

As faculty of Weill Cornell Medical College in Qatar, we are committed to providing transparency for any and all external relationships prior to giving an academic presentation.

Javaid I Sheikh

I DO NOT have a financial interest in commercial products or services discussed in this presentation.

From disease to health: An evolving approach

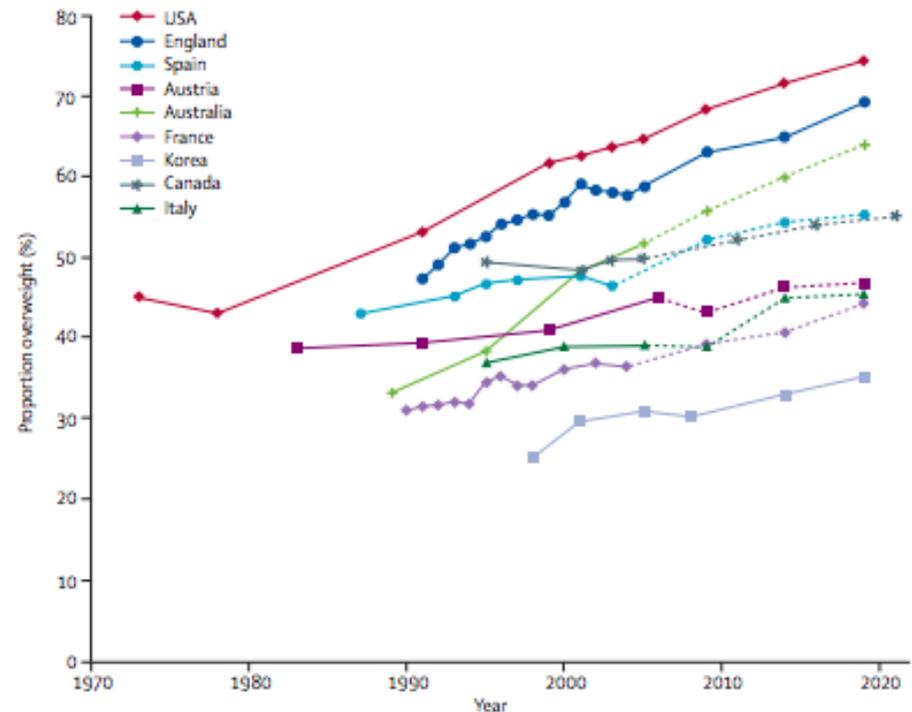
- Growing burden of chronic diseases
- Ineffective healthcare systems, increasing costs, suboptimal outcomes
- Broad consensus on need for new approaches
- Shifting from a 'disease' model to systems biology and a focus on health
- P4 medicine gets P5 (population health)
- Your Health First: a health promotion platform for Qatar
- A proposed framework for population health in Qatar

Growing burden of chronic diseases (U.S.)

- >75% of healthcare costs in U.S. are due to chronic conditions (obesity, heart disease, stroke, cancer, diabetes, arthritis)
- Chronic diseases cause 7 in 10 deaths each year in the U.S.
- As of 2012, about half of all adults—117 million people—have one or more chronic health conditions (25% adults has 2 or more)

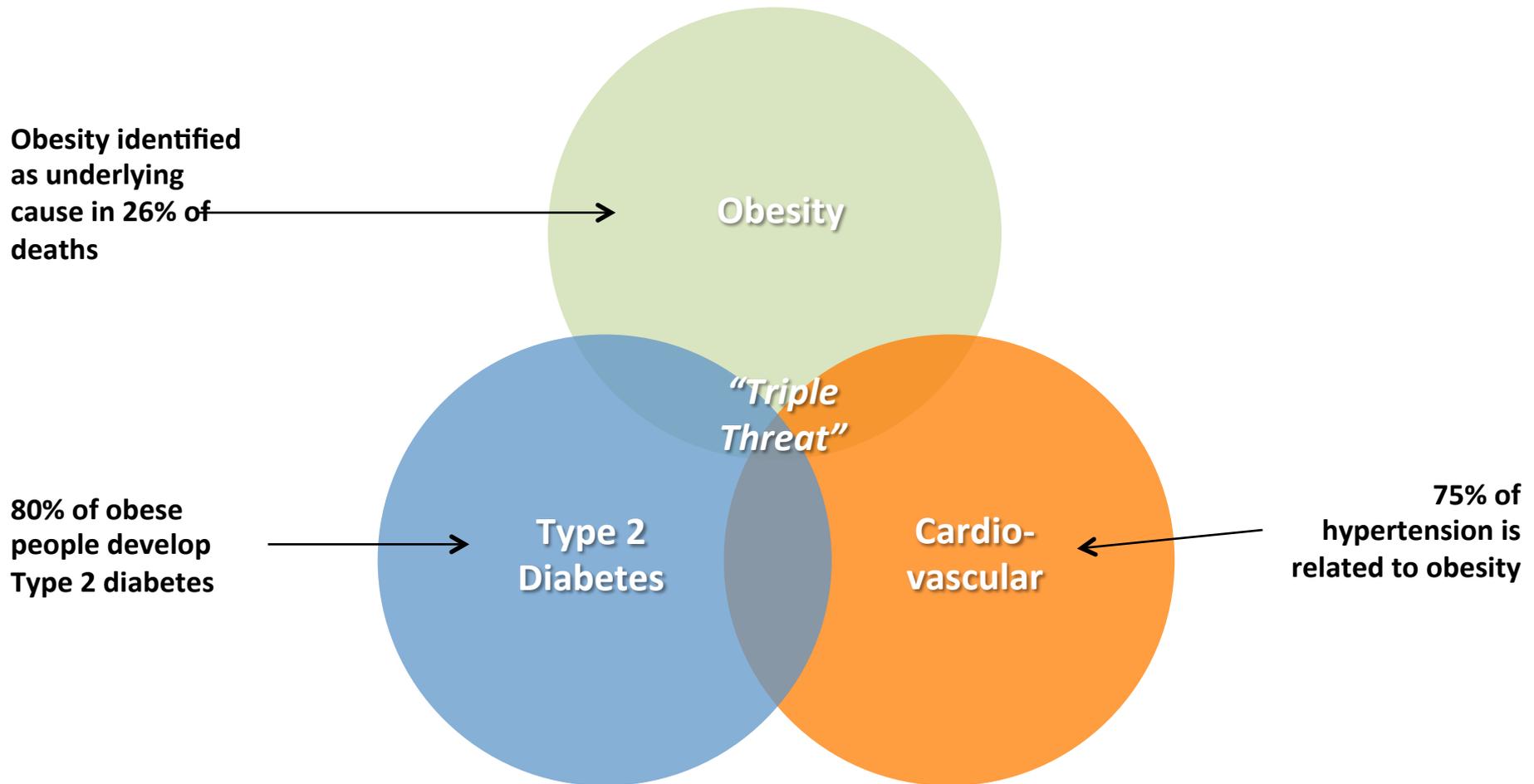
Example: Increasing rates of obesity

- Global obesity pandemic (2008):
 - 1.5 billion overweight
 - 500 million obese
 - 170 million children overweight or obese



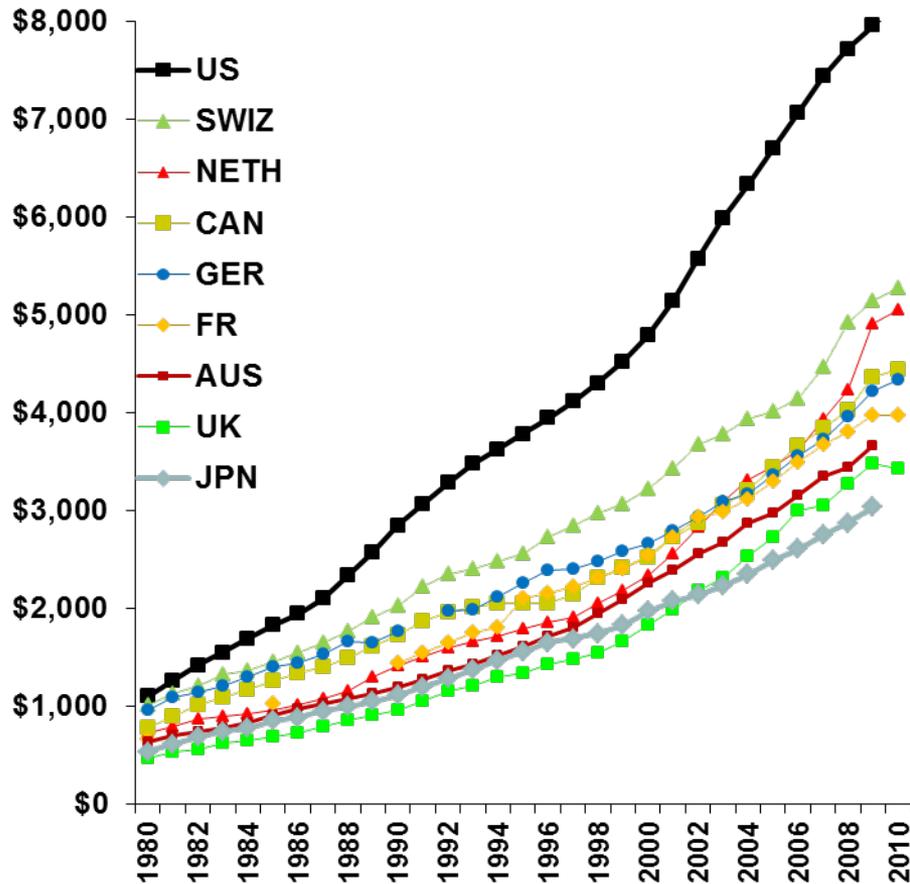
Past and projected prevalence of overweight (BMI $\geq 25\text{kg/m}^2$)

