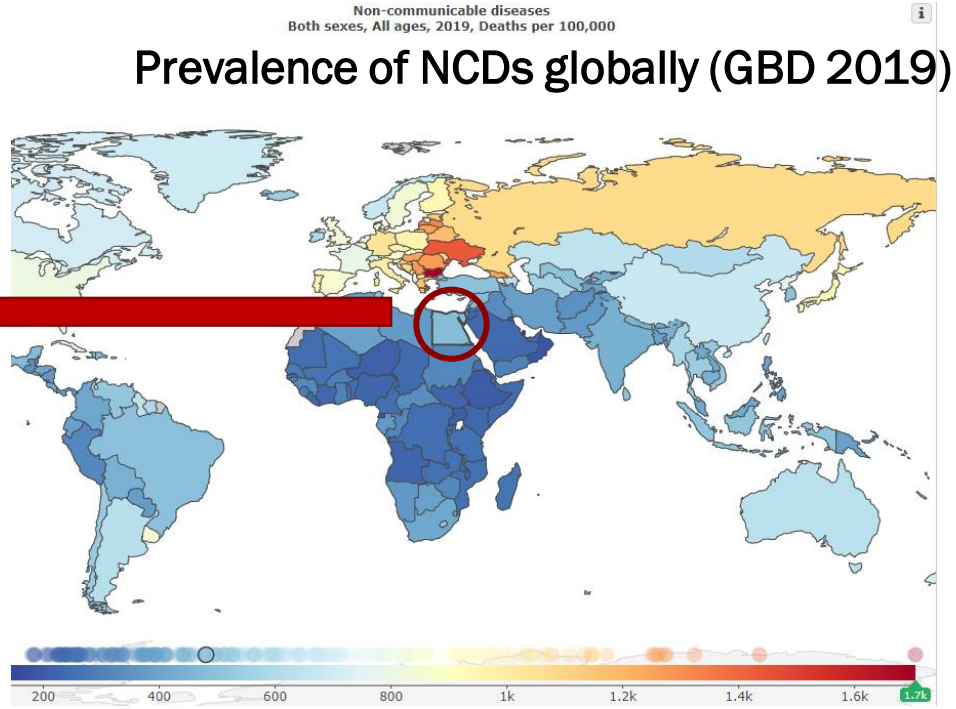
contents

Context in Egypt

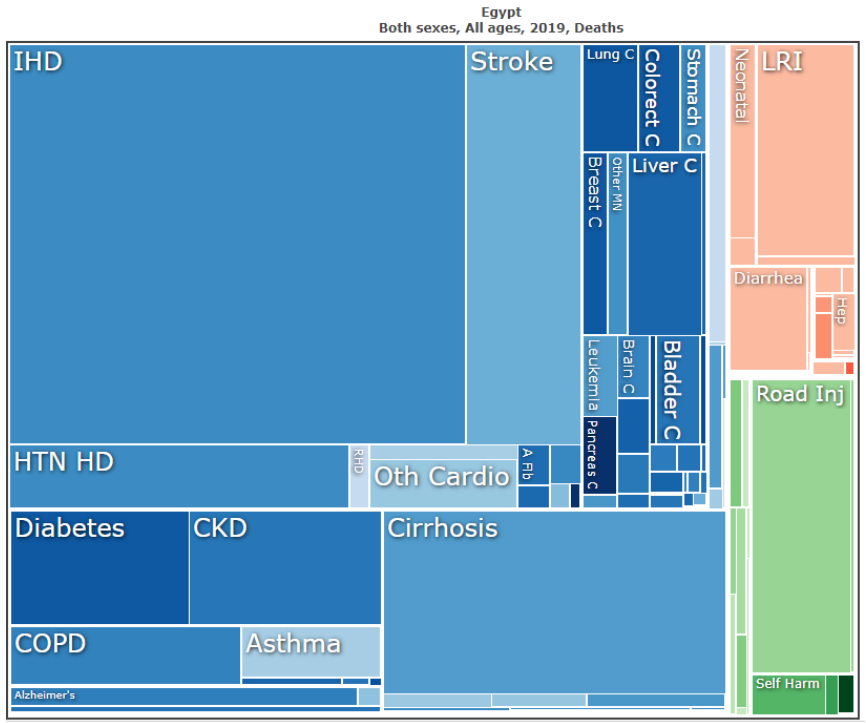
- Third most populous country in Africa
- 100 million population
- Arab culture
- High burden of NCDs and obesity
- Diet, lifestyle and genetic factors

NCD disease burden in Egypt

Prevalence of NCDs globally (GBD 2019)



Causes of deaths in Egypt (GBD 2019)



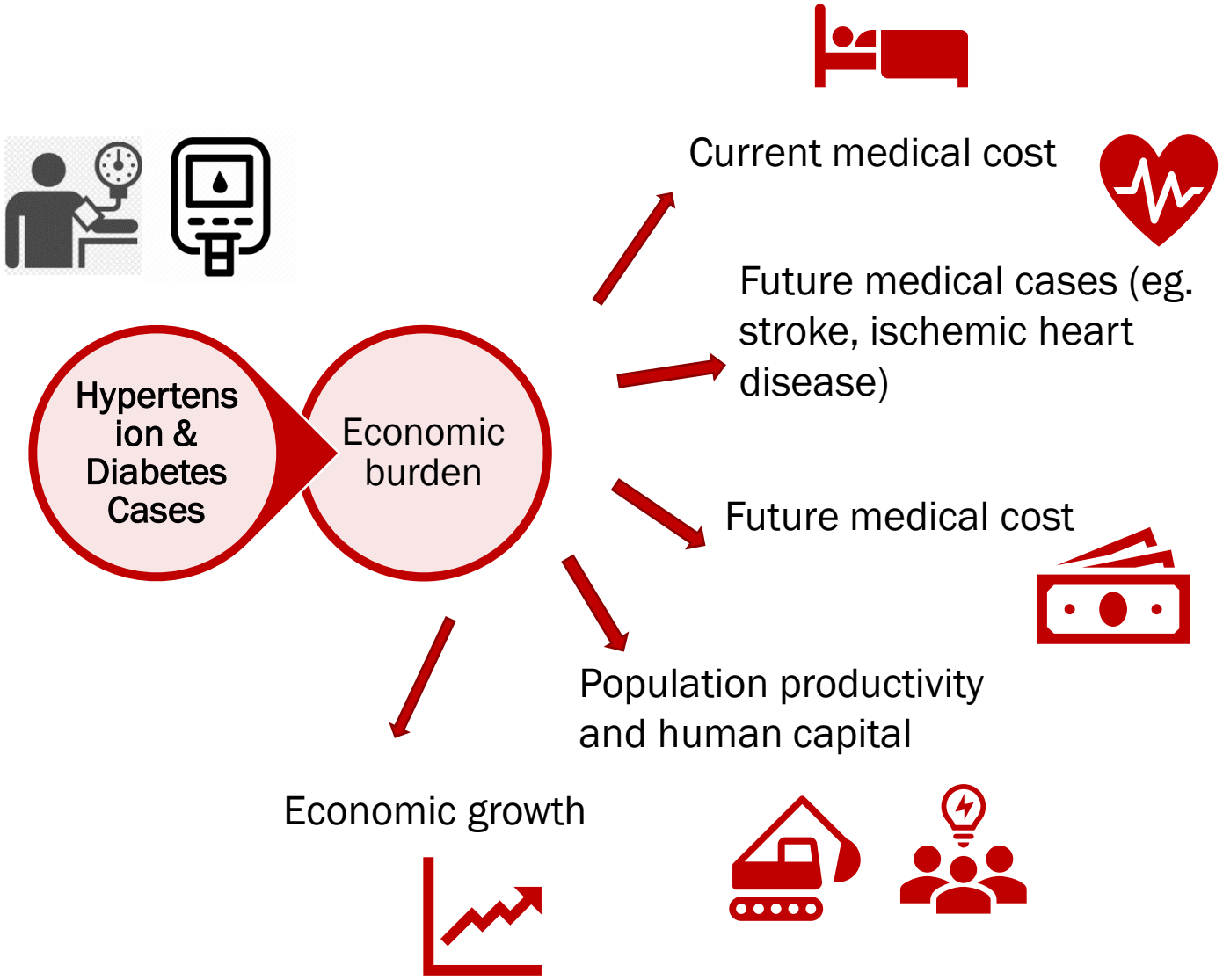
Causes of deaths in Egypt (GBD 2019)

