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Policy. Analysis. Advocacy.

Public Health Priorities and Funding: Policy Decisions

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Agenda

Housekeeping

Presentation is being recorded

- I. What is public health
- II. Public health funding for disease control
- III. US CDC priorities and funding

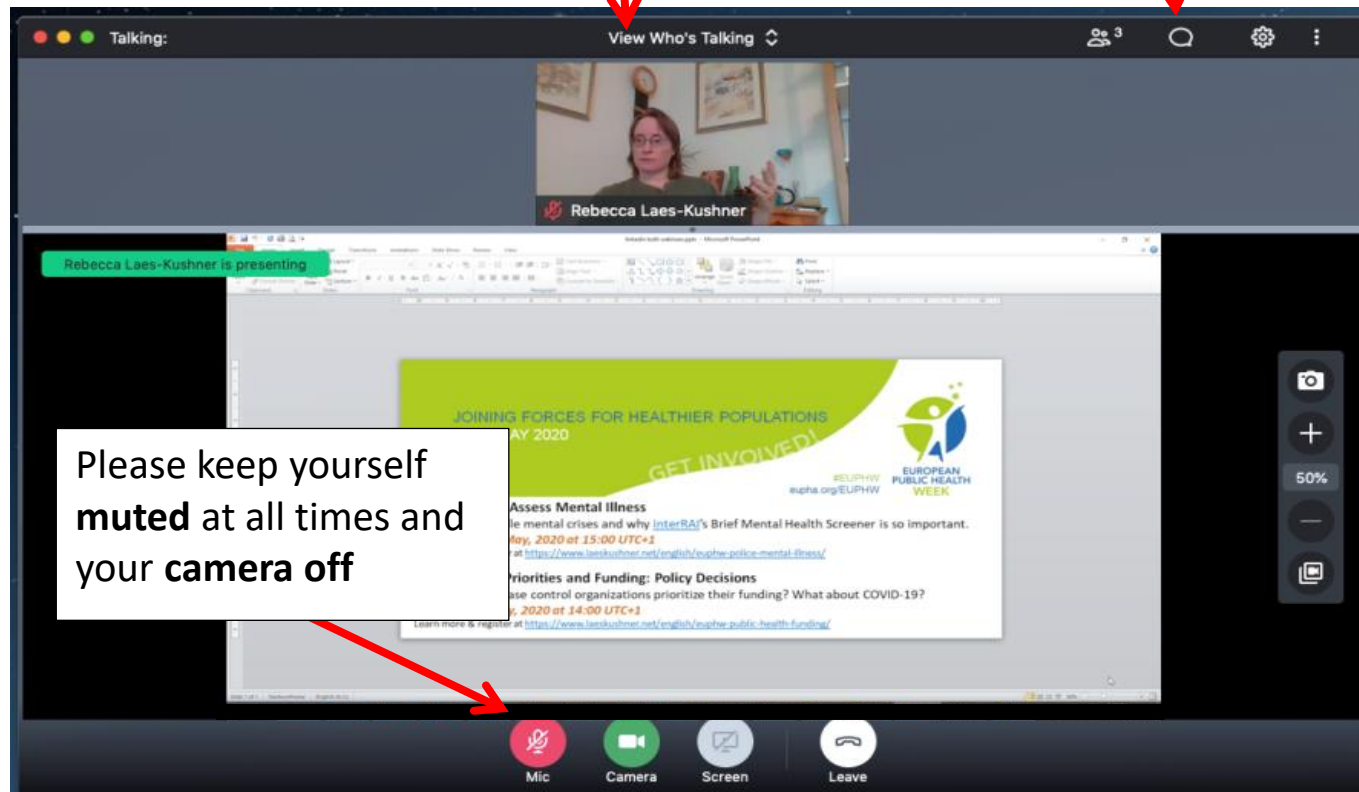
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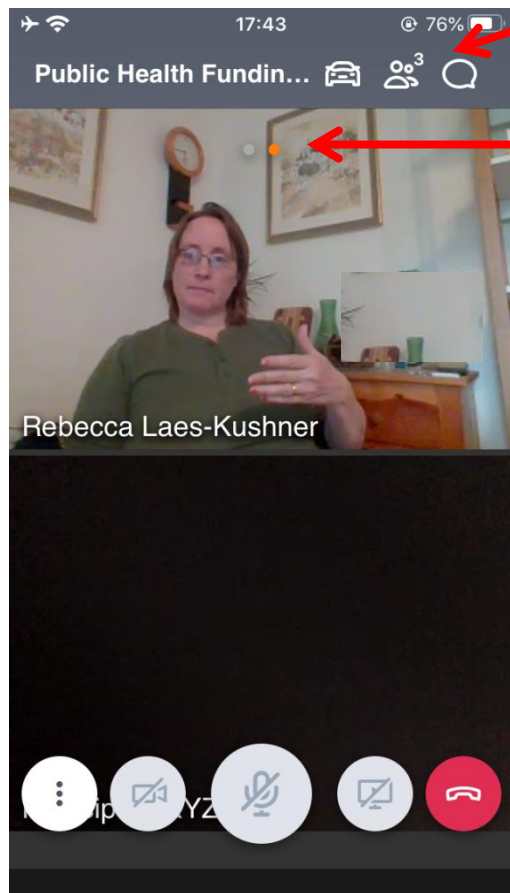
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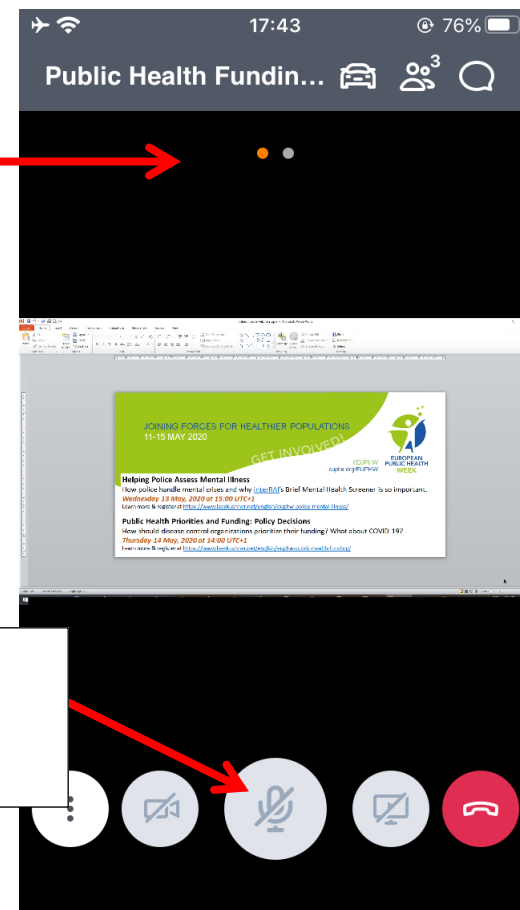
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Presenter

