

Citi
GPS



Future of Health

AmCham 2024

Citi GPS: Global Perspectives & Solutions

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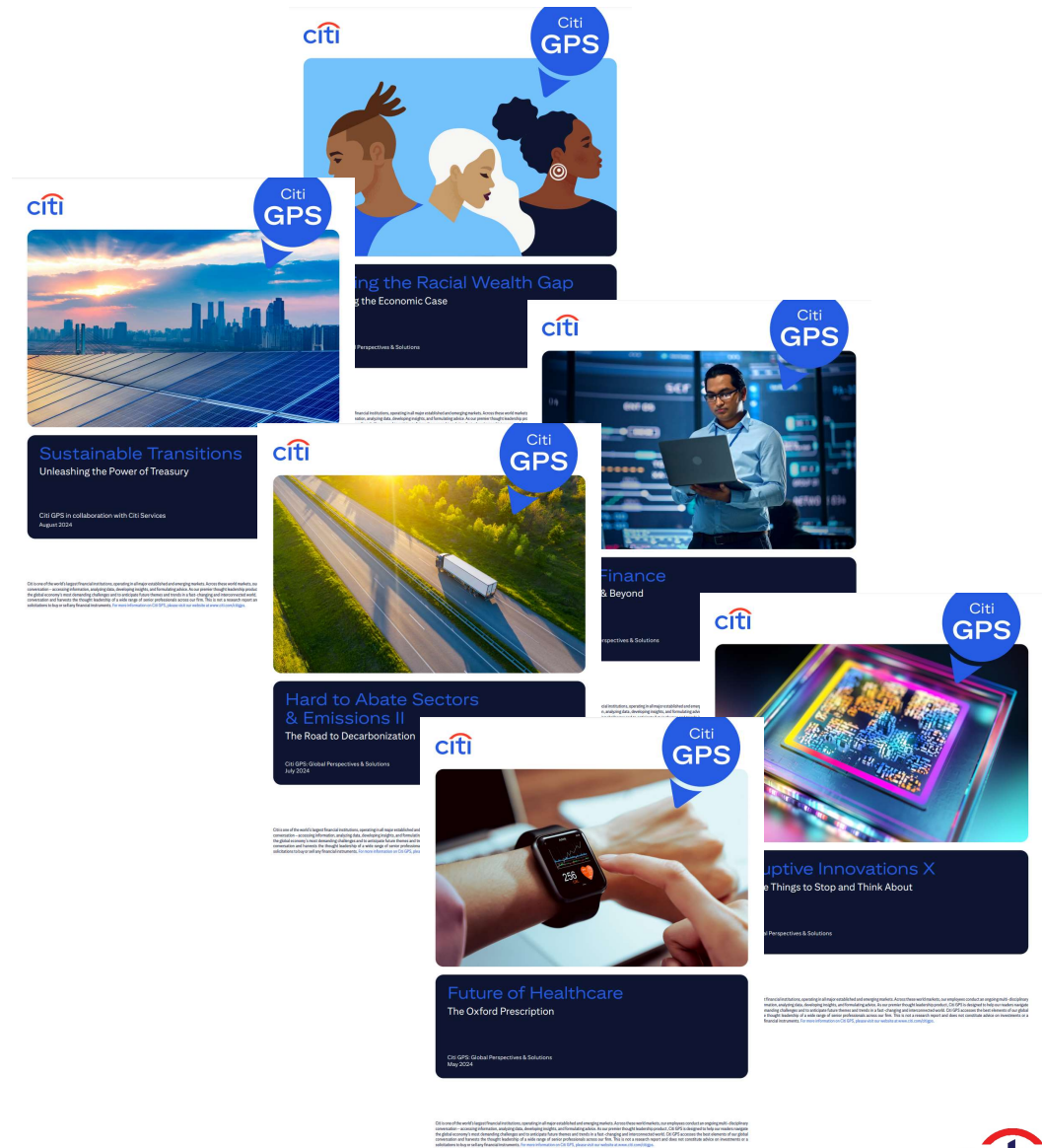
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Citi Global Insights

- Citi seeks to deliver pre-eminent thought leadership, via its unparalleled global network
- CGI is effectively a think-tank, focusing on long-term trends
- Future of Health, Finance, Sustainability, Digital Innovation
- Distinct from *Equity Research*
 - “Themes” not “Investments”
 - Longer time horizon

Adam Spielman

- Head of Health and Consumer, Citi Global Insights
- At Citi for 27 years
- Formerly head of European Consumer Equity Research
- Harvard Business School
- Cambridge University