1 Ischemic heart disease	Communicable, maternal, neonatal, and nutritional diseases
2 Cirrhosis	Non-communicable diseases
3 Stroke	Injuries
4 Road injuries	
5 Chronic kidney disease	
6 Hypertensive heart disease	
7 Lower respiratory infect	
8 Diabetes	
9 COPD	
10 Liver cancer	

- NCD burden higher than global average
- NCD accounts for 82% of death and 67% of pre-mature death
- Top killers: IHD, liver disease, stroke, CKD, hypertension, diabetes, COPD

A big proportion of these can be prevented!

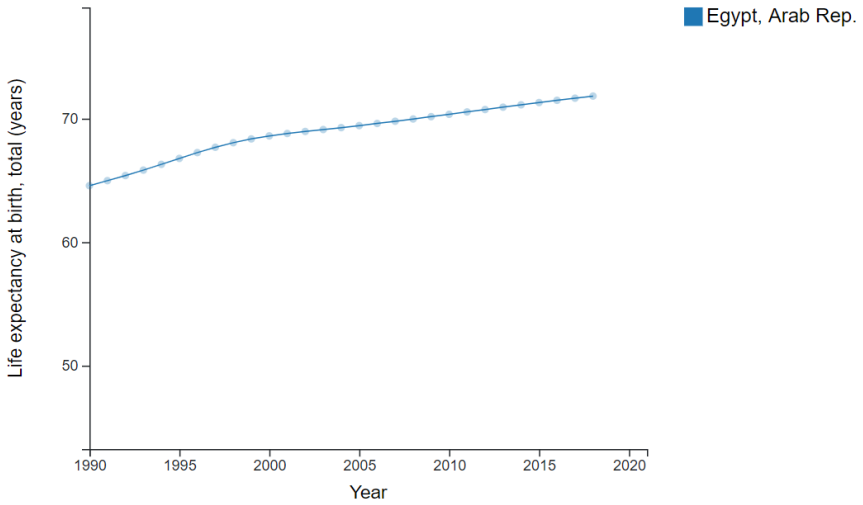
NCD economic burden in Egypt

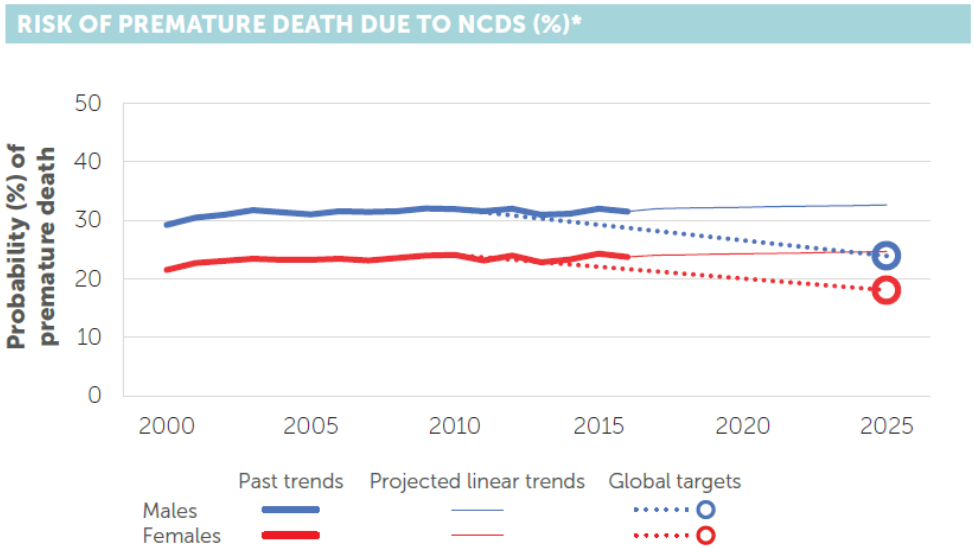


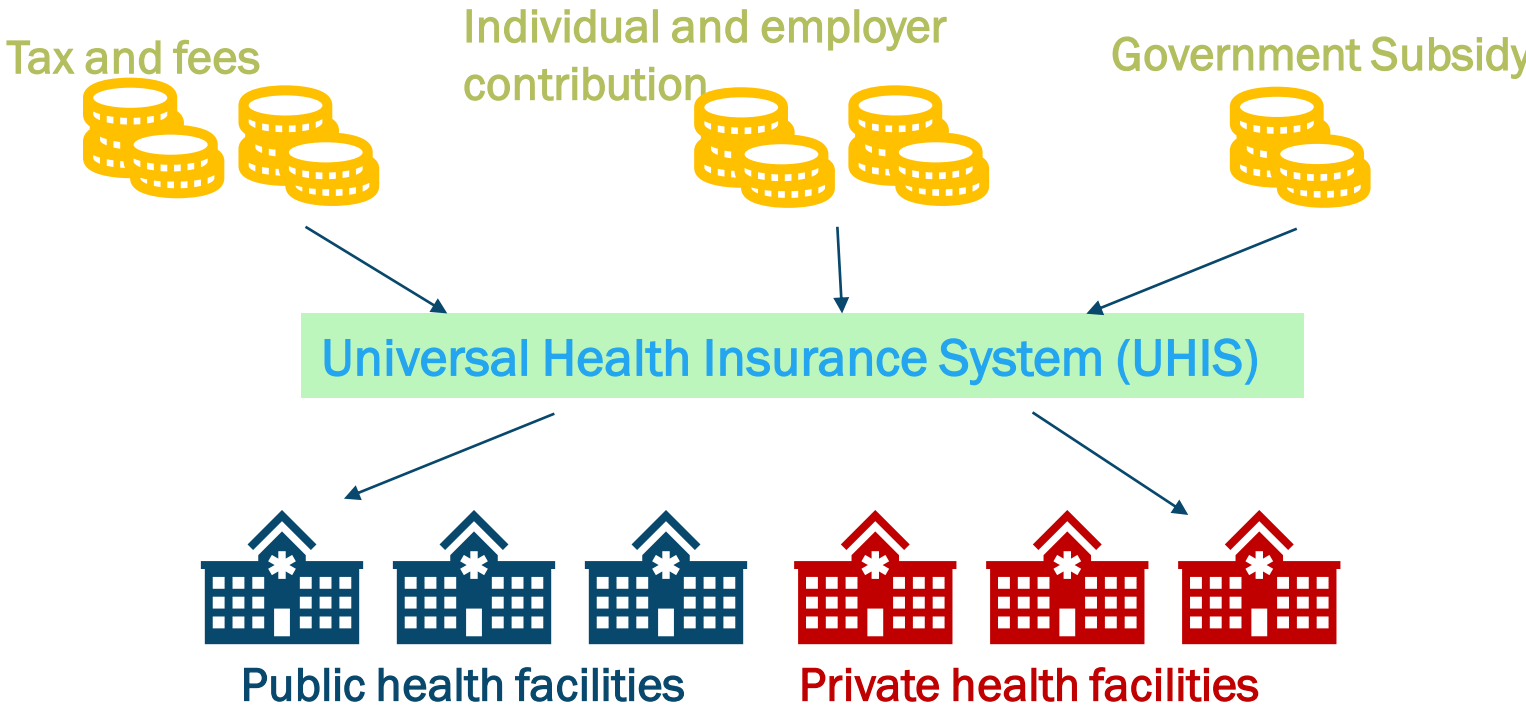
- The **economic loss due to diabetes** alone is estimated at **US$1.3 billion** in 2010 for Egypt
- Chronic conditions have been found to cause **productivity losses** equivalent to **12% of Egypt's GDP**.