Rebecca Laes-Kushner (MPA) is a public policy expert. She has worked with and for state governments and NGOs in the United States on social welfare and health care policy issues, including bundled payments, accountable care organizations (ACOs), managed care organizations (MCOs), nursing facility care, quality measurement and health insurance regulations. She currently consults to NGOs in Switzerland on topics ranging from health care to the environment protection and sustainable development.

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I. What is public health?

- Improving infrastructure for common good
- Equity – good health for everyone

Public health discoveries

John Snow knew contaminated water spread cholera and was able to prove it during an outbreak in London in 1854, when he mapped deaths from cholera and identified a specific water pump as the source of contamination. He also proved a waterworks company pulling water from sewage-filled areas of the Thames River also led to more cholera.

Louis Pasteur discovered in 1863 how to heat wine sufficiently to prevent bacterial contamination. This knowledge was extended to the dairy industry.

Tu Youyou identified the ancient traditional Chinese use of sweet wormwood to fight fevers, a symptom of malaria; she and her team extracted a substance, artemisinin, which is used today to fight malaria. She and colleagues won the Nobel Prize in the category “Physiology or Medicine” in 2015.

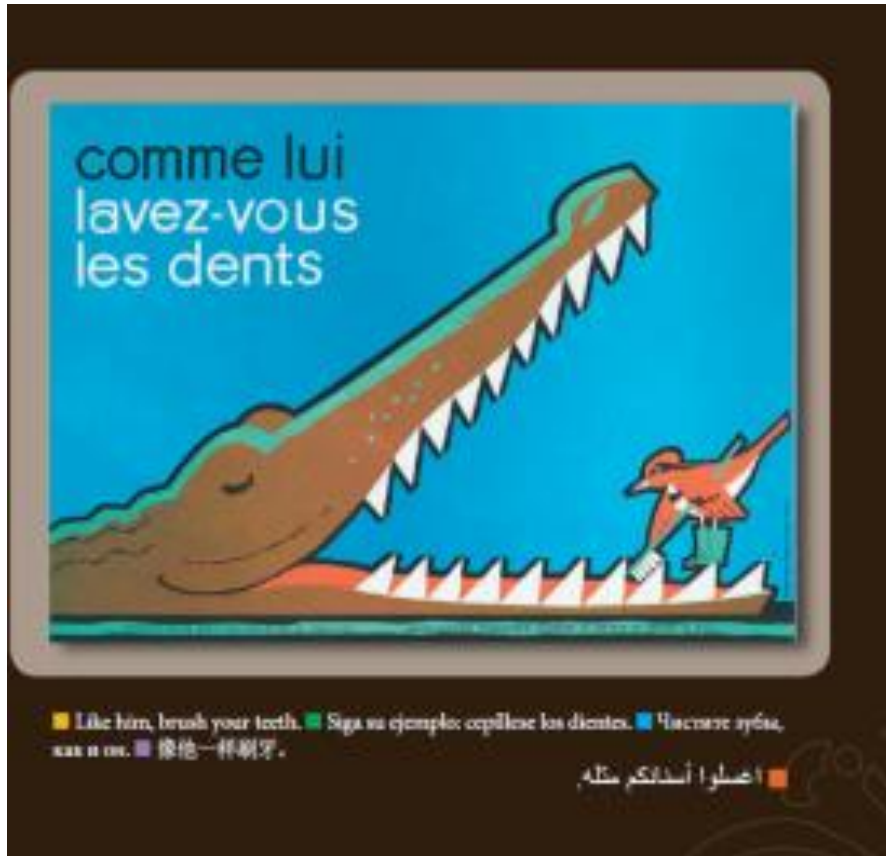
Brief history of public health

- Intertwined with modern science/research on how diseases spread
- England, Germany, France, USA in 1800s
 - Germany – Deutsche Ärztevereinsbund (1873)
 - Lillian Wald – “public health nursing” (1893)
- After WWII
 - WHO – health is right for everyone (1948)
 - US CDC – malaria (1946)

Public health priorities

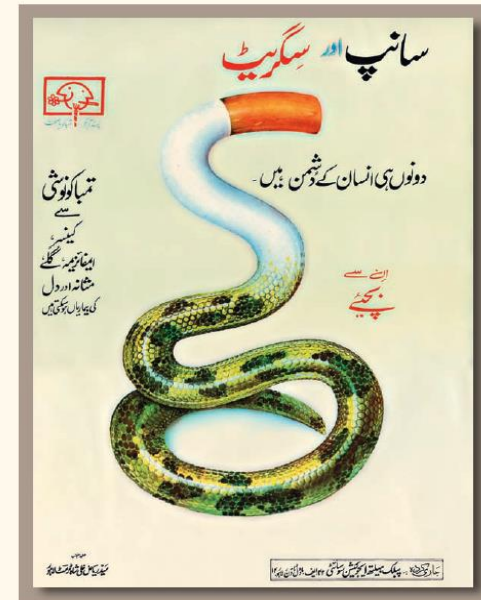
- **(Common) infectious diseases**, such as the flu, sexually transmitted diseases (STDs) and tuberculosis (TB)
- **Chronic & non-communicable diseases (NCDs)**, such as asthma, obesity, diabetes, cancer and mental health issues
- **Environmentally-caused diseases**, such as dysentery, cholera and other waterborne diseases; respiratory diseases caused by air pollution; and poverty-related diseases
- **Emerging infectious diseases**, including HIV in the 1980s and 1990 and SARS, H1N1, Ebola, and now COVID-19
 - One Health – zoonotic diseases
- **Other topics**, such as maternal health, birth defects, child mortality, developmental disabilities, and injuries