Interrelated chronic diseases

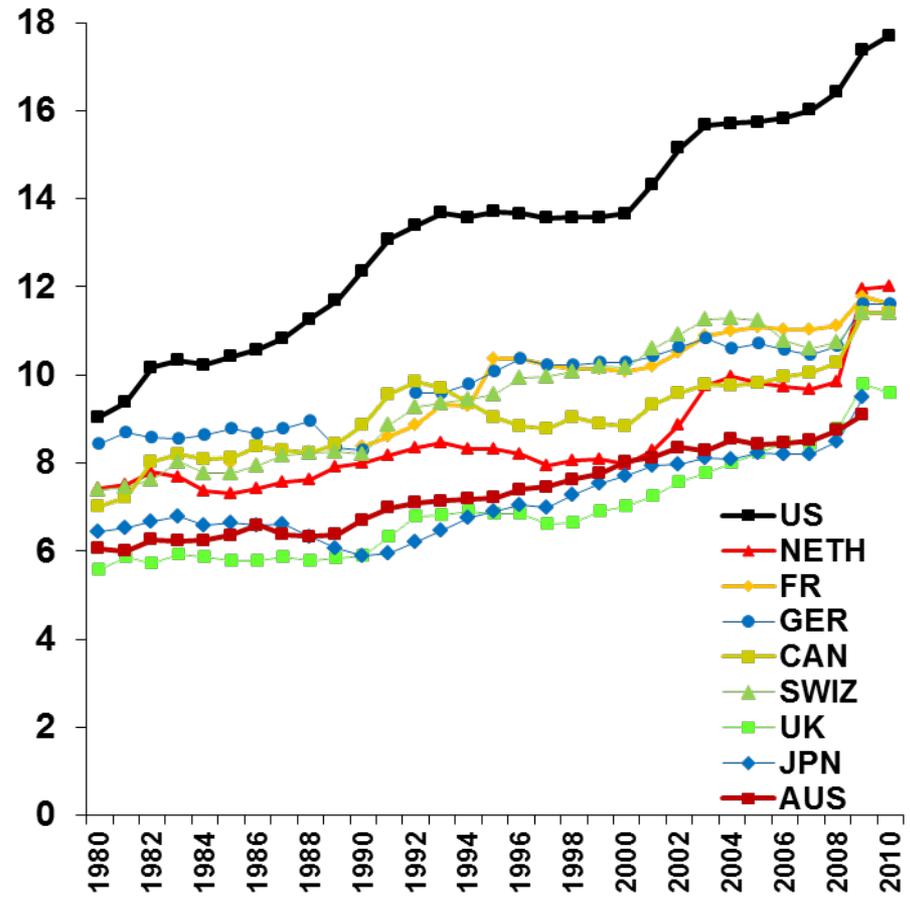


A comparison of health expenditures

Average spending on health per capita (\$US PPP)



Total health expenditures as percent of GDP



More is not better



	AUS	CAN	GER	NETH	NZ	UK	US
OVERALL RANKING (2010)	3	6	4	1	5	2	7
Quality Care	4	7	5	2	1	3	6
Effective Care	2	7	6	3	5	1	4
Safe Care	6	5	3	1	4	2	7
Coordinated Care	4	5	7	2	1	3	6
Patient-Centered Care	2	5	3	6	1	7	4
Access	6.5	5	3	1	4	2	6.5
Cost-Related Problem	6	3.5	3.5	2	5	1	7
Timeliness of Care	6	7	2	1	3	4	5
Efficiency	2	6	5	3	4	1	7
Equity	4	5	3	1	6	2	7
Long, Healthy, Productive Lives	1	2	3	4	5	6	7
Health Expenditures/Capita, 2007	\$3,357	\$3,895	\$3,588	\$3,837*	\$2,454	\$2,992	\$7,290

Economic burden of chronic diseases

- Seven chronic diseases* cost U.S. economy \$1.3 trillion annually (\$1.1 trillion due to lost productivity)
- Long-term impact of chronic disease on economic growth—the consequence of less investment in human and physical capital—is likely to be of even greater magnitude than the impact of treatment costs and lost labor supply (U.S. economic output could be reduced by much as \$5.7 trillion in real GDP by the year 2050)

* Cancer, diabetes, hypertension, stroke, heart disease, pulmonary conditions and mental illness.

How did we get here...
...and what to do?

Philosophic underpinnings of modern medicine

- 16-18th centuries: scientific revolution and enlightenment
 - Copernicus, Galileo, Descartes, Bacon, Vesalius, Harvey
 - 19th century: origin of hospital medicine, germ theory of disease (Pasteur, Lister, others) leading to expansion of science-based medicine
 - 20th century ushered in the era of 'magic bullets' with discovery of penicillin and advent of antibiotics
- Current paradigm based on scientific positivism:
 - Reductionist (understand systems by reducing to them to their component parts)
 - Linear thinking (cause and effect)
 - Objectivity (neutral and value free observations)
 - Cumulative (incrementally build body of knowledge)

Limits of reductionism in medical science

- There are fundamental benefits of scientific positivism approach: progress has been made
- But may be suboptimal method for understanding complex adaptive systems

Modern science/medicine	Post-modern science/medicine
<ul style="list-style-type: none">• Reductionist	<ul style="list-style-type: none">• Connectedness of components (networks)
<ul style="list-style-type: none">• Linear thinking	<ul style="list-style-type: none">• Natural world is non-linear (small changes can have major effects, and vice versa)
<ul style="list-style-type: none">• Objectivity	<ul style="list-style-type: none">• Context matters (cultural, social, economic factors)

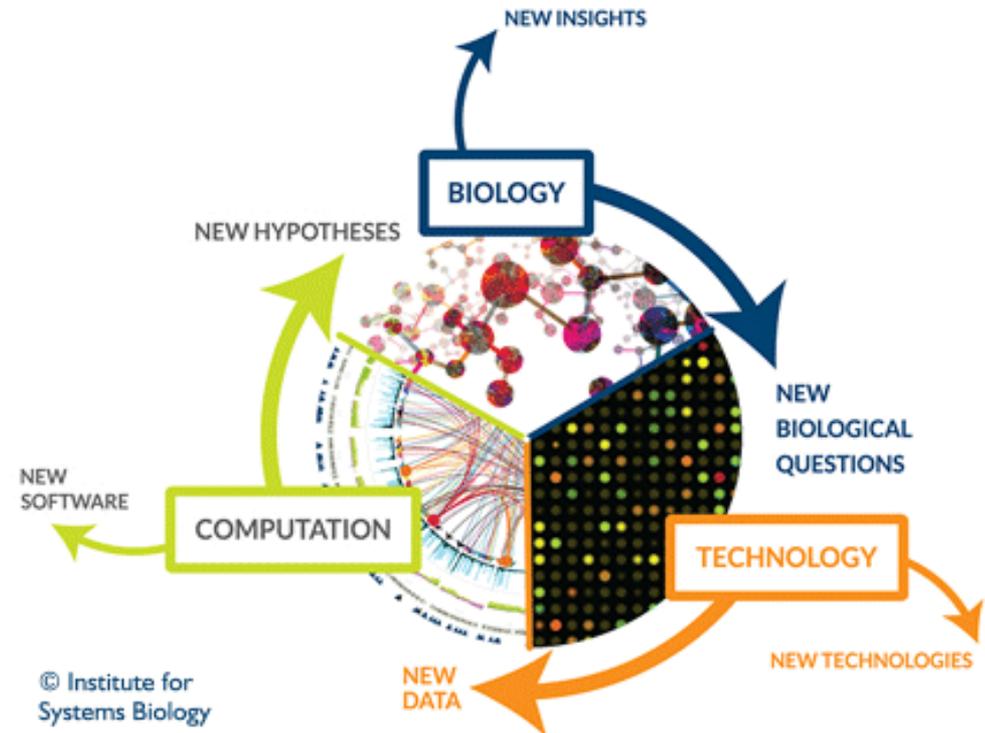
A New Biology for the 21st century

Strategy for dealing with biological complexity: New Biology, which is an integrated and interdisciplinary approach to biology

“Biology is at a point of inflection. Years of research have generated detailed information about the components of the complex systems that characterize life—genes, cells, organisms, ecosystems—and this knowledge has begun to fuse into greater understanding of how all those components work together as systems.”