Healthcare has been one of humanity's greatest achievements

- Global life expectancy improved 4+ months each year since 1950

But it is coming under increasing pressure in almost all countries

- 15-20% of GDP

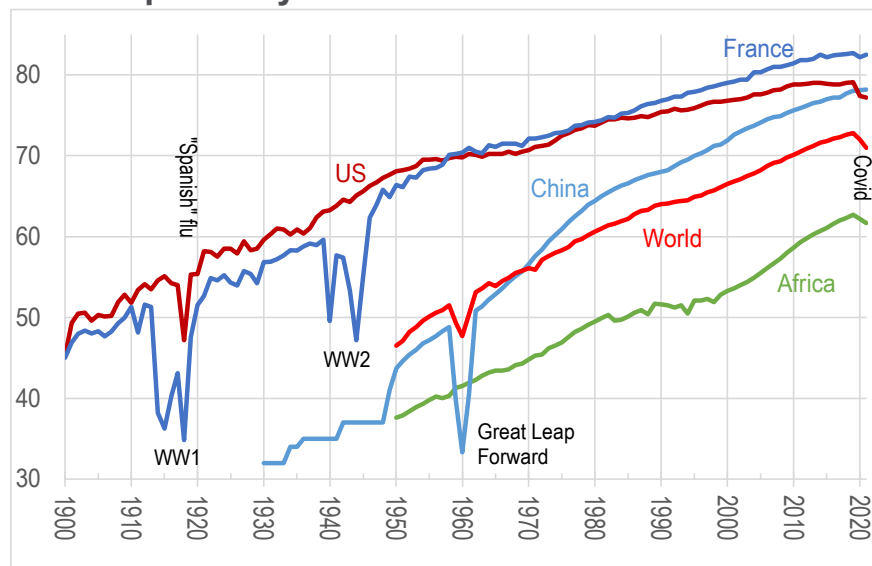
We interviewed 17 senior Oxford Professors

- World No1 for clinical and health (THES)
- Wide range of disciplines

The Oxford Prescription

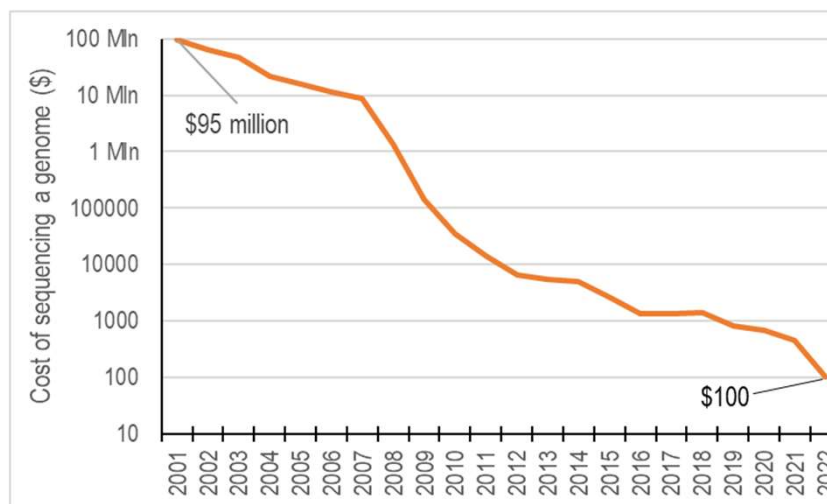
1. Treat diseases before symptoms become failure
2. Re-organize how healthcare is delivered
3. Leverage digital/ data technology
4. Refocus drug development to benefit large populations
5. Better public health, especially around obesity
6. Prepare for future outbreaks/ pandemics

Life Expectancy at Birth Since 1900



Source: WHO

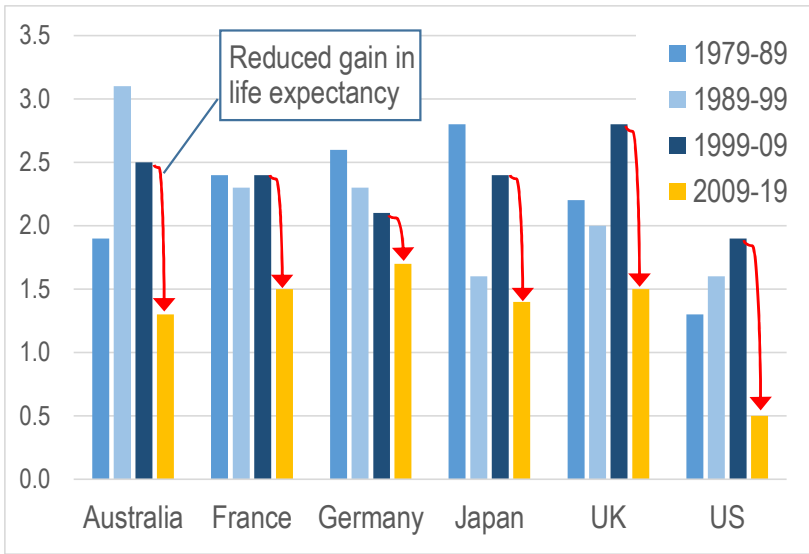
Cost of Sequencing a Full Human Genome, 2001 to 2022