Public health messages



Like him, brush your teeth

Source: WHO



■ The snake and the cigarette: both are enemies of the people. Keep away from them. ■ Le serpent et la cigarette: deux ennemis publics. Evitons-les! ■ La serpiente y el cigarrillo: dos enemigos públicos. Pon terreno por medio ■ Змея и сигареты - враги человека. Держитесь от них подальше. ■ 毒蛇与卷烟: 均为人类之敌。请远离它们。 ■ الثعبان والسجارة عدوان للناس فابتعد عنهما.

The snake and the cigarette:
both are enemies of the people.
Keep away from them both.

Public health messages: drunk driving



Source: WHO

Public health messages: drunk driving



■ Six ways to protect yourself from avian flu. ■ Six moyens de se protéger contre la grippe aviaire. ■ Seis formas de protegerse de la gripe aviar. ■ Шесть способов защитить себя от птичьего гриппа. ■ 防范禽流感的六项措施。 ■ ست طرق تحمون بها انفسكم من انقلونزا الطيور.



■ Six mesures pour éviter la grippe aviaire. ■ Seis medidas para prevenir la gripe aviar. ■ Шесть шагов для избежания птичьего гриппа. ■ 预防禽流感的六项措施。 ■ ست خطوات لتجنب الإصابة بانقلونزا الطيور.

Six ways to protect yourself from avian flu

Source: WHO "Clean"

Public health initiatives

- Seat belts, airbags, and now rear-view cameras
- Infectious diseases: measles, mumps, rubella, smallpox, polio
- Safer childbirth for women (leading cause of death in women)
- Less cancer (smoking bans, mammograms, colonoscopy)
- Fewer cavities (water fluoridation, oral health)
- Workplace safety (black lung disease, workplace injuries)
- Food safety and nutrition labeling
- **Preparedness and response capabilities to emerging infectious diseases**

Test your knowledge

How many people die annually from these causes?

Disease	Mortality rate (2016)
1. Heart disease/stroke	a. Over 15 million people died from this
2. Diarrheal disease	b. Second most common cause of death in low-income countries
3. Deaths in Africa due to communicable, maternal, perinatal or nutritional issues	c. 56%
4. Alzheimer's Disease and Related Dementias (ADRD)	d. Almost 2,000,000 people died from this worldwide
5. Syphilis	e. 10 th most frequent cause of death for children under 5 worldwide
6. Road injury	f. Top cause of death for children 5-14 years of age worldwide
7. HIV/AIDS	g. 6 th cause of death for men 15-49 in the Americas
8. Self-harm	h. A leading cause of death for young women in southeast Asia and Europe
source: WHO mortality data https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death , https://www.who.int/gho/mortality_burden_disease/causes_death/top_10/en/ and https://www.who.int/gho/mortality_burden_disease/causes_death/region_text/en/	

Life without public health

- Costs for health care
- Societal costs

Case studies:

- a. Life expectancy
- b. Smallpox

a. Life Expectancy (1/2)