Systems approach

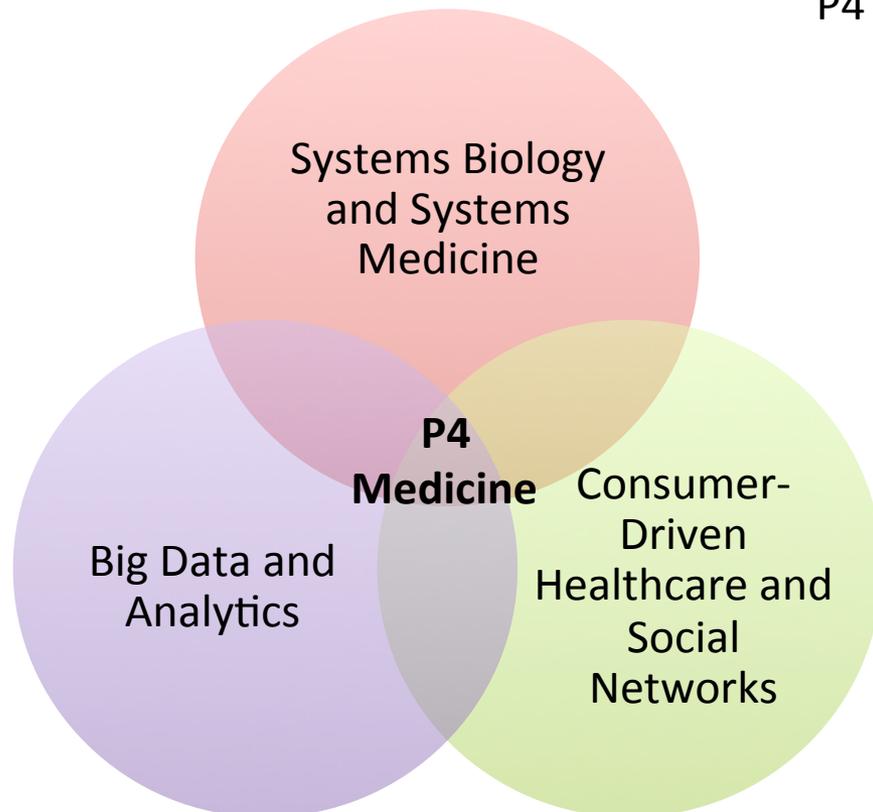
- **Systems biology** seeks to understand complex biological systems in their entirety by integrating all levels of functional information into a cohesive model (“[It] is about putting together rather than taking apart, integration rather than reduction [...]”)
- **Systems medicine** looks at the dynamic systems of the human body as part of an integrated whole, incorporating biochemical, physiological, and environment interactions



Medicine with new dimensions-P4 medicine

Convergence of systems medicine, patient-activated social networks, and the digital revolution has led to a P4 medicine that is predictive, preventive, personalized, and participatory

P4 Medicine Institute, Leroy Hood, Chair



P4 medicine

- **Predictive:** detect many diseases at the earliest detectable phase
- **Preventive:** preserve individual's wellness
- **Personalized:** stratify disease to enable targeted therapies*
- **Participatory:** patient-driven networks as drivers of this process

Key characteristics

- Pro-active, systems-driven, cross-disciplinary, integrative
- Quantifies wellness and demystifies disease in measurable ways
- Envisions enormous data dimensionality from multiple sources to simpler testable hypotheses
- Focus is on the individual

* Precision medicine

Missing ingredient

- We are moving in the right direction: starting to deal with complexity
- However, focus is still on individuals
- Also, healthcare only targets disease, once symptoms become apparent, instead of promoting wellness
- A key component is needed to promote health and wellness broadly; i.e., a population-based approach

The 5th P: population health

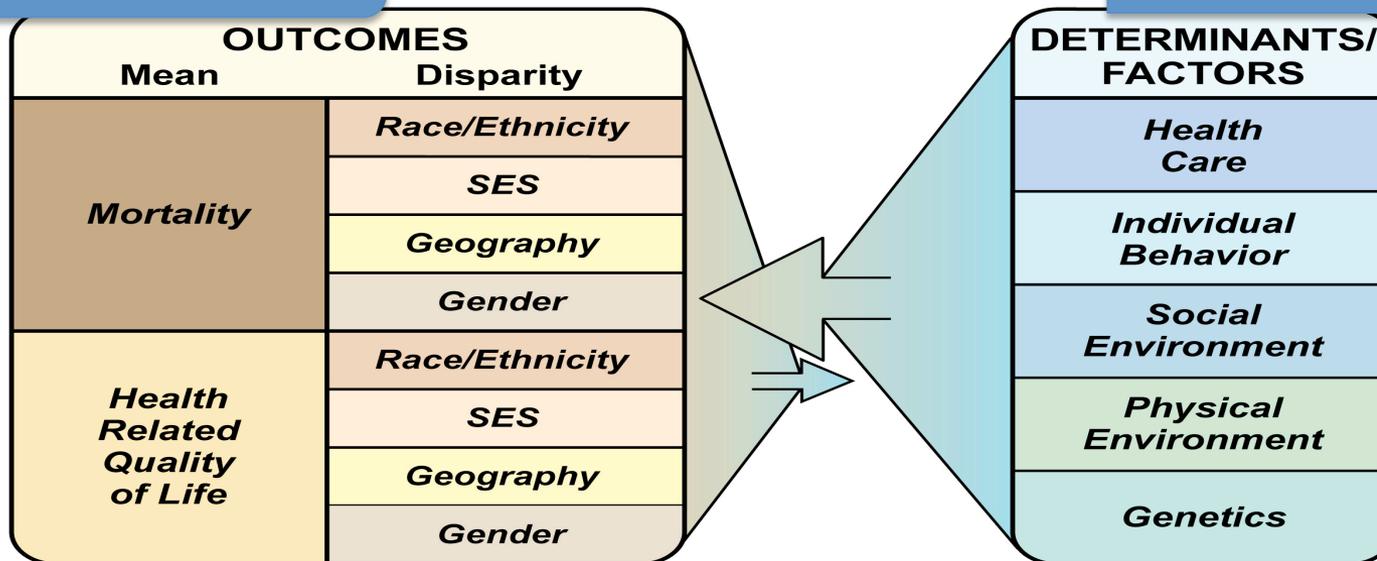
“Population health is defined as the health outcomes of a group of individuals, including the distribution of such outcomes within the group”

Kindig & Stoddart, *Am J Pub Health* 2003; 93:366-369

Dimensions of population health

Identifies variations in the occurrences

Focuses on interrelated conditions and factors that influence health of the population over the life course



Applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations

POLICIES and PROGRAMS

Integrating the 5th P into the P4 framework

- Potential of P4 medicine can best be realized through a partnership between medicine and population health

P4	Integration of 5 th P into 4 Ps	Examples
Predictive	Ecologic model of health	Environmental factors, lifestyle; requires complex population-based, longitudinal epidemiologic studies
Preventive	Population screening	Apply evidence-based screening using new biomarkers
Personalized	Evidence-based medicine	Apply comparative effectiveness research
Participatory	Essential role population health	Participation and education of patients, physicians, and the entire healthcare community

Population health adoption

- American Society of Hypertension (ASH) recently changed its mission statement to include focus on population health:

“Many health care organizations [...] are recognizing that to deliver value-based care and prosper, they must focus on managing the health of their population”

R. Phillips, MD, PhD

ASH Board member

CMO Houston Methodist Hospital

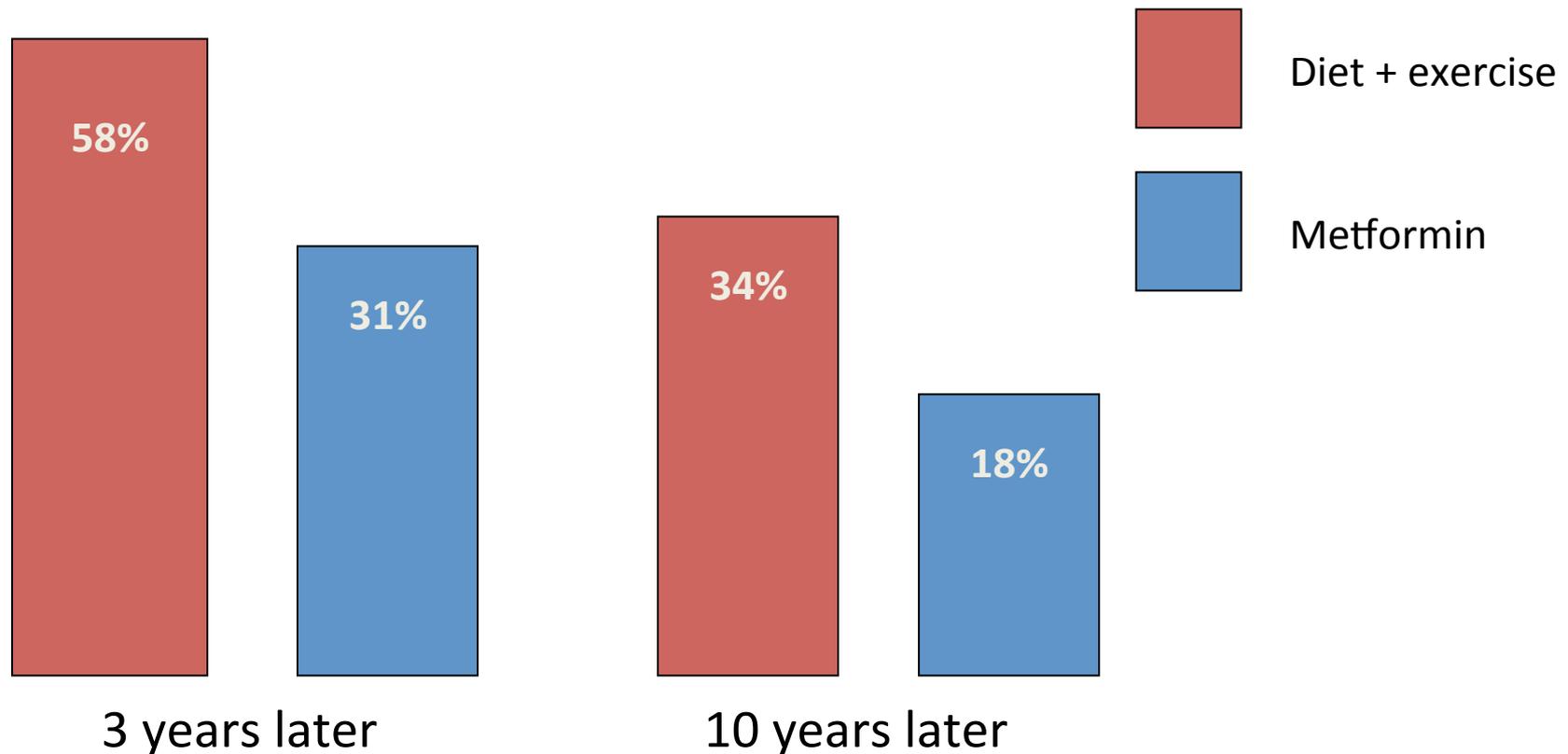
(Weill Cornell affiliate)