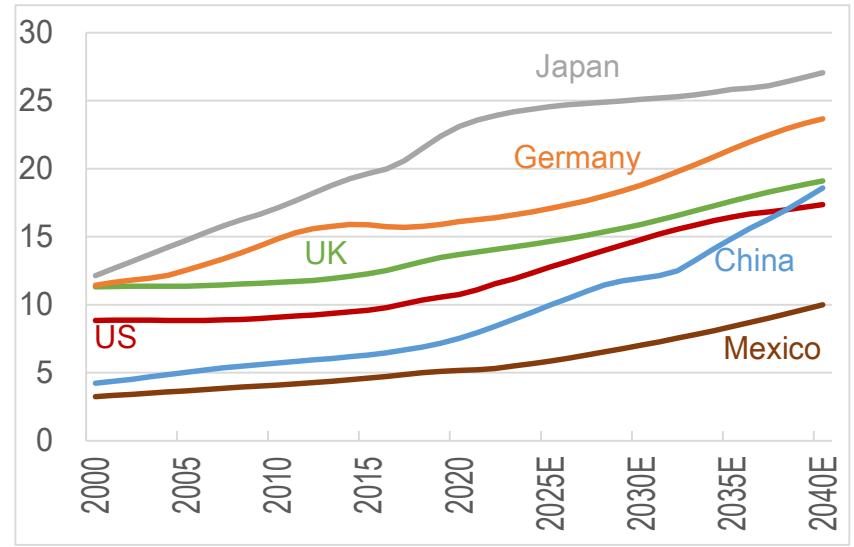
Source: NHGRI Genome Sequencing Program, OWID, Ultima

But pressures on healthcare are rising

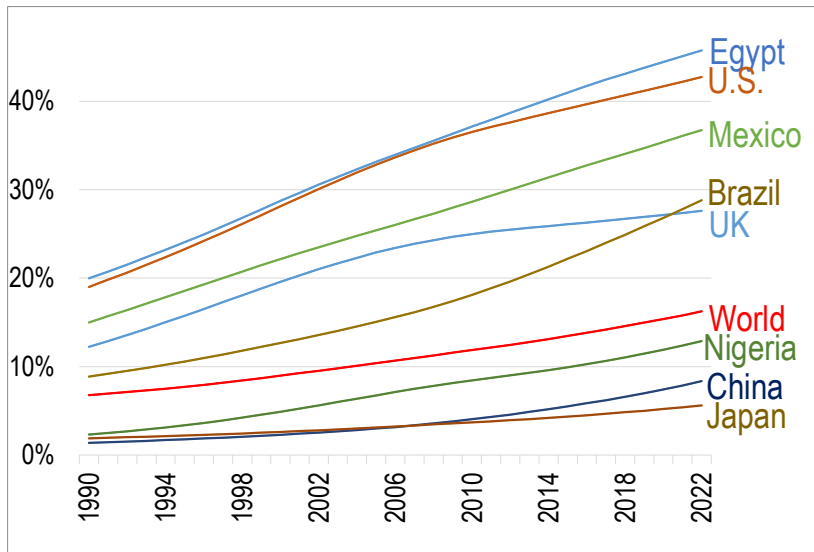
Changes in Life Expectancy by Decade



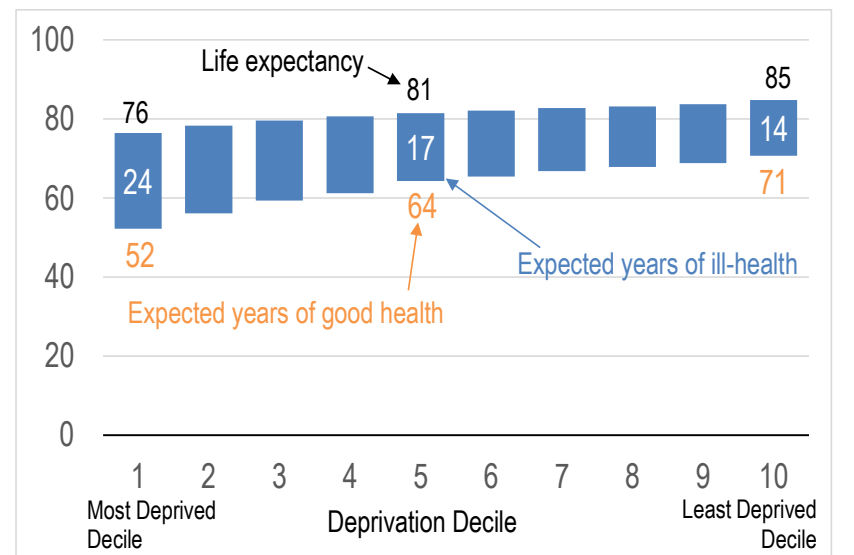
Elderly Population Across Countries (% Aged 70 or More)