- Without interventions, the economic burden is expected to **double** by 2030 with population aging.

How Do NCD Policies Fit in Broader Health System Reforms?

Policy perspective on NCDs: Health outcome and human capital, health resources, health financing







- Universal Health Insurance System
- Health care quality improvement
- Public hospital quality improvement
- Preventive care
- Spending efficiency
- Fiscal sustainability

100 Million SEHA Campaign (100 Million Healthy Lives campaign)

President's Hepatitis C elimination initiative

Screening for diabetes, hypertension, and obesity were added

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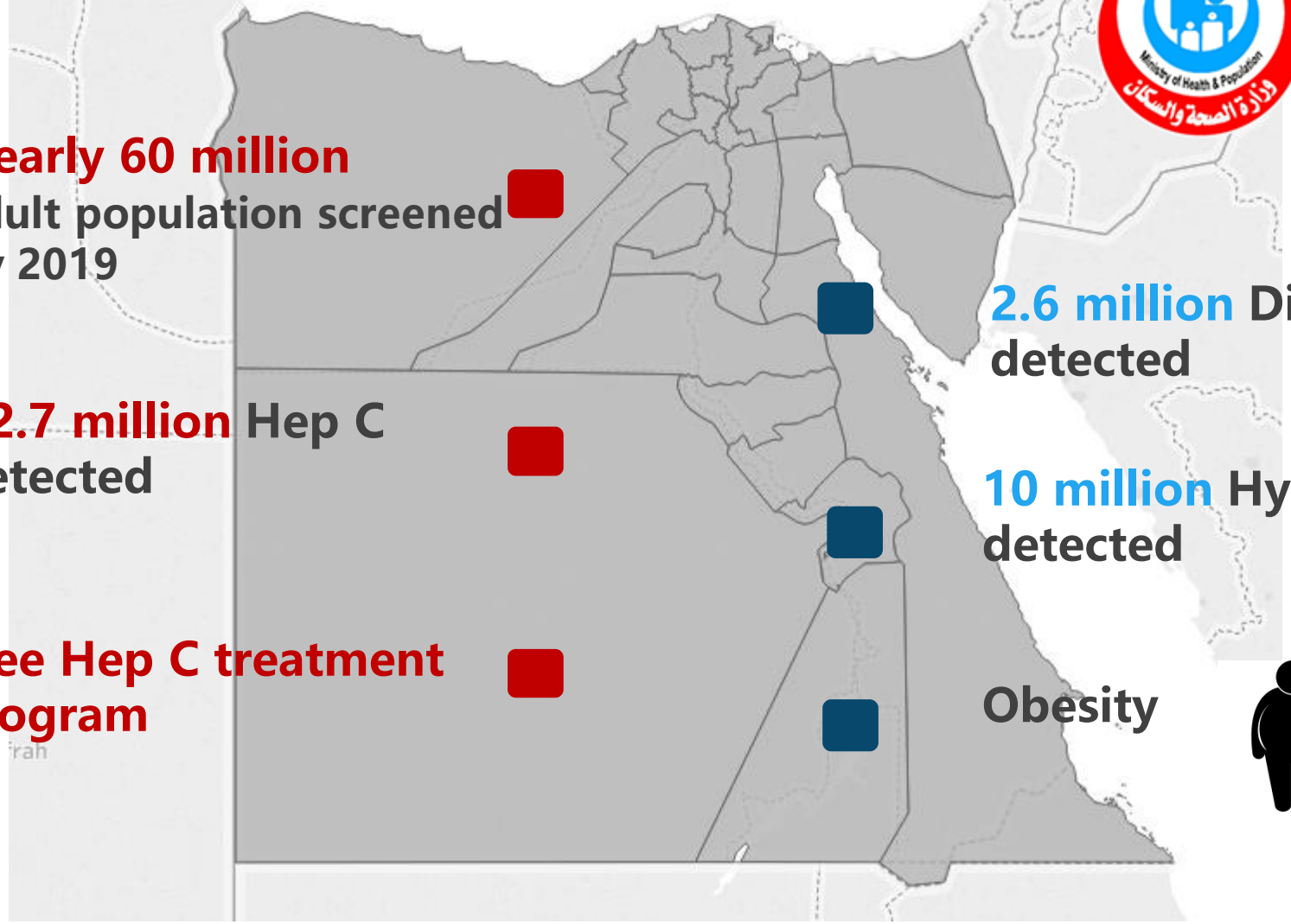
Nearly 60 million
adult population screened by 2019