An example of a 'Life Style Medicine' study

Lifestyle changes more effective than drugs

Diabetes Prevention Program (DPP) – Diabetes % risk reduction



Sources:

Diabetes Prevention Program Research Group. Reduction of the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. *N Engl J Med* 2002; 346:393-403.

Diabetes Prevention Program Research Group. 10-Year Follow-up of Diabetes Incidence and Weight Loss in Diabetes Prevention Program Outcomes Study. *Lancet* 2009; 374(9702):1677-1686.

**“Knowing is not enough; we must apply.
Willing is not enough; we must do.”**

Johann Wolfgang von Goethe

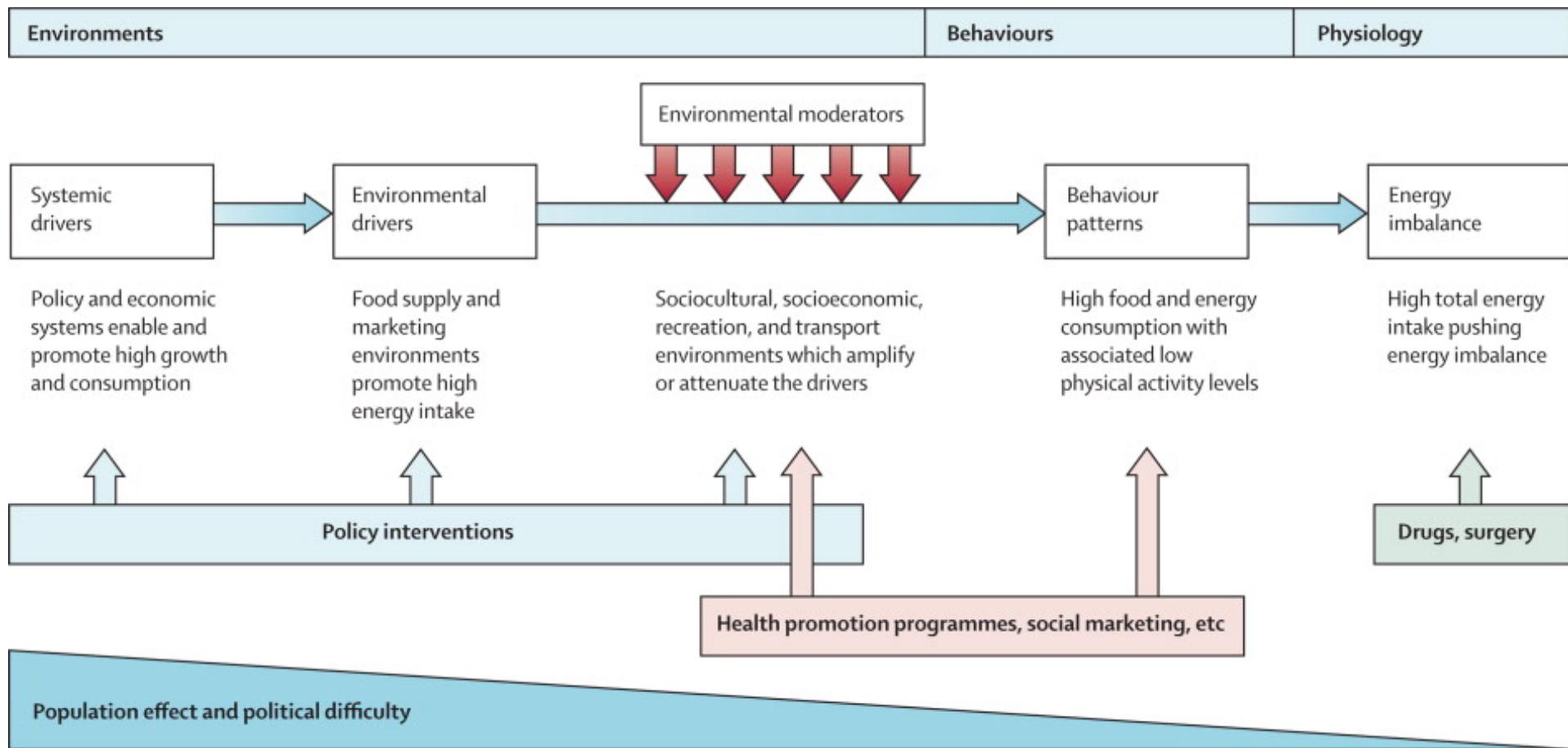
WCMC-Q's contributions in population health

- Road traffic injuries
- Human Development Index
- Risk factors associated with pre-diabetes in school children
- Smoking and its effect on progression of diabetes
- Obesity – epidemiology and genomics
- Assessment of risk factors for diabetes and CVD
- Disease burden of HCV in the MENA region including Qatar
- **Sahtak Awalan (Your Health First)**

Globalization and rising obesity in Qatar

- Qatar –WHO Steps Survey 2012 reports percentage of Overweight and obese adults as 70.1 and 41.4% respectively
- Another survey suggests that 73% of Qatari men and 69% of Qatari women are projected to be overweight by 2015, with approximately half considered obese
- Published Diabetes rates approximate 17% in adults
- Possible Contributing Factors
 - Rapidly rising SES and a rise of consumerism
 - Trade liberalization and easy access to varied high caloric products from all over the world
 - Changes in dietary patterns (hyper palatable fast food, refined grains, sugar drinks, others)
 - Decreased physical activity
 - Positive energy balance

Global Drivers of Obesity Pandemic



Sahtak Awalan - Your Health First (YHF)

- In summer 2012, His Excellency Abdullah bin Khalid Al Qahtani, inaugurated YHF, a mass campaign to cultivate healthy behaviors
 - Educate people on healthy trends and lifestyles
 - Encourage people to adopt a healthier lifestyle
- Target populations
 - Qatari nationals and residents, males and females
 - Special focus on children and youth

YHF Objectives

Phase I

- **To create broad awareness about health issues that have arisen due to rapid urbanization**
- **To provide health and medical information in layman's terminology, which is easy for the general public to understand**

Phase II

- To educate, motivate, and facilitate healthier lifestyles

Phase III

- To provide an interactive platform for policy makers, healthcare professionals, and academics to target specific segments of the population for rigorously designed health promotion initiatives
- To cultivate life long healthy behaviors in younger people to achieve a healthy Qatari society in line with leadership's Qatar National Vision 2030