Proportion of Adults with Obesity (BMI < 30)



Healthy Life Expectancy by Decile of Social Deprivation



1. Preventative Healthcare and Early Treatment

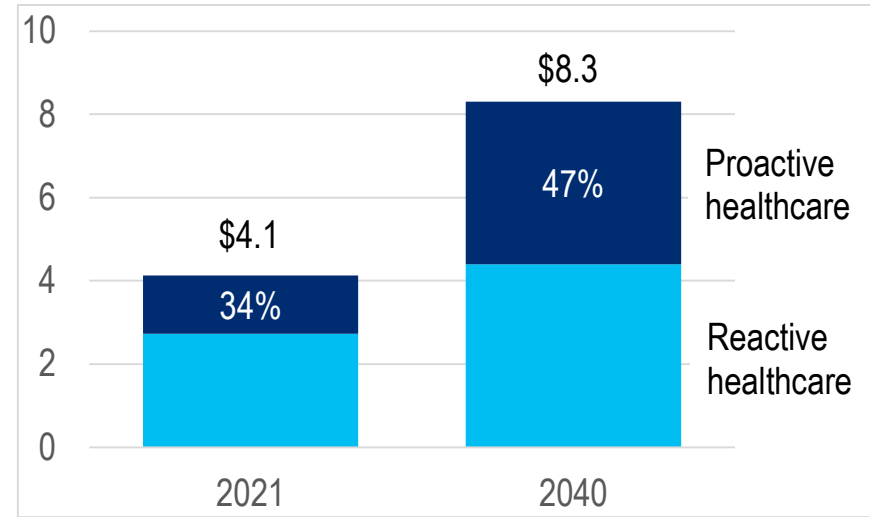
Several new approaches hold promise of predicting chronic diseases ahead of symptoms becoming apparent

- **Liquid biopsies/CT-DNA** can detect cancer signals before symptoms
- **Polygenic risk scoring** – Do your genes show you at greater risk of disease?
More intense diagnostics
- **Proteomic risk scoring** – Do your proteins suggest you are developing a disease?
Therapeutics

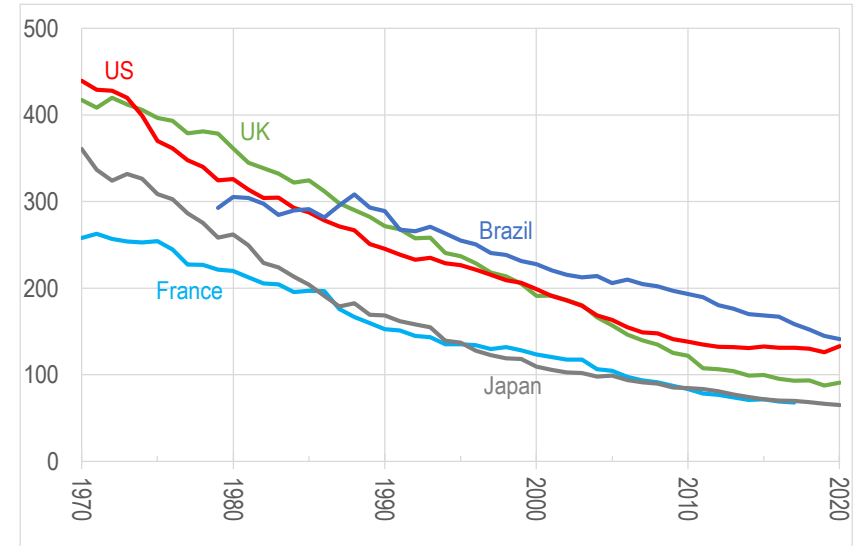
Cardiovascular disease is a good example, as death rates have fallen

1. Blood pressure (*ACE inhibitors*)
2. Cholesterol (*Statins*)
3. Smoking (*Public health programs*)
4. Obesity (*GLP-1s*)

U.S. Spending on Healthcare – Trillions of USD (inflation adjusted)