~2.7 million Hep C detected

Free Hep C treatment program



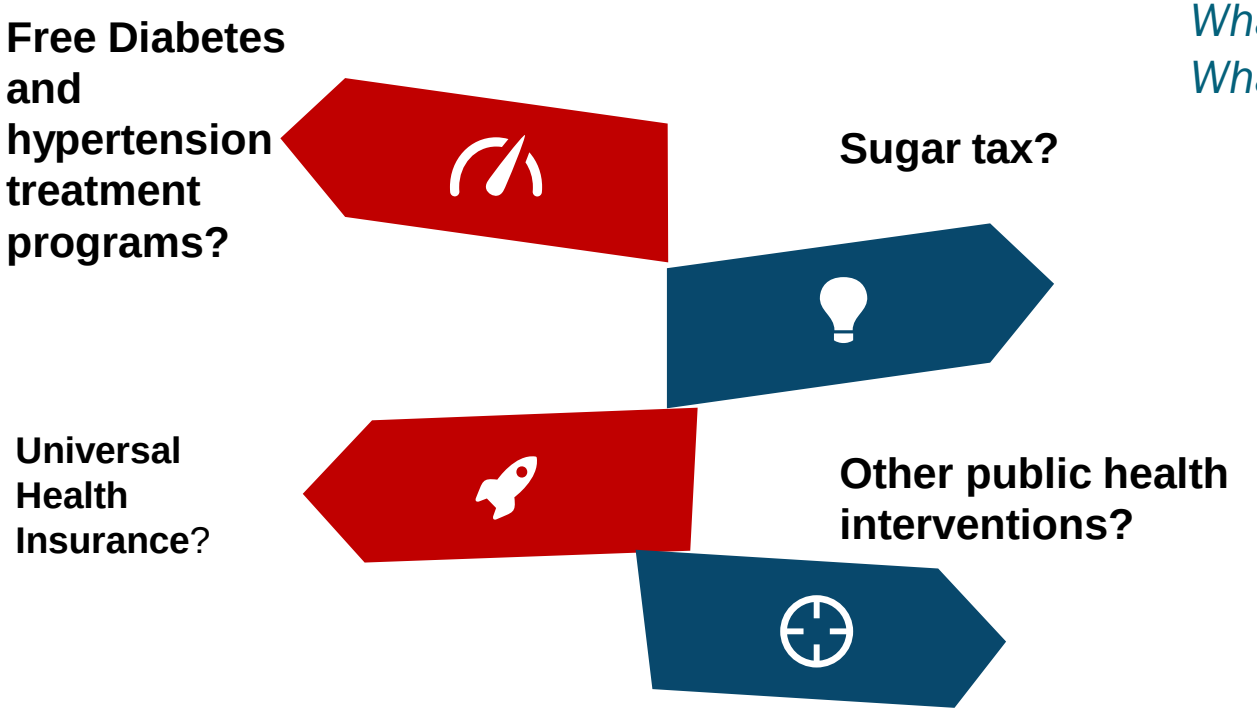
2.6 million Diabetes detected

10 million Hypertension detected

Obesity


١٠٠ مليون
عيادات متنقلة
من وزارة الصحة

What next with hypertension and diabetes policy in Egypt?



What are the cost and return of each policy/ program?
What are the high-value policies/programs?

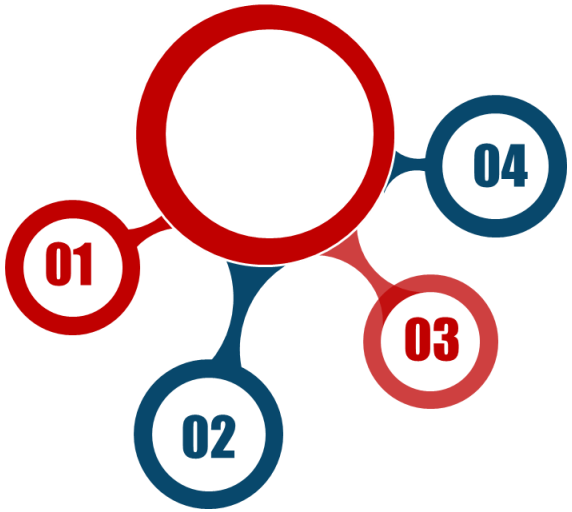
Implications for other low- and middle-income countries?

- Feasibility and cost-effectiveness of large-scale population NCD screening and management?
- Contribute to the mixed evidence in the literature

Study objectives

Estimate Costs of screening and treatment

- Diabetes screening and treatment over 15 years
- Government expenditures needed