Creating effective messages for YHF

General principles and success factor

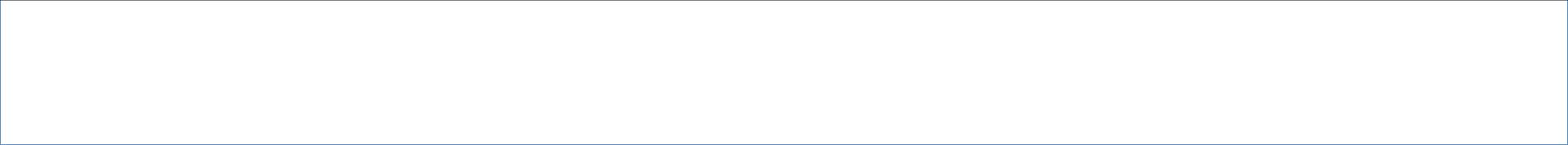
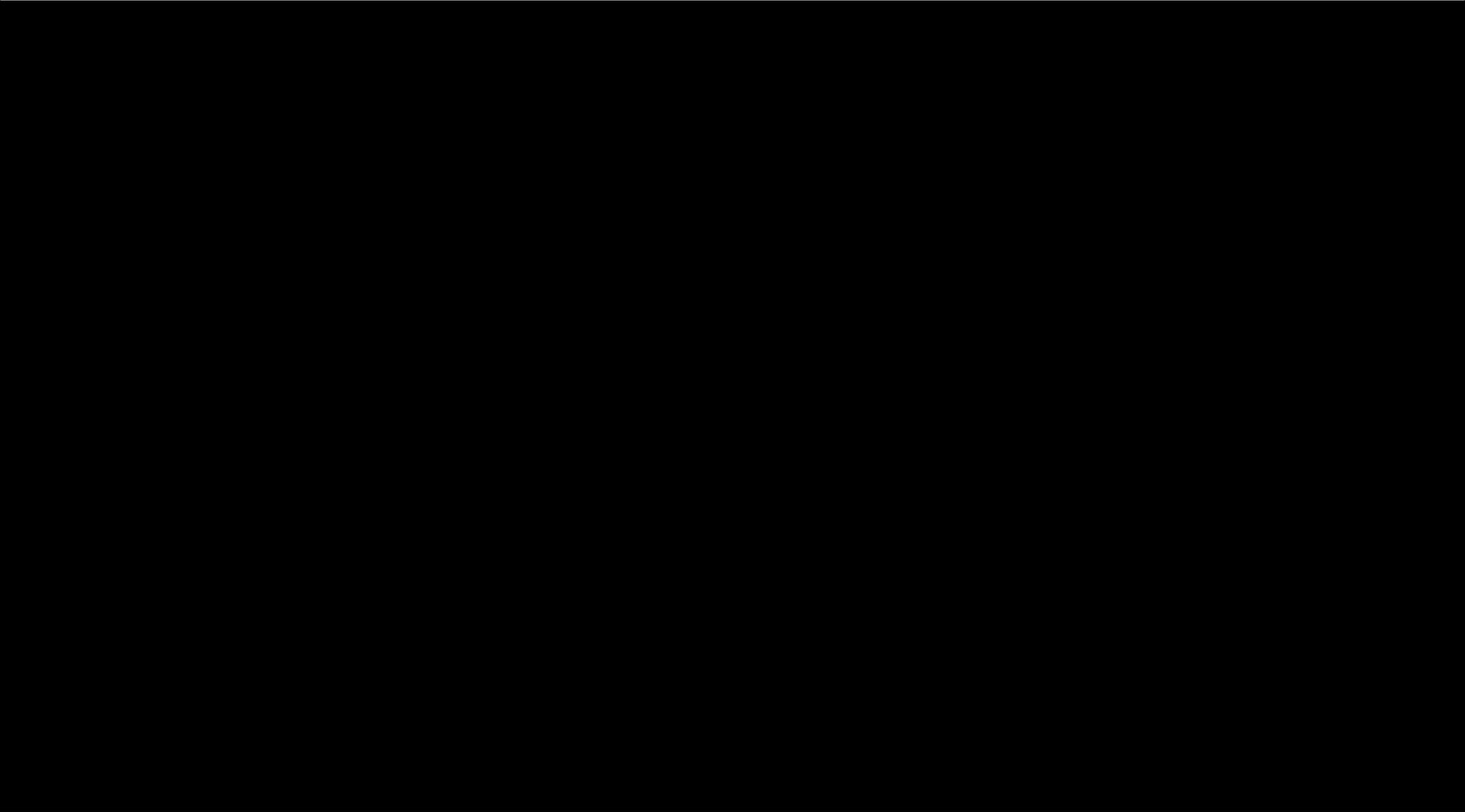
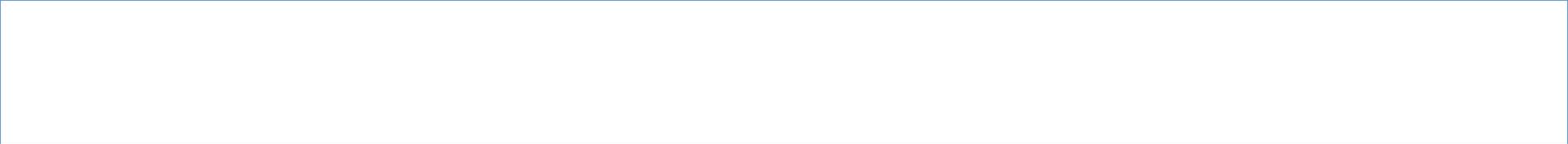
- Complexity of the healthcare issues
- Characteristics of the message
 - Clarity
 - Relevance
 - Focus
- Characteristics of the message recipient
 - Attitudes
 - Health literacy
 - Familiarity with new media

“Eat food. Not too much. Mostly plants.”

Michael Pollan, 2009

Time to get moving!





YHF Objectives

Phase I

- To create broad awareness about health issues that have arisen due to rapid urbanization
- To provide health and medical information in layman's terminology, which is easy for the general public to understand

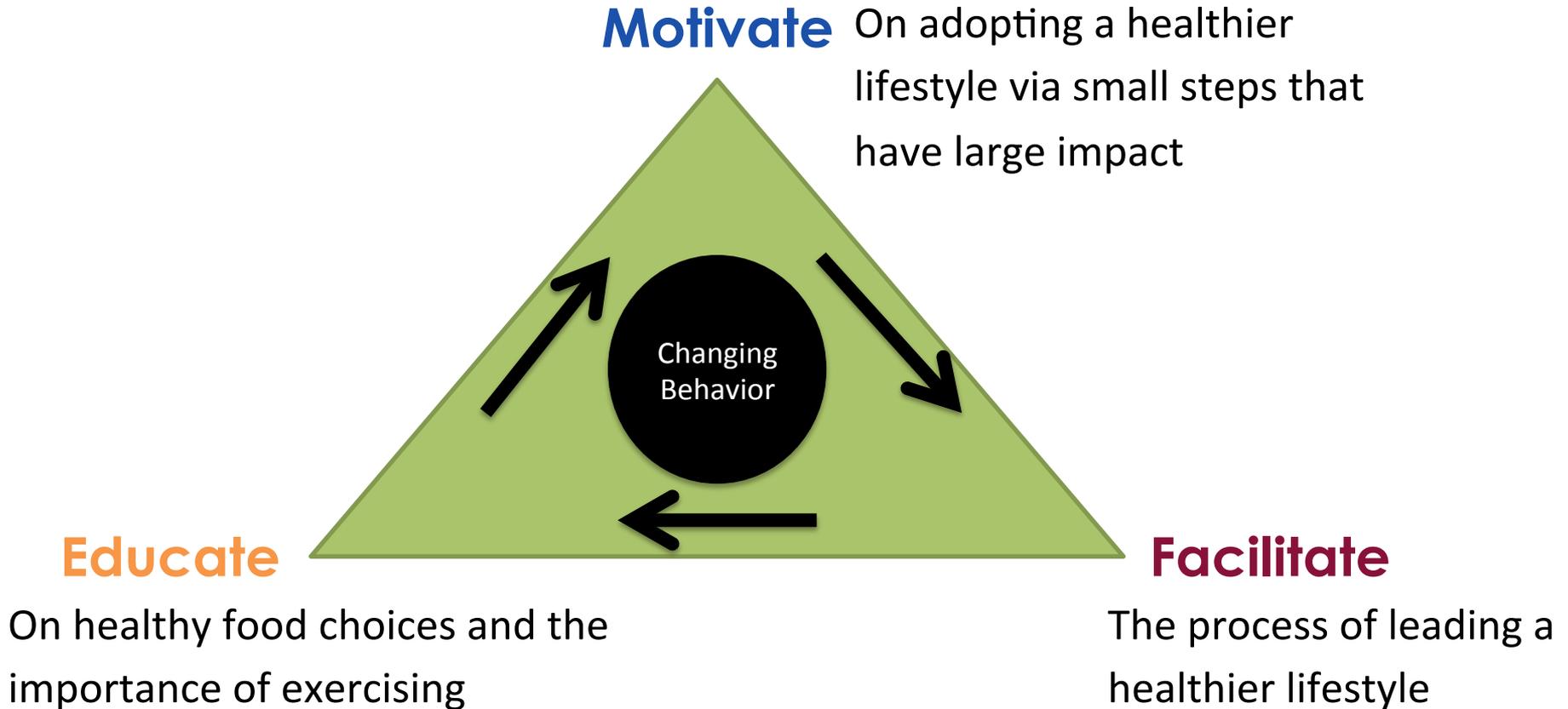
Phase II

- **To educate, motivate, and facilitate healthier lifestyles**

Phase III

- To provide an interactive platform for policy makers, healthcare professionals, and academics to target specific segments of the population for rigorously designed health promotion initiatives
- To cultivate life long healthy behaviors in younger people to achieve a healthy Qatari society in line with leadership's Qatar National Vision 2030

YHF Phase II: Three-pillared campaign



YHF fitness & nutrition

Fitness

- The Challenge: to be able to participate in annual fitness competition between middle schools, children compete throughout the year and make posters about healthy living