Deaths Caused by Cardiovascular Disease per 100,000



2. Reorganize how healthcare is delivered

Incentivize health systems to focus on prevention and early treatment

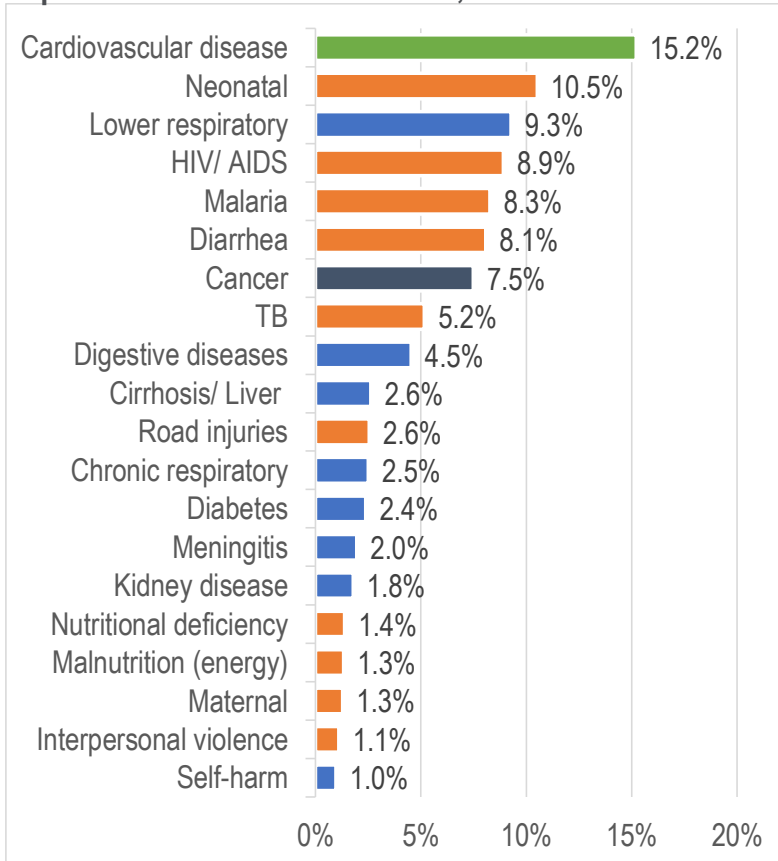
Refocus provision away from hospitals and into the community

- Vaccinations delivered in the community by relatively unskilled staff and coordinated by digital communications

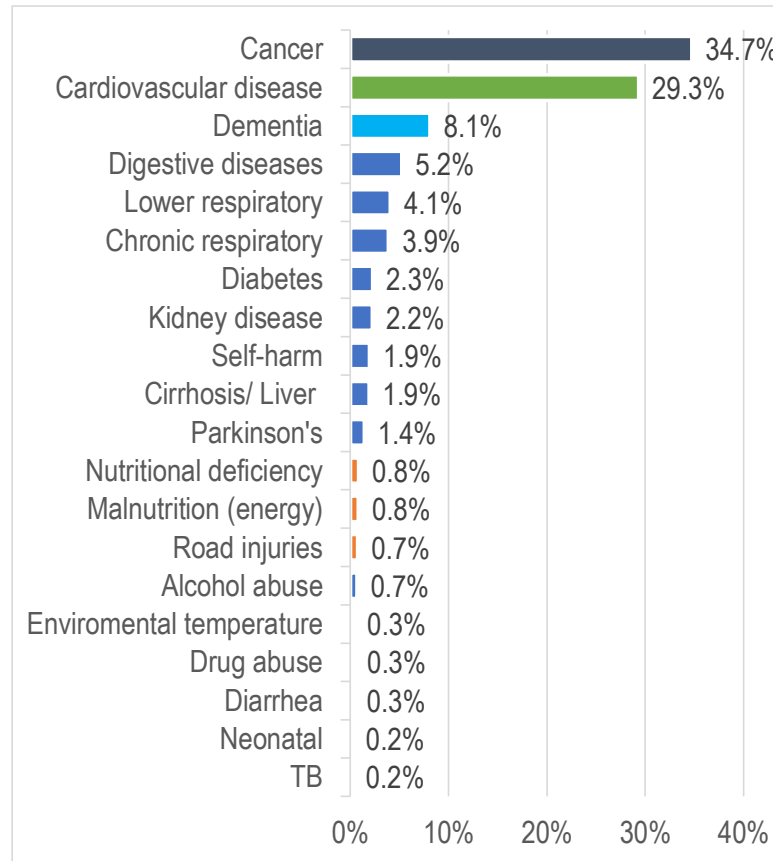
Healthcare in less developed countries can be improved by focusing on basics

- Many of the major killers in Africa barely feature in equivalent charts for Western Europe

Top 20 Causes of Death in Africa, 2019



Top 20 Causes of Death in France, 2019



Source: IMHE, Global Burden of Disease, OWID

3. Leverage digital technology

Greater and more integrated use of data, while being mindful of unintended consequences