Swiss Life Expectancy

1876 Switzerland:

- 27% of deaths <1 yr
- 8% 1-5 years
- 1% each age >5

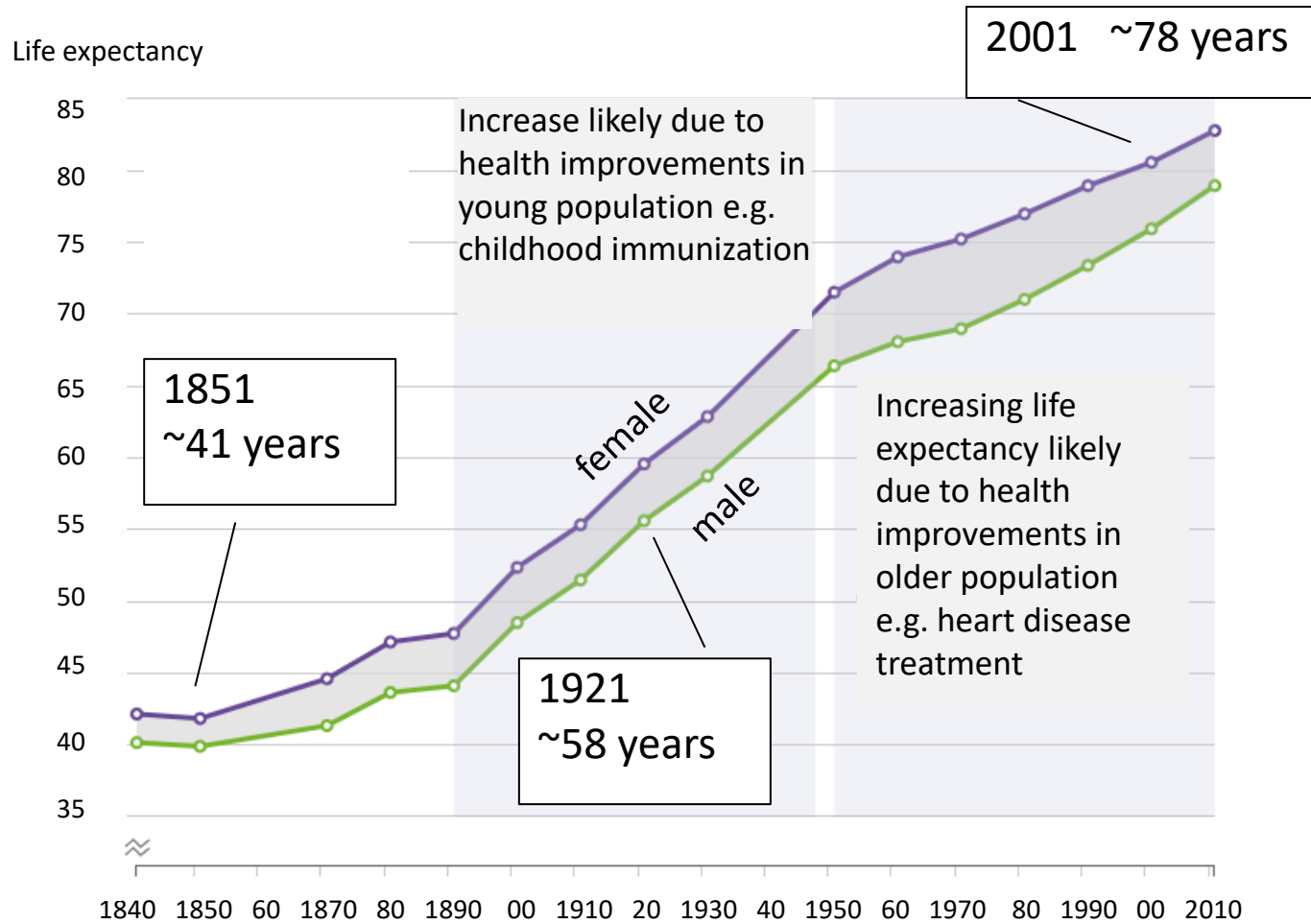


Year	Avg age
1876	40.19
1880	42.47
1885	43.92
1890	45.01
1895	46.93
1899	49.31

Source: <https://www.mortality.org/hmd/CHE/STATS/E0per.txt>

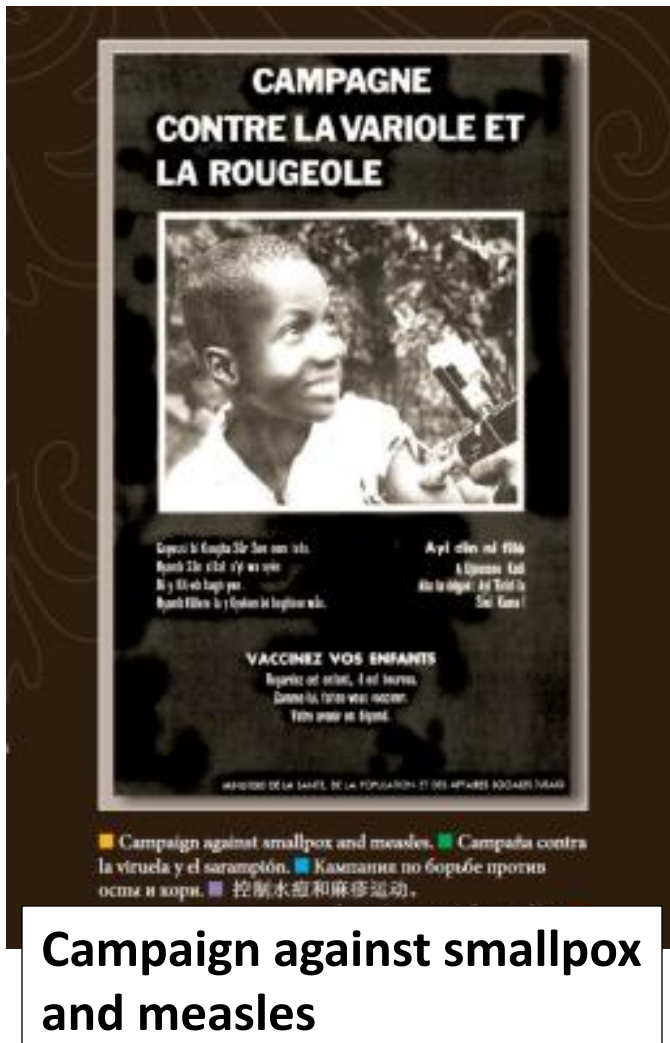
a. Life Expectancy (2/2)

Life expectancy at birth, England and Wales, 1841 to 2011



Source: Decennial Life Tables, ONS

Public health messages: smallpox



Poster promoting youth vaccination for smallpox and measles

c. Smallpox

The Speckled Monster
by Jennifer Lee Carrell

- 2 figures championed smallpox vaccinations in 1700s London and Boston
- based on Ottoman (Turkey) and African slave (US) practices
- Eradicated worldwide 1980 – WHO public health initiative



Source: <https://www.immunize.org/photos/smallpox-photos.asp>

Why public health?

- Without public health initiatives, we'd be facing
 - Infant mortality
 - Maternal deaths
 - More deaths from malaria, HIV, other communicable diseases
 - Earlier deaths and lower quality of life in old age
 - More deaths from...working conditions, lack of sanitation/clean water, injuries, car accidents, cancer
 - Etc.
 - Etc.
 - Etc.
 - Etc.

II. Funding for disease control

Distinguish between organizations that:

- provide regular health care services (such as health systems)
- promote public health initiatives (such as national public health associations)
- have a **mandate for disease control**, may engage in research and policy development, act in a convening/facilitation role, or provide direct provision of outreach and care for public health initiatives (such as the WHO).