Nutrition

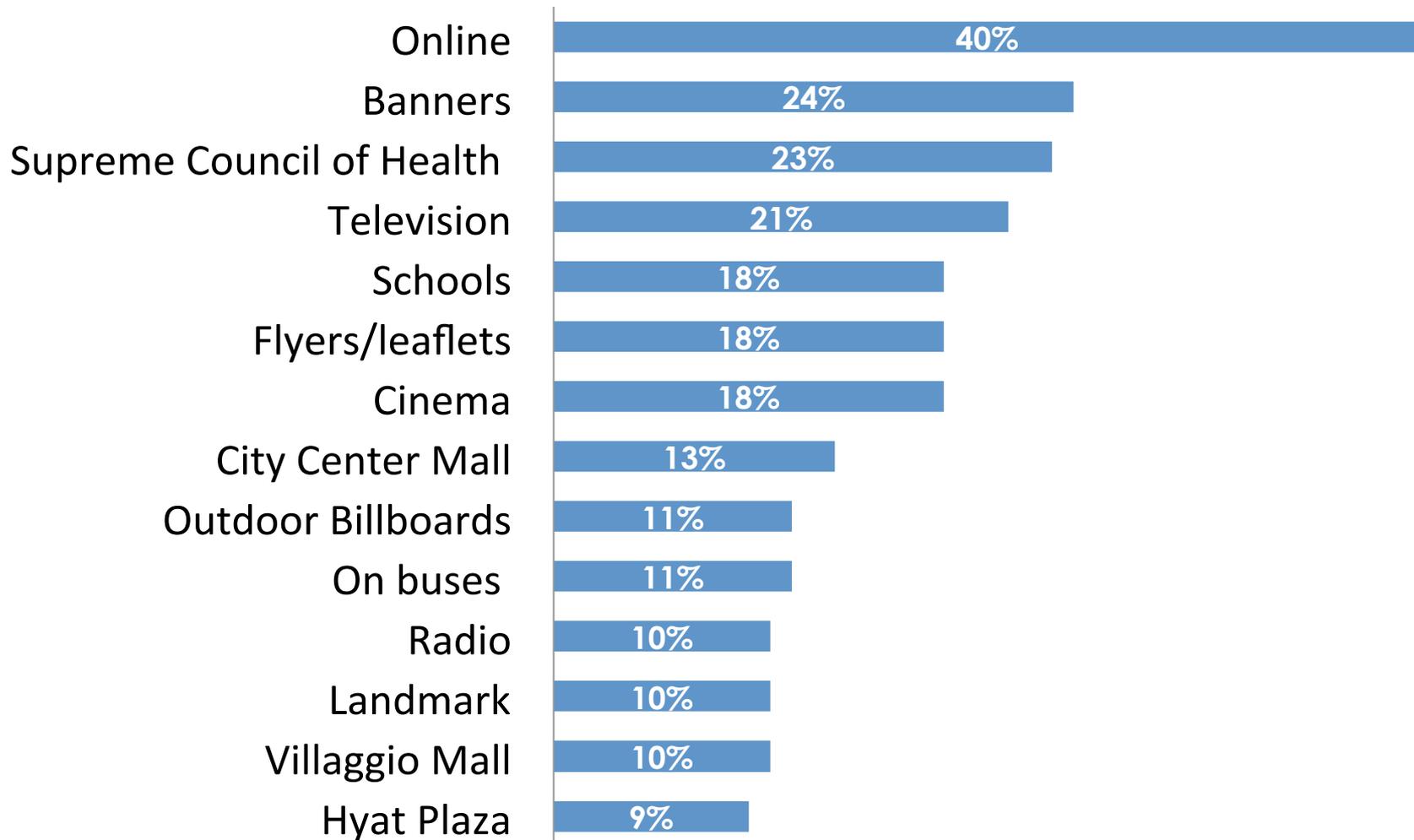
- The Greenhouse Project: elementary school-based initiative to teach children about the benefits of growing and eating healthy foods
- Your Healthy School Canteen: rebranding of QF school cafeterias, which will be emulated in schools across Qatar

YHF results after 2 years (2014:Q2)

- **76%** of those aware of the campaign thought that it was effective
- **22%** actively participated in one or more of the YHF initiatives
- **73%** of those participating in initiatives thought they were effective
- **83%** agreed that “small changes” in lifestyle habits would “greatly improve health and wellbeing”
- **58%** were encouraged to lead a healthier lifestyle or at least consider it; another **32%** were reinforced in their healthy lifestyle choices

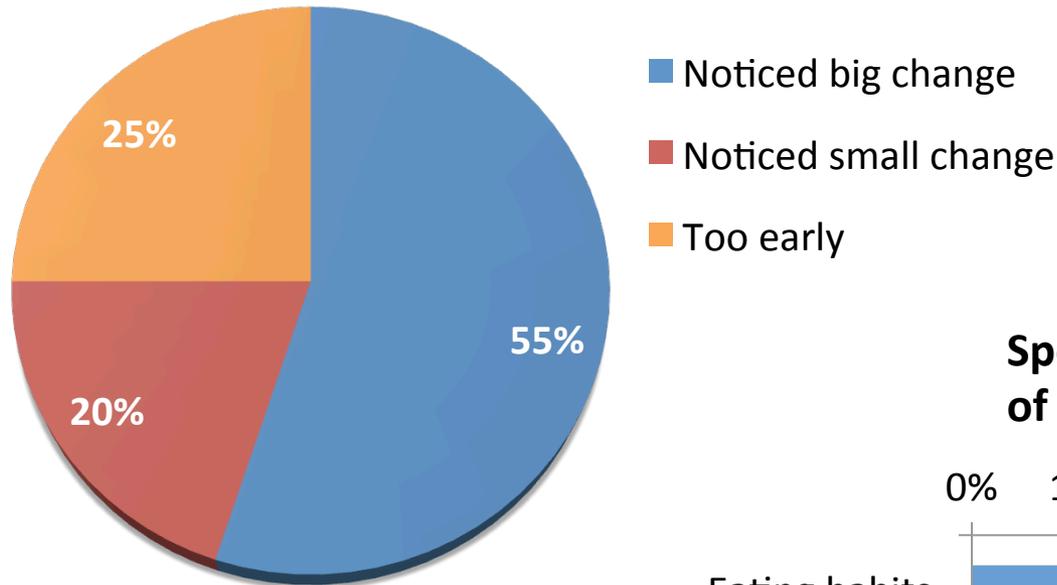
YHF communication channels

Sources of awareness for YHF

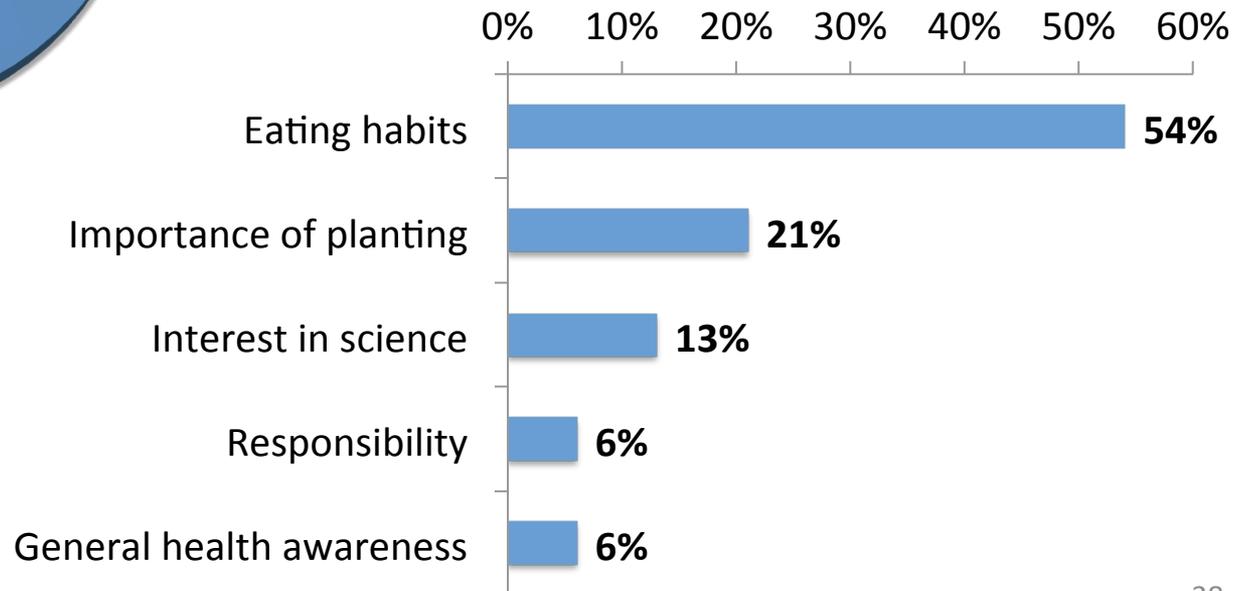


YHF the Greenhouse Project

Attitudes & behaviors of participating children



Specific changes in attitude of participating children



YHF the Greenhouse Project

- Received a score of 8.2/10 on encouraging children to consume more vegetables and fruits; children actually started bringing healthier lunch boxes to school