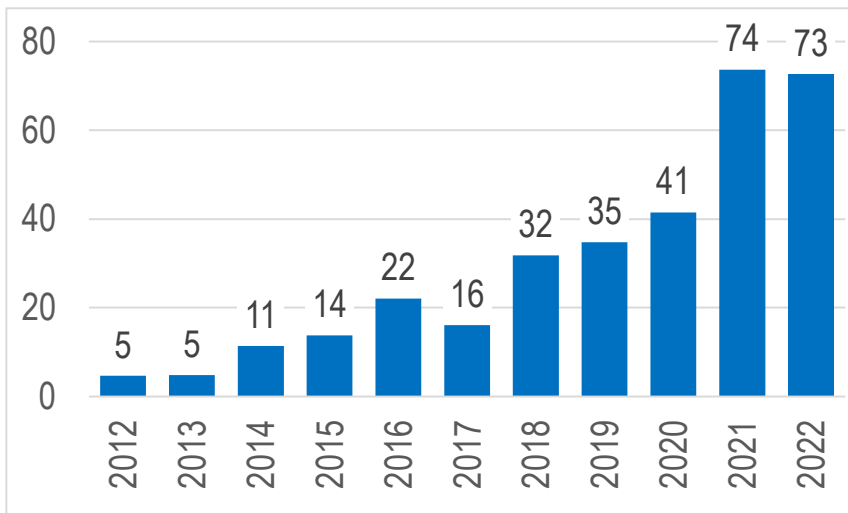
1. Genomic and other 'omic data
2. Health records
3. Lifestyle data from wearables

Consumer tech – e.g. smartwatches - can give people more of a sense of agency

Wearables are not a magic bullet

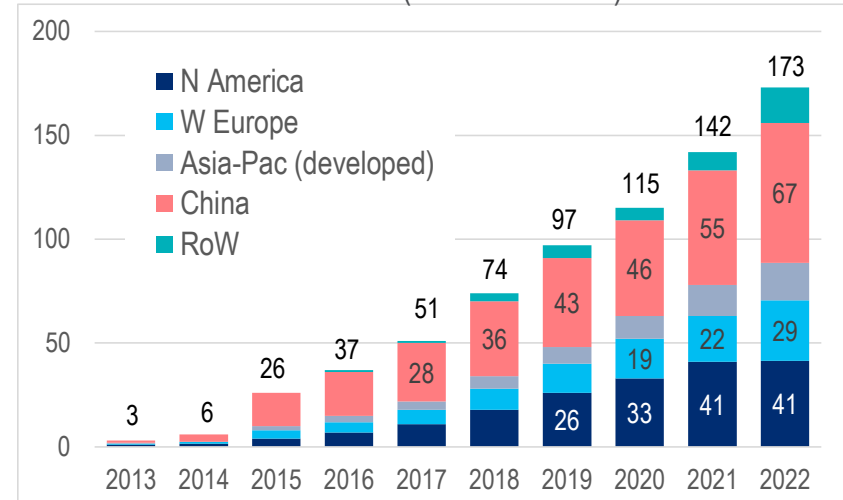
- Questions on accuracy
- Health inequalities

VC Investment in Healthtech (\$ in billions)



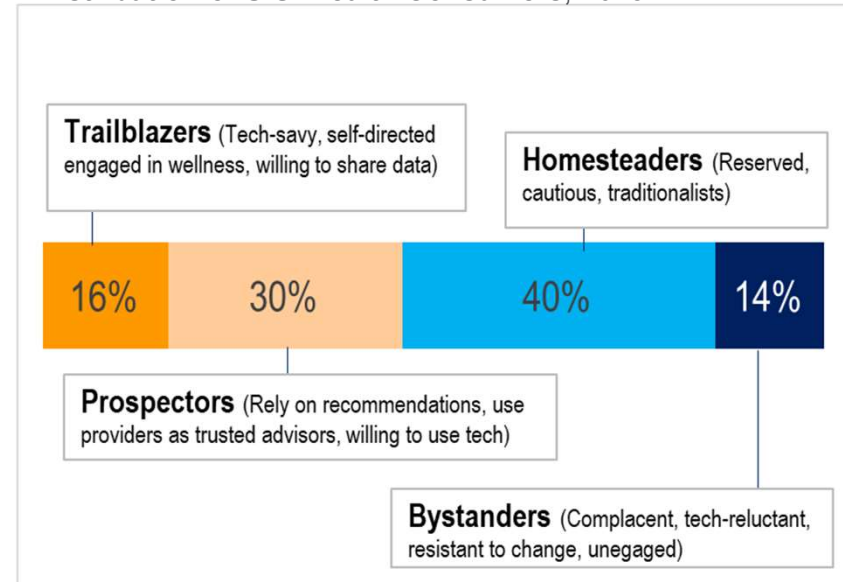
Source: Pitchbook. Excludes drug discovery, M&A and IPOs

World Smartwatch Market (Millions of Units)