Review the cost-effectiveness of other public health interventions for NCD

- Salt, Sugar, Tobacco, alcohol

Estimate Benefits of screening and treatment

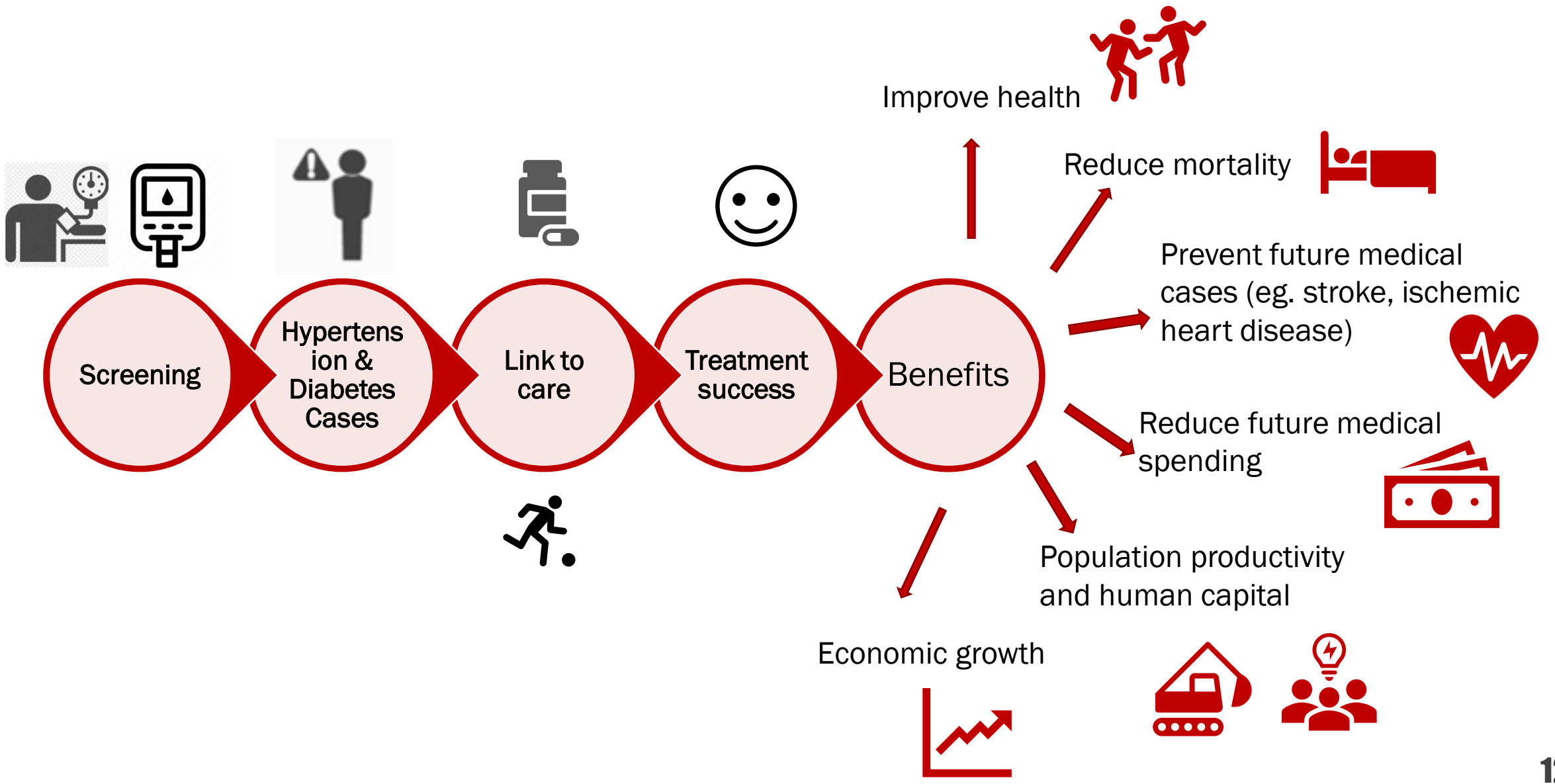
- Health benefits (death, DALYs)
- Productivity gains
- Potential future medical cost savings due to early diagnosis and treatment

Assess value of screening and treatment

- Cost-effectiveness
- Return to investment

Estimating Cost and Benefit of Hypertension and Diabetes Screening (100 Seha campaign) and Treatment

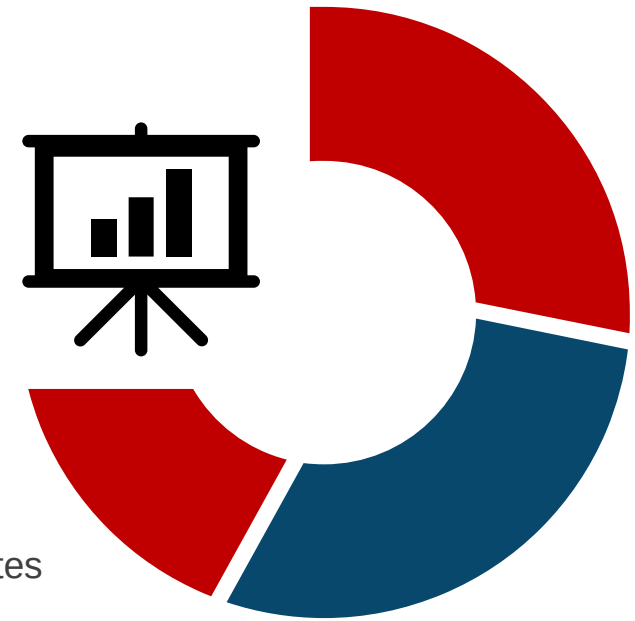
Social impacts of hypertension and diabetes screening



Methodology overview for NCD screening cost and benefits modeling

General inputs

- 15 year time horizon
- 3% annual discount rate
- Health system perspective vs government perspective
- Data source: MOHP, literature from Egypt and globally, IHME GBD



Cost estimates inputs

- NCD screening cost per case
- Diabetes and hypertension treatment cost per case per year (inpatient, outpatient)
- Treatment practice and treatment cost for other medical conditions caused by hypertension and diabetes (stroke, ischemic heart disease, chronic kidney disease)
- Public/private mix
- Prevalence, incidence, mortality of other medical conditions caused by hypertension and diabetes (stroke, ischemic heart disease, chronic kidney disease), and attributable mortality to hypertension and diabetes
- Cost of treatment per year per case for stroke, ischemic heart disease, chronic kidney disease

Benefit estimates inputs

- # screen positive for hypertension and diabetes
- % patient linkage to care
- Treatment success rate of hypertension and diabetes in Egypt
- Mortality attributable to hypertension and diabetes
- Wage loss due to NCDs

Monetize health benefits

- Employment rate and market wage
- Willingness to pay to avoid DALY

Detailed input values and assumptions see Excel Annex

cost of hypertension and diabetes screening and treatment

Results —Estimated total cost of hypertension and diabetes screening and treatment in Egypt

100 Million Seha diabetes and hypertension screening campaign (2018-2020)

[hypothetical scenario] follow-up treatment for diabetes and hypertension (2019-2034)

[actual] NCD screening cost = US$131.7 million

+

[Projected] Diabetes and hypertension total treatment cost in Egypt over 15 years = US $4.9 billion

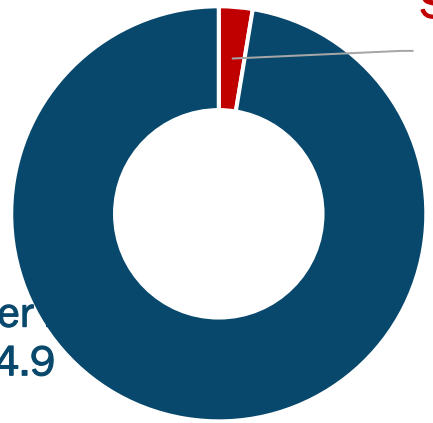
Screening cost breakdown:

- medical diagnostic supplies for NCD (US$ 65,449,066)
- media campaign (US$ 64,739,592)
- logistics cost (US$ 5,226,466)
- employees wages (US$ 40,428,249)

These account for 60% of the 100 million seha campaign fixed cost

- **Treatment cost around US$413 million per year**
- Modeled in 15 years time horizon
- Future spending are discounted to present value using 3% annual discount rate
- Total cost of hypertension and diabetes treatment in Egypt per year is around US$413,197,196 based on MOH NCD program data

Projected diabetes and hypertension screening and treatment cost in Egypt over 15 years=US$5.06 billion