YHF Objectives

Phase I

- To create broad awareness about health issues that have arisen due to rapid urbanization
- To provide health and medical information in layman's terminology, which is easy for the general public to understand

Phase II

- To educate, motivate, and facilitate healthier lifestyles

Phase III

- **To provide an interactive platform for policy makers, healthcare professionals, and academics to target specific segments of the population for rigorously designed health promotion initiatives**
- **To cultivate life long healthy behaviors in younger people to achieve a healthy Qatari society in line with leadership's Qatar National Vision 2030**

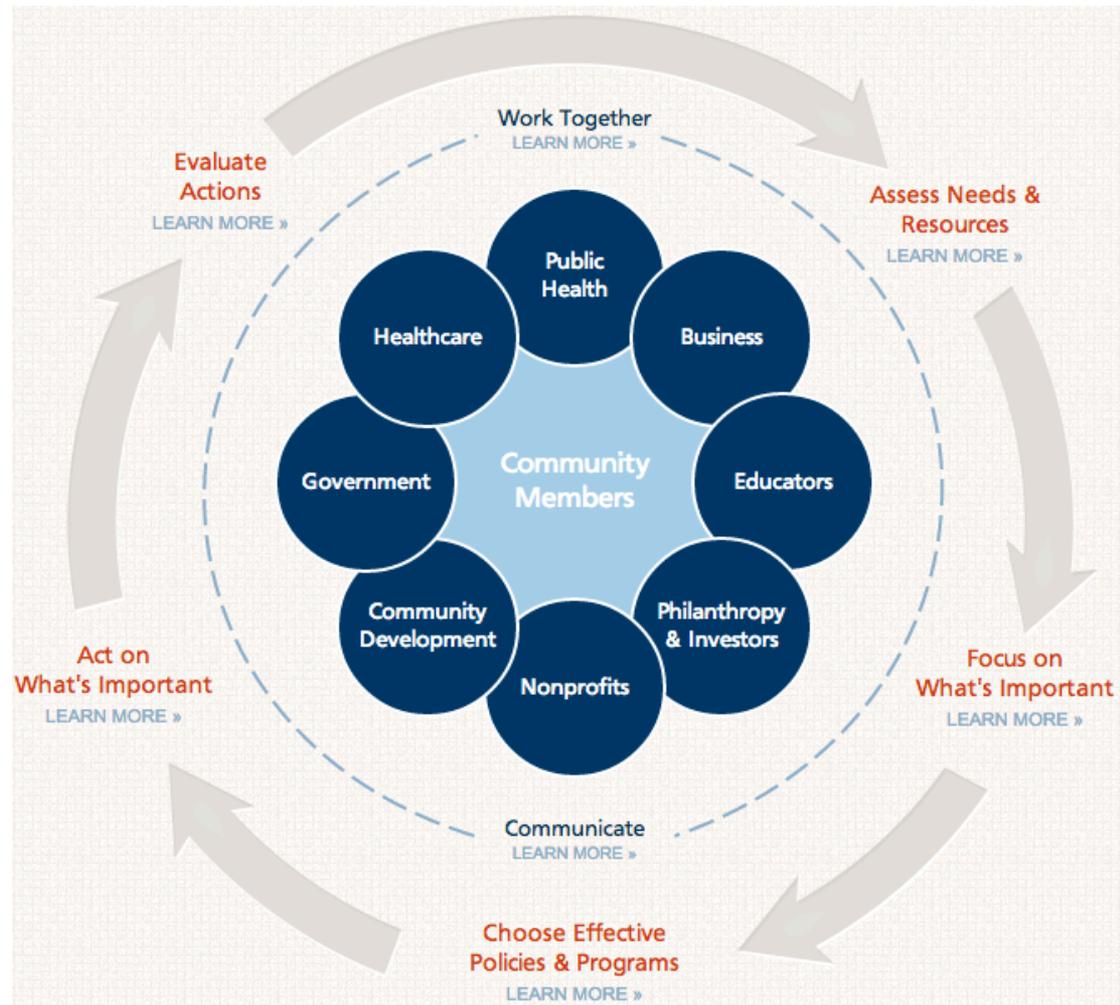
Developing a framework for population health utilizing global and local data

Challenges

- How do we evaluate and promote health and wellness in a rigorous fashion at the population level?
- How do we develop measures of quality and positive outcomes for population health, and how do we collect and use these?
- How can effective cross-sector partnerships be formed and implemented to help accomplish the task?
- How do we obtain the necessary resources for population health initiatives?

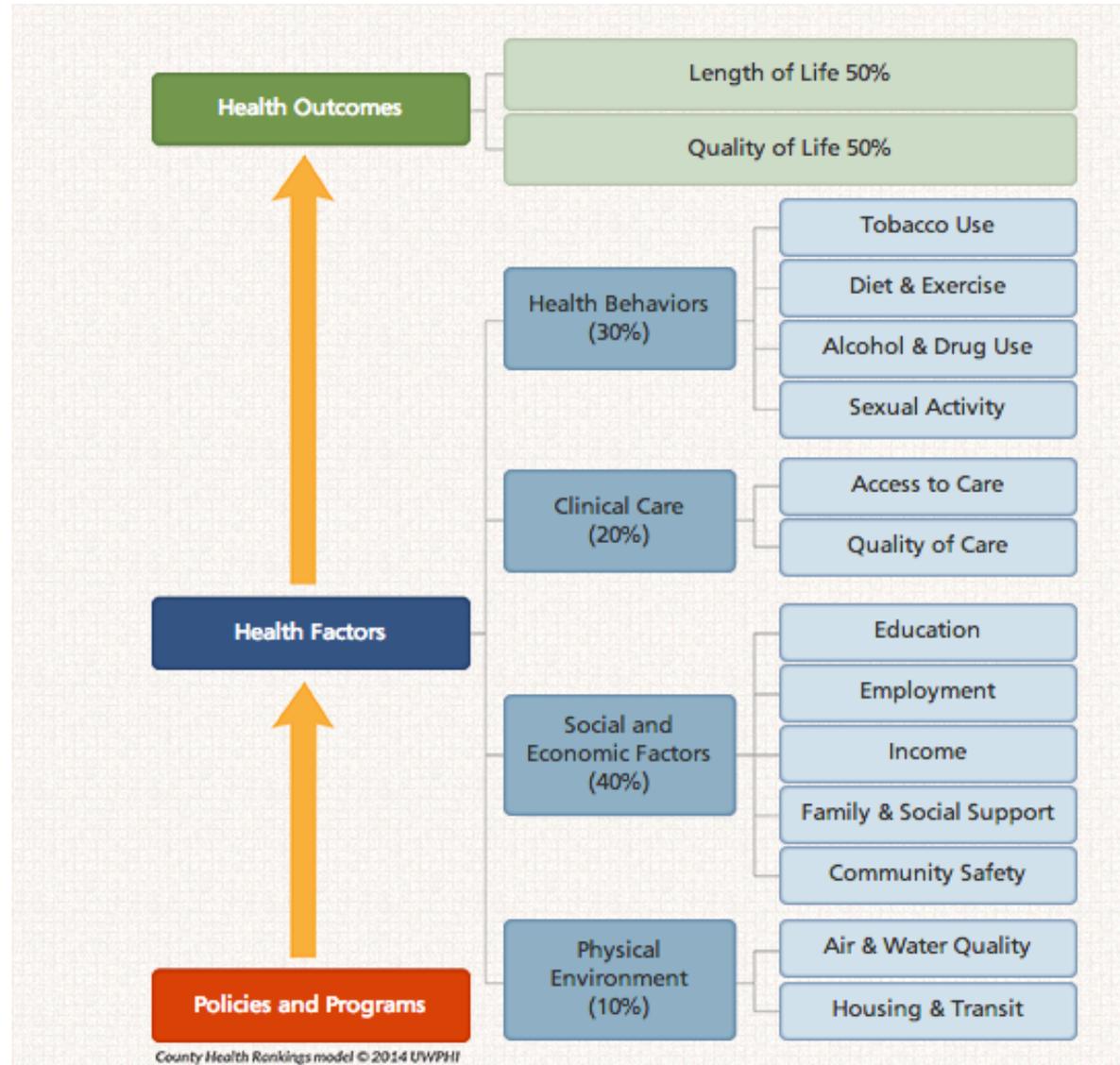
County Health Rankings & Roadmaps program

- Collaboration between RWJF and U of Wisconsin Population Health Inst.
 - Measure annually vital health factors
 - Provide tools and guidance to understand data, develop strategies to promote health



County Health Rankings & Roadmaps program

- Model of population health that emphasizes the many factors that, if improved, can help make communities healthier