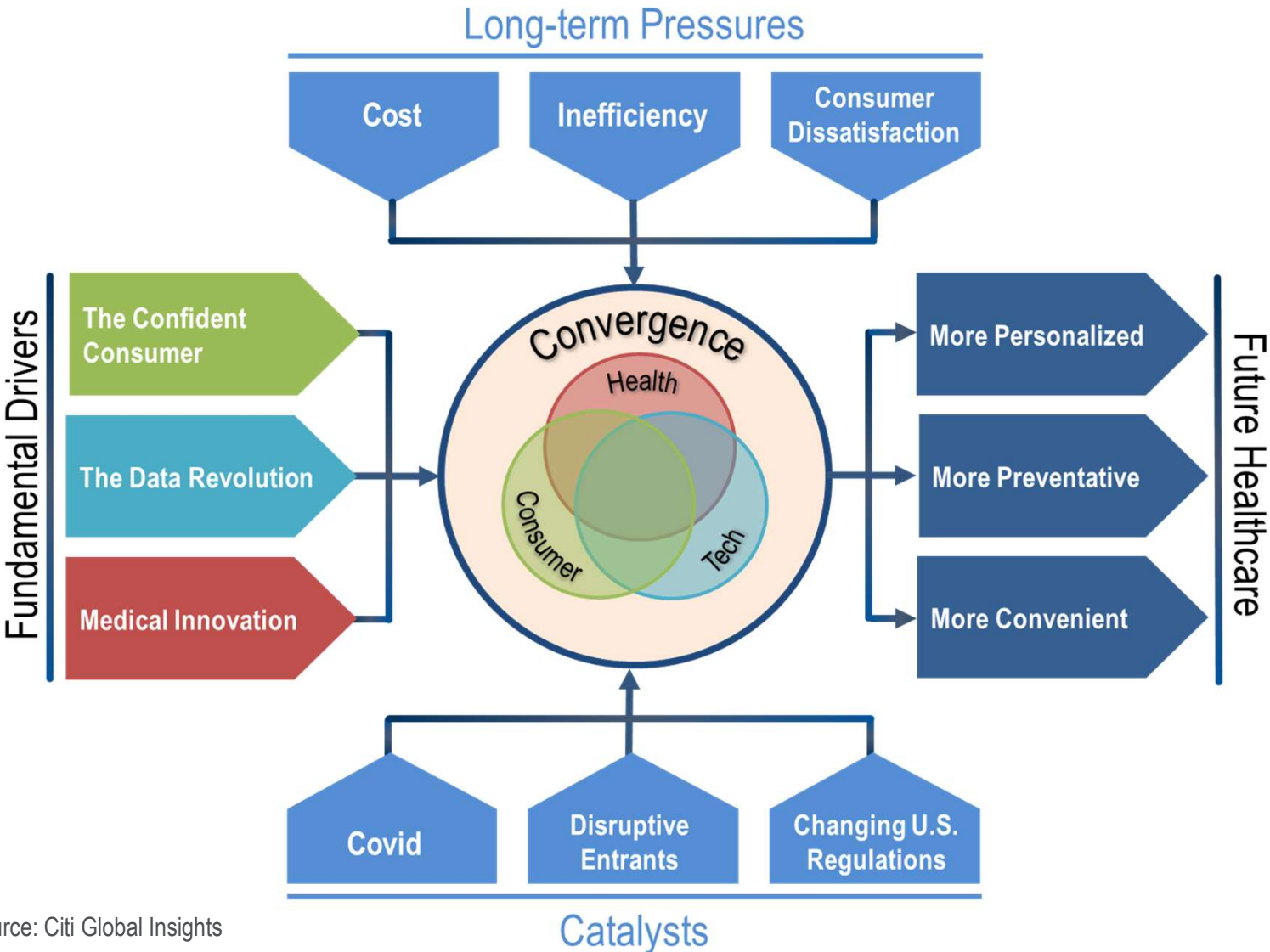
Source: CCS

Distribution of U.S. Health Consumers, 2018



Source: Deloitte

Healthcare is undergoing a profound transformation



Source: Citi Global Insights

Anti-obesity drugs likely to make a truly profound difference

Obesity causes irreversible harm over decades

GLP-1 drugs cause substantial weight loss

- 25-35% reduction in calorie intake
- **>15% loss of bodyweight** for semaglutide on average
- **>20% loss** for tirzepatide