Disease Control Organizations

- The **World Health Organization** (WHO) works to promote health, improve the health of vulnerable populations, promote universal health coverage and protect a billion people from health emergencies. Founded 1948.
- The **European Center for Disease Prevention and Control** (ECDC) focuses on infectious diseases with surveillance, epidemic response, and public health preparedness. Founded 2005 by EU.
- The **U.S. Centers for Disease Control and Prevention** (US CDC) works to protect Americans from health, safety and security threats, including chronic, acute, and preventable diseases as well as health threats from human error, deliberate attack and global disease threats. It also promotes public health. Founded 1946 to fight malaria.
- **Africa Centres for Disease Control and Prevention** (Africa CDC) strengthens the capacity and capability of Africa's public health institutions as well as partnerships to detect and respond quickly and effectively to disease threats and outbreaks, based on data-driven interventions and programs. Founded 2016 after Ebola outbreak.
- **Indian National Centre for Disease Control** (NCDC), established as the Central Malaria Bureau in 1909, is now a national center of excellence for control of communicable diseases.
- **Pan American Health Organization** (PAHO) works with countries in North, Central, and South America to fight communicable and non-communicable diseases, improve health systems, and respond during emergencies and disasters. It is the WHO regional office for the Americas as well as an independent organization. Founded 1902.

Priorities of Disease Control Orgs

Type	Issue	WHO	US CDC	Euro CDC	Africa CDC	Indian Nat'l CDC	PAHO
NCDs	Chronic diseases and NCD prevention	X	X		X	X	X
NCDs	Birth defects, developmental disabilities		X				
NCDs	Maternal & child health, child mortality	X	X				X
NCDs	Injuries, occupational health, accidents	X	X			X	X
NCDs	Alcohol, substance abuse	X					X
NCDs	Tobacco	X	X			X	X
NCDs	Mental health	X					X
emerging infect	Identify emerging infectious diseases	X	X	X	X	X	X
emerging infect	Animal health, One Health		X	X	X	X	X
infectious	Immunizations	X	X	X	X		X
infectious	HIV/AIDS, STDs, hepatitis	X	X	X	X	X	X
infectious	Tuberculosis (TB)	X	X	X	X		X
infectious	Communicable diseases	X	X	X	X		X
Infect, environ	Hospital safety, antibiotic resistance	X	X	X	X	X	X
environ	Climate change	X		X		X	X
environ	Food and water-borne diseases	X	X	X	X		X
environ	Air, water pollution	X				X	X
environ, other	Natural disasters	X		X			X
other	Health equity	X		X			X

Choosing public health priorities

- 57M deaths in 2016 worldwide
- Top causes: (>50% of deaths)
 - Heart disease
 - Stroke
 - Pulmonary disease
 - Diabetes
 - Lung cancer
 - Alzheimer's Disease and Related Dementias (ADRD)
 - Tuberculosis (TB)
 - Diarrheal diseases
 - Road injuries

<https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>

How big are their budgets?

Guess how big the budgets are for:

WHO

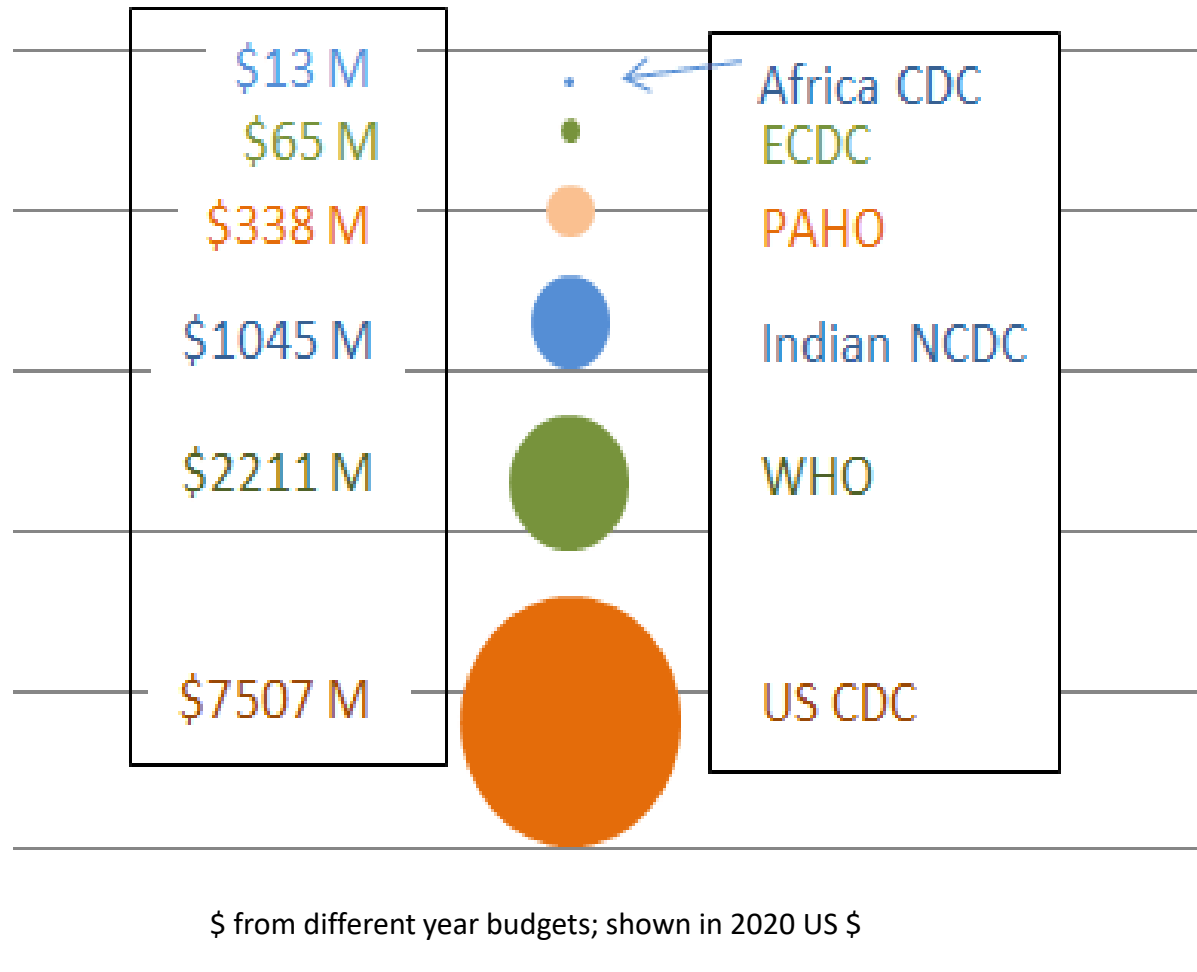
ECDC

US CDC

- \$5M?
- \$50M?
- \$300M?
- \$1B?
- \$5B?
- \$10B?
- Other amount you think is close

All costs in US \$

Total Funding by Organization



Policy Question

- How should global funds be spent?
 - All on COVID-19?
 - How choose other priorities?
 - Birth defects?
 - Water, sanitation & hygiene (WASH) to prevent diarrhea, cholera, typhoid fever, E. coli, dysentery, etc.?
 - Vaccinations?
 - Alzheimer's treatments/research?
- Look at disease burden: # with disease, cost of treating, cost of prevention vs. savings
- Talk to experts – full picture

Return on Investment (ROI)

Sample program: Community Health Workers (CHWs) visit people at home to help manage their chronic disease (heart disease, diabetes)

(*numbers on this page only are not real)

Policy decisions about ROI

Social ROI



ROI must be >\$1 to have a positive financial return

CHW program costs*

- CHW salary \$200K
- Manager salary \$70K
- Supplies \$5K
- Admin/overhead \$40K

Total: \$315K

Health care savings*

- Reduced medication \$20K
- Fewer doctor visits \$40K
- Less ER usage \$100K
- Less inpatient stays \$470K

Total: \$630K

ROI: \$630 / \$315 = \$2 ROI for every \$1 spent on (this sample) program

Public health messages: vaccination



■ Protect your child: make sure he gets three doses before his first birthday. ■ Protégez votre enfant en veillant à ce qu'il reçoive les trois doses avant l'âge d'un an. ■ Protecta a se bije: complete las tres dosis durante el primer año. ■ Sematkan semua pemberian vaksinasi anak-anak di rumah sebelum usia setahun. ■ 一岁之内完成三次接种，可为孩子带来保护。



■ Libérer le Nigeria de la poliomyélite. Veillez à ce que chaque enfant soit vacciné. ■