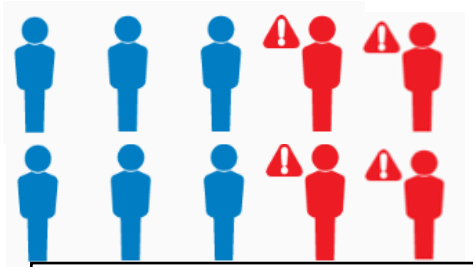
Assume treating 4,095,694 hypertension patients and 817,219 diabetics patients per year with an annual cost of $413,197,196

Health Benefits

Results—Estimated death due to hypertension and diabetes

- Base line - WITHOUT hypertension and diabetes treatment

60 million eligible population



12,548,081 hypertension cases

Hypertension mortality ~ 0.49% per year

61,547 deaths / year due to hypertension

3,095,527 diabetes cases

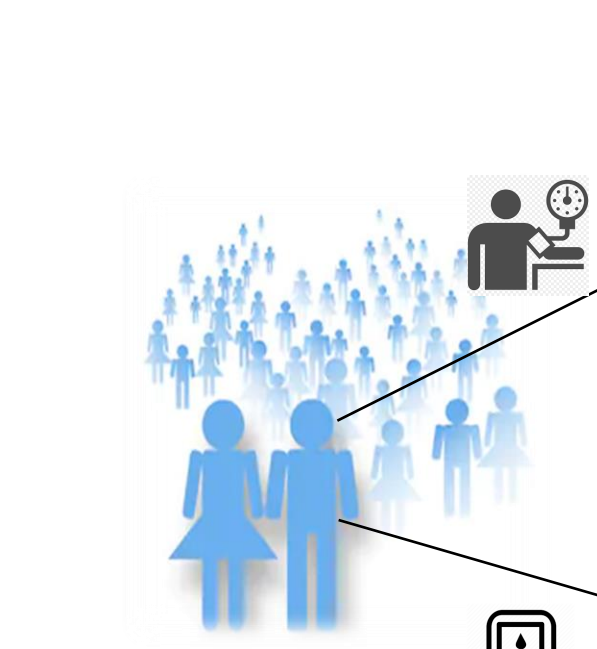
Diabetes mortality ~ 0.29% per year

8,849 death / year due to diabetes

- The total number of hypertension patients, diabetics patients and the associated death from the conditions among 60 million eligible people are extrapolated based on current screening results of 49,919,510 people.
- Mortality due to hypertension and diabetes estimated based on MOH screening and deaths data.

Results—Health Benefits

■ WITH hypertension and diabetes screening and treatment



60 million eligible population screened

12,548,081 hypertension patients identified

Linkage to care = 68%
Treatment success rate = 48%

4,095,694 successfully treated patients

41,458 death/year due to hypertension

Hypertension death reduces by 32.6% compared to no screening or treatment

32.6%

3,095,527 diabetes patients identified

Linkage to care = 88%
Treatment success rate = 30%

817,219 successfully treated patients

6,580 death / year due to diabetes

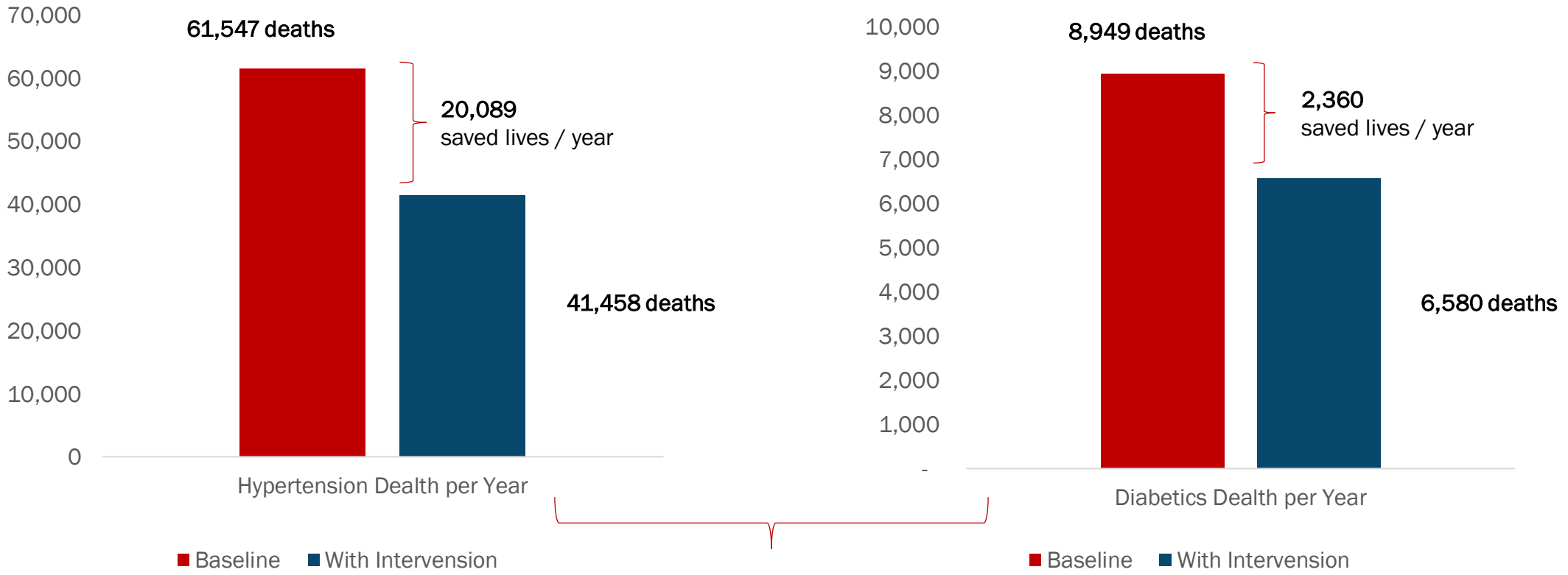
26%

Diabetics death reduces by 26% compared to no screening and treatment

Number of cases detected * % Linkage to care * %Treatment success = Number successfully treated

Result—Health benefits

Lives saved by hypertension and diabetes screening and treatment



Total saved lives per year = 20,089 + 2,460 = 22,449

Total saved lives 15 years = 22,449 X 15 = 336,739

Productivity Benefits

Method—Estimating productivity benefits

■ WITHOUT program

Total productivity loss due to hypertension and diabetes per year
=annual wage X % wage loss X # patients

■ WITH hypertension and diabetes screening and treatment program

Total productivity loss due to hypertension and diabetes per year
=annual wage X % wage loss X # patients X (100%-successfully treated%)

- **Inputs summary**
  - Monthly wage~4800 EGP
  - 10% wage loss due to hypertension and diabetes
  - Reversed loss % consistent with successful treatment outcome (i.e. linkage to care * treatment success rate)
  - Egypt GDP (2018 $USD) = $250,894,760,351