GLP-1s help with many diseases

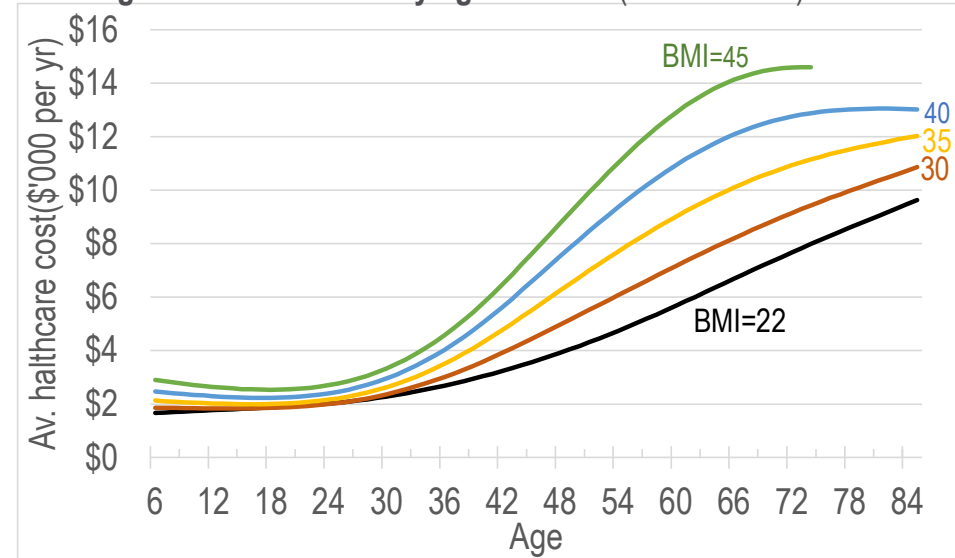
- Cardiovascular disease
- Diabetes
- Kidney disease
- Many cancers
- Dementia

Drugs are currently in short supply, and expensive

- Current global capacity: 25 mln patients
- Future capacity: 100-500 mln patients
- 100 new GLP-1 drugs under development

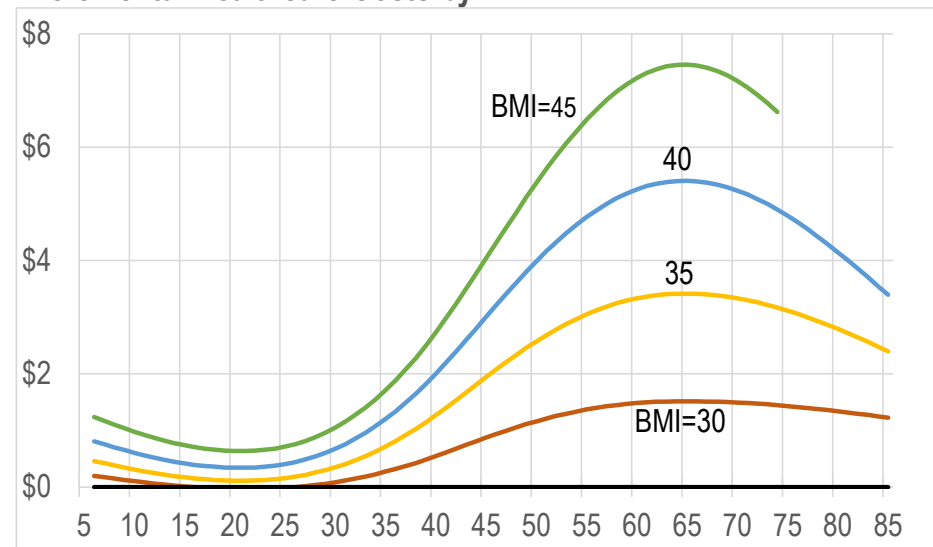
In next 1-5 years, GLP-1s likely to increase medical spending: increase in life expectancy of people with obesity-related diseases

Average healthcare costs by age and BMI (U.S. 2011-16)



Source: PlosOne

Incremental Healthcare Costs by BMI



Source: PlosOne

AI is likely to affect healthcare profoundly

AI's impact on Health may be more important than any other sector

- Universal need; ever-increasing demand
- 15-20% of GDP in each country
- Inefficient – low penetration of “tech”

Medical imaging

- Already widely used
- X-rays, CTs, MRIs
- AI can interpret images more accurately than humans

Healthcare admin

- Biggest opportunity for AI?
- 36% of U.S. clinicians spend more than half their time on admin¹
- Average U.S. doctor spends 13 hours a week on prior authorizations²
- Payments flows opaque and inefficient
- So far resistant to “tech” solutions
- 15-35% of the cost of all healthcare ≈ \$1 trillion in the U.S.
- Opportunity to cut this by 1/3 ??

Drug development

- AI can understand proteins, DNA in ways humans cannot
- AlphaFold2 ==> Malaria vaccine
- Clinical trials will always be required – av length of time ~10 years

Co-pilots for clinicians

- Ambient note-taking can blend into medical prompts
- Evolving from “nice to have” to “immoral not to use”
- Nursing at 20¢/hr allows AI agents to perform tasks that were formerly uneconomic



¹OliveAI
²AHA

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