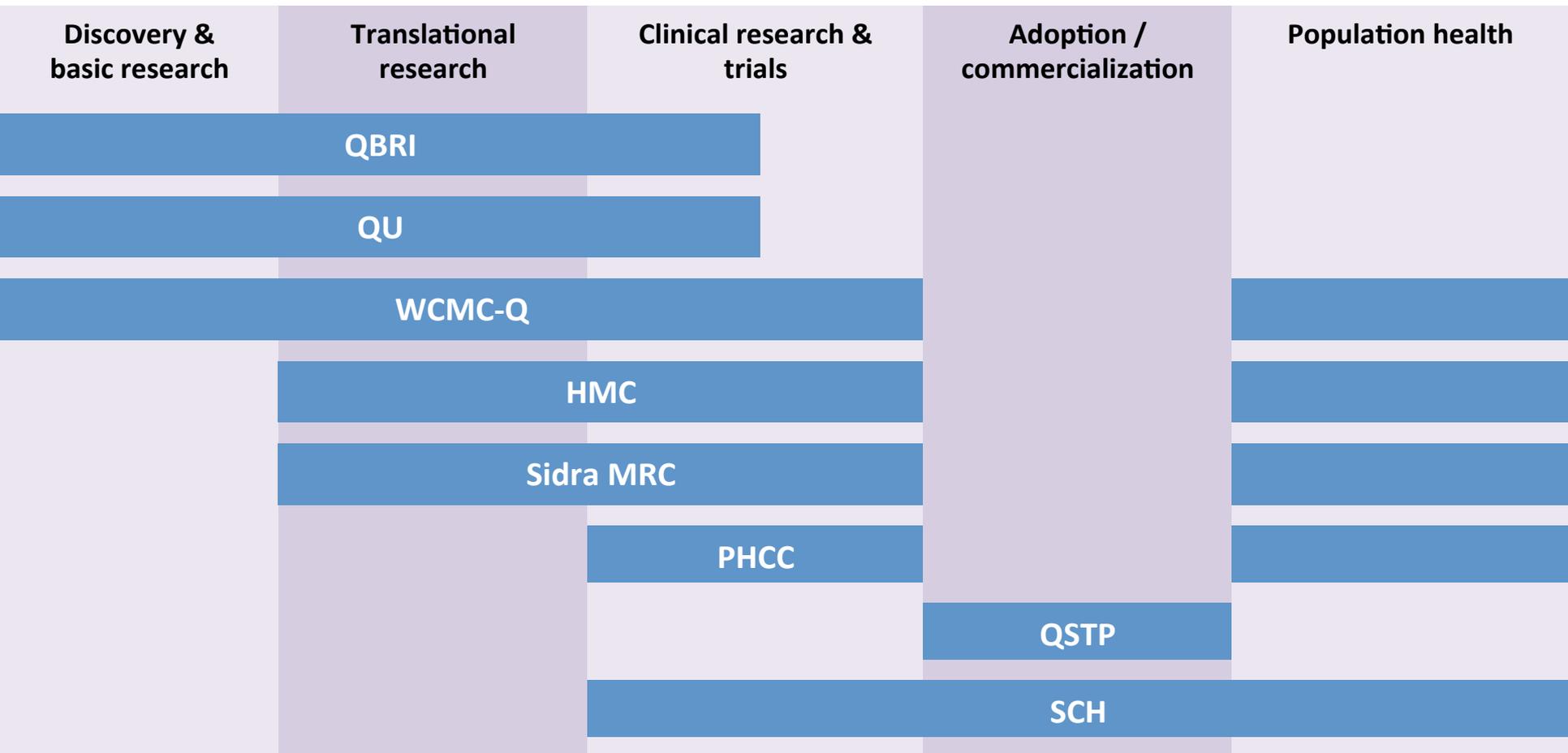
Quality measures for population health

Institute of Medicine Committee on Quality Measures for the Healthy People Leading Health Indicators (2013):

- Finding: Multi-sectorial health system currently uses a vast and complex array of measures of quality in an uncoordinated way
- Recommendation: Partners in population health (public health agencies, healthcare organizations, communities) should adopt a portfolio of quality measures:
 - Follow set of criteria for selecting and prioritizing measures
 - Centrally developed and managed; endorsed by external experts
 - To be used for assessment, improvement, and accountability of the multi-sectorial health system

Integrating research into population health

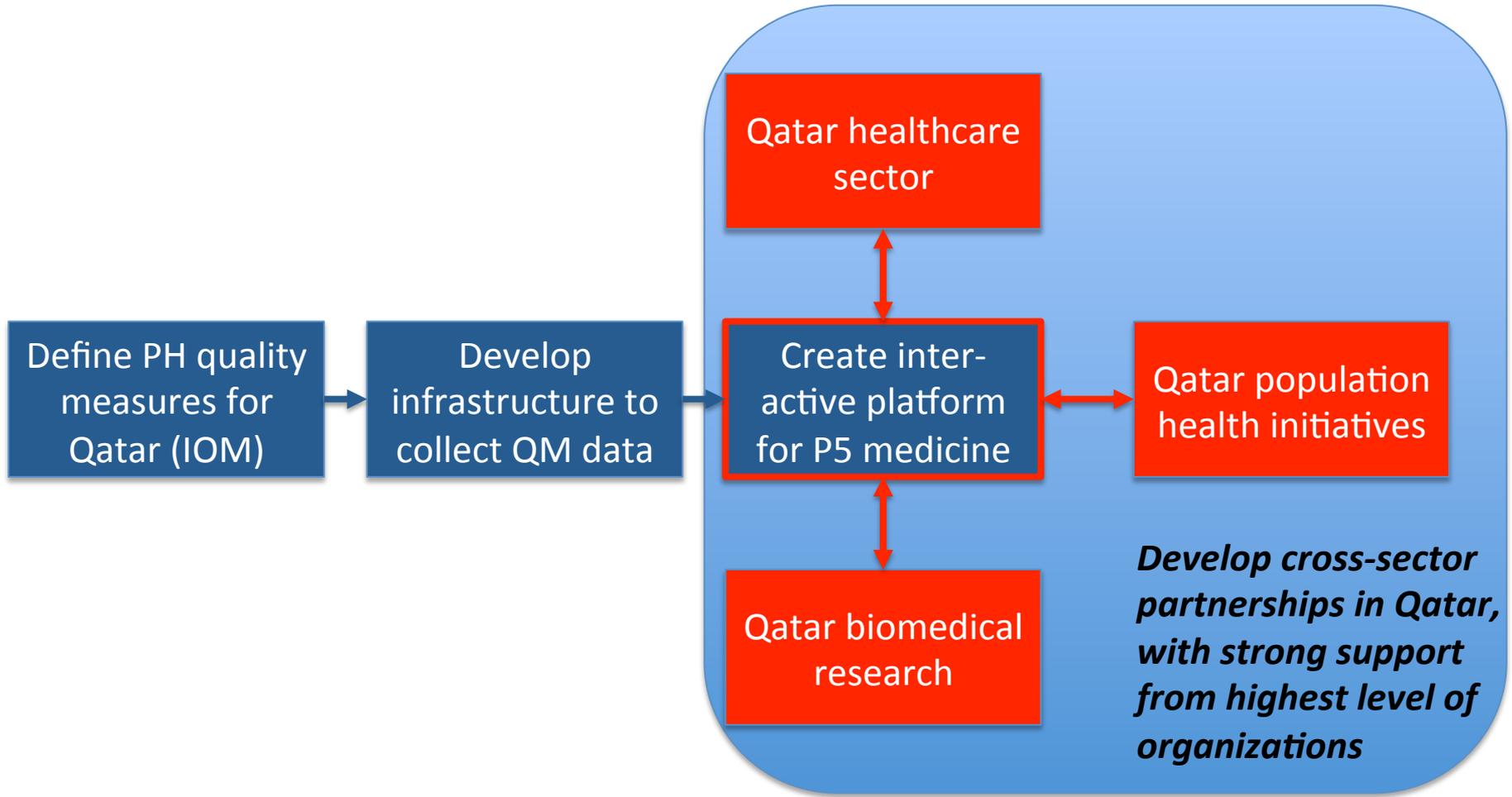
Practicing P5 medicine in Qatar



Integrating research into population health-contd

- Focus on translational & clinical research:
 - Phase 4 clinical trials, health services research, clinical outcomes research
 - Population-level outcome studies, social determinants of health
- Foster community partnerships in initiatives linked to local needs
- Build interdisciplinary team science
- Customize and define metrics of population health
- Encourage broad participation by faculty in devising rigorously designed, targeted, population health studies

Proposed framework for population health in Qatar



Conclusions

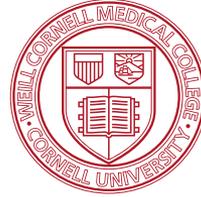
From an individual's disease to population health

- A palpable shift is under way from a disease model to a health focus
- P4 medicine (Predictive, Preventive, Personalized, Participatory) needs to integrate population health (P5) for a transformative model of health and wellness of large groups of people
- A population health platform (YHF) led by SCH/WCMC-Q, with broad participation of healthcare stakeholders and multi-sectorial involvement, is a must for long-term well-being of Qatari population
- Qatar has the vision, ambition, and resources to make such a transformative model successful

“It does not require a majority to prevail, but rather an irate, tireless minority keen to set brush fires in people’s minds.”

Samuel Adams

Founding Father of the United States



كلية طب وايل كورنيل في قطر
Weill Cornell Medical College in Qatar

Member of Qatar Foundation