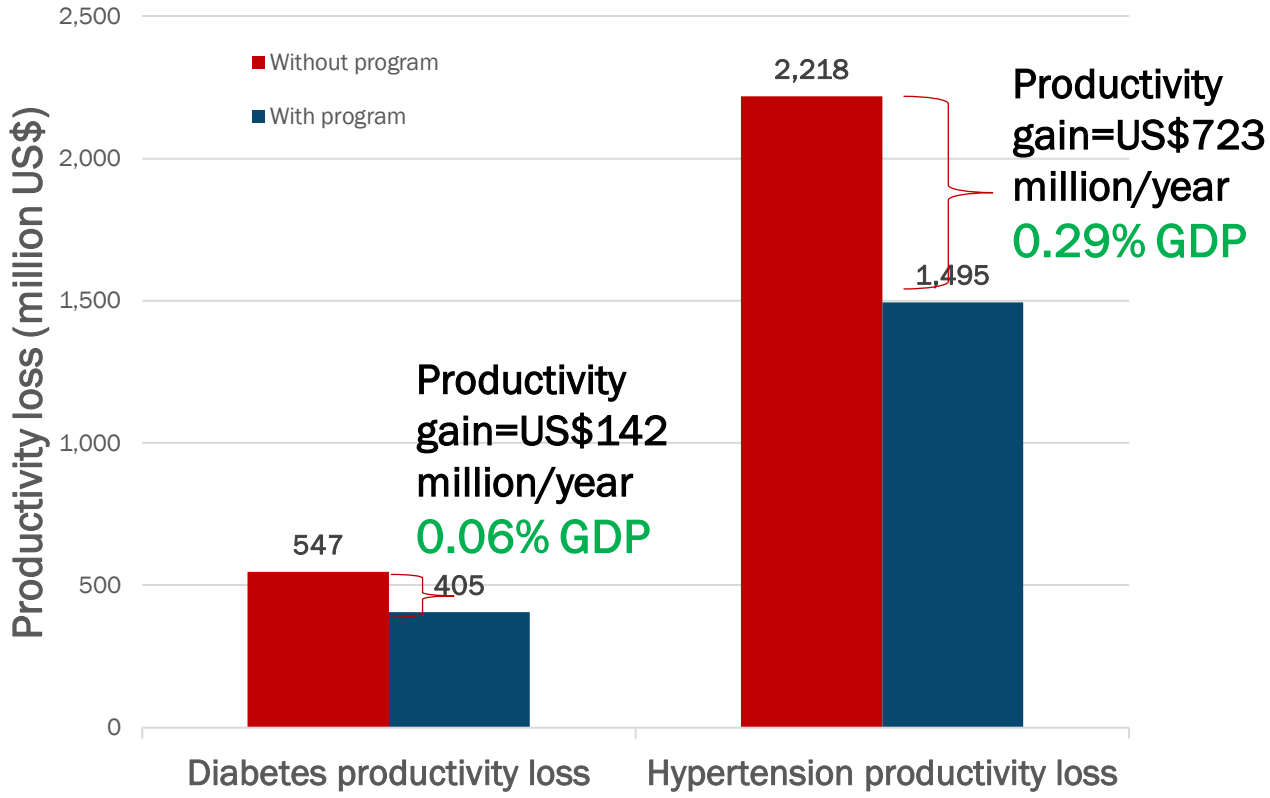
Results—Productivity benefits

WITHOUT program

Productivity loss in a year due to hypertension
= US$ 2.2 billion (0.88% of Egypt's GDP in 2018)
Productivity loss in a year due to diabetes
=US$547 million (0.22% of Egypt's GDP in 2018)

WITH hypertension and diabetes screening and treatment program

Productivity loss in a year due to hypertension
= US$ 1.5 billion (0.6% of Egypt's GDP in 2018)
Productivity loss in a year due to diabetes
=US$405 million (0.16% of Egypt's GDP in 2018)



Total productivity gained per year with hypertension and diabetes screening and treatment program
= US$ 868 million per year
= 0.35% of Egypt's 2018 GDP

Total productivity gained over 15 years with hypertension and diabetes screening and treatment program
= US$ 10 billion

Future medical cost savings

Result—Potential future medical cost savings

Diabetes and Hypertension are risk factors for many other NCDs, such as stroke, ischemic heart disease, chronic kidney disease, which are top killers in Egypt.

Prevent and reduce

Ischemic Heart Disease

Stroke

Chronic Kidney Disease

- Without proper hypertension and diabetes management, these diseases will incur high cost to health system in subsequent years, that will be eventually be born by Universal Health Insurance, MOH, or patient out-of-pocket payment.
- Three diseases (stroke, IHD, CKD) attributable to diabetes and hypertension are estimated to cost Egyptian health system 13 billion EGP per year for proper management.
- NCD screening and treatment programs today is estimated to result in future cost savings to the Egyptian health system by 3 billion EGP per year

Disease name	Cost saving per year on NCD spending due to early diagnosis and treatment of diabetes and hypertension	
	EGP	USD
Stroke	258,573,078	15,210,181
Ischemic heart disease	388,105,418	22,829,730
Chronic kidney disease (due to hypertension and diabetes)	2,314,360,115	136,138,830
Total	**EGP 2.96 billion**	**US$174 million**

Overall cost-effectiveness and return to investment

Result—Cost-effectiveness

Hypertension and diabetes screening and treatment program is very cost-effective and have good return-to-investment

	Costs	Benefit (Productive Gain only)	Benefit (Future medial cost savings)	Deaths	Deaths prevented	Cost / Benefit Ratio (without future medical saving)	Cost / Benefit Ratio (with future medical saving)	Cost per Death Averted	Cost per DALY averted
No program	-	-		1,057,312	-	-	-	-	
Screening and follow-up treatment	US$ 5 billion	US$ 10 billion	US$ 2 billion	720,573	336,739	2.05	2.46	US$15,040 per death avoided	US$1,000 per DALY averted

For $1 invested, return is between $2.05 to $2.46 in economic value

Program is very cost-effective, judged by commonly used benchmark of GDP per capita per DALY.

Note:
cost-effective interventions: cost per DALY is < 3X GDP per capita (ie. US$7,647 for Egypt)
Very cost-effective interventions: cost per DALY is <1x GDP per capita (ie. US$2,545 for Egypt)

Result—Cost-effectiveness sensitivity analysis

If program can provide treatment to more detected patients and improve quality of treatment, program benefits will increase significantly !

Number of cases detected * % Linkage to care * %Treatment success = Number successfully treated

Changes in program cost-benefit-ratio when varying the linkage to care and treatment success

Cost Benefit Ratio		Treatment success rate		
		20%	50%	90%
Linkage to care	20%	1.72	1.92	1.99
	50%	1.92	2.01	2.04
	90%	1.99	2.04	2.06

E.g. When treatment success rate = 90% and linkage to care = 90%, the cost benefit ratio is increased to 2.06

Changes in # lives saved when varying the linkage to care and treatment success

# Saved Lives		Treatment success rate		
		20%	50%	90%
Linkage to care	20%	42,292	105,731	190,316
	50%	105,731	264,328	475,790
	90%	190,316	475,790	856,423

E.g. When treatment success rate = 90% and linkage to care = 90%, total number of saved lives will increase to 856,423

Global best-buy NCD interventions

Economic perspectives

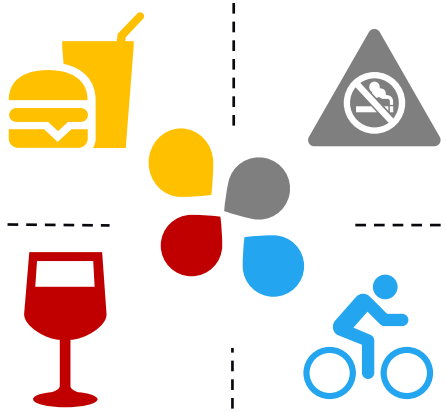
Literature on best-buy and cost-effective public health interventions for NCDs

01 Food

- Reduce salt intake through reformulation, labeling and public campaign **(best buy)**
- Reduce industrial trans-fats through legislation
- Reduce sugar intake through SSB tax

02 Tobacco

- Excise tax and price increase **(best buy)**
- Package regulation (eg. graphic health warning) **(best buy)**
- Ban on tobacco advertisement **(best buy)**
- Mass media campaign **(best buy)**



03 Alcohol

- Excise tax on alcohol **(best buy)**
- Bans or comprehensive restrictions on alcohol advertising **(best buy)**

04 Physical activity

- community wide public education and awareness campaign for physical activity **(best buy)**

Best buy: interventions with cost effectiveness analysis (CEA) ≤ I$100 per DALY averted in LMICs
Other interventions shown here are effective and with CEA >I$100 per DALY averted in LMICs

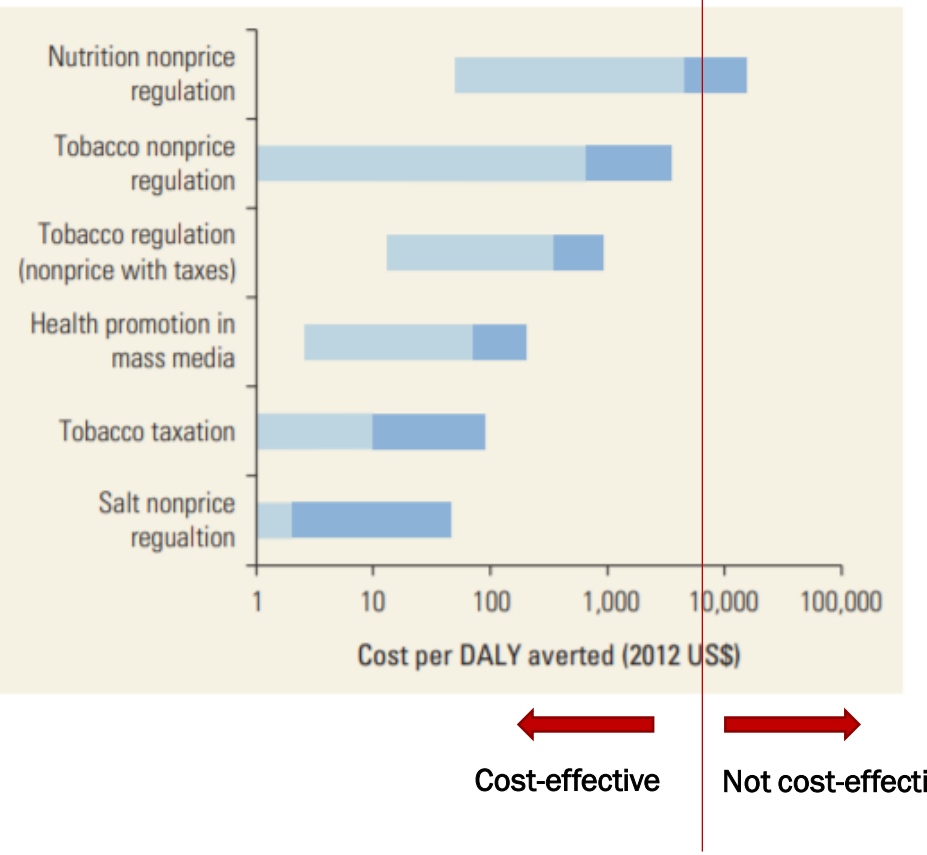
Source: WHO NCD best buys, 2017

Examples on different types of NCD interventions

Area	Fast-acting policies	Longer-term population-based public health interventions
Tobacco control	Tobacco tax Ban tobacco advertisement	Community-based Smoking cessation programs
Food	Sugar tax Ban on trans-fat	Reduce salt intake through public health campaign
Physical activity		Physical activity campaign
Alcohol	Tax on alcohol	

Literature on economic return of good public health interventions for NCDs

Figure 19.1 Average Cost-Effectiveness of Population-Level Interventions for CVRD Risk Factors, 2000–14



Source: Disease Control Priority DCP3, 2019

Intervention	Economic return for $1 investment
Reduce salt content in manufactured foods by at least 30%	$19
Salt interventions	$16.9
Alcohol interventions	$13.6
Tobacco interventions	$13.0
CVD clinical intervention	$3.0

Source: WHO and UNDP, The Investment Case for Noncommunicable Disease Prevention and Control in Mongolia : Return on Investment Analysis & Institutional Context Analysis, 2017

Rachel Nugent. Benefits and Costs of the Non-Communicable Disease Targets for the Post-2015 Development Agenda, 2016

Summary

- 100 million Seha campaign has potential to bring huge health benefits, productivity benefits, and future medical savings.
- To achieve the benefits, the campaign needs to be followed up with high quality hypertension and diabetes treatment.
- Many public health policies and interventions also have high return to investment, and are cost-effective ways to combat NCDs.
- Egypt case demonstrates the feasibility and economic return of large-scale NCD screenings in middle income countries.

Comprehensive approach to tackle NCDs in Egypt

Expand 100 million seha campaign

Public health program to prevent NCDs

Improve public awareness and care seeking for hypertension and diabetes

Public policies targeting the market and individuals to incentivize healthy life styles

Improve availability, accessibility, and affordability of care for hypertension and diabetes

Improve quality of care and increase treatment success rate

Expand coverage for other NCD treatments

THANK YOU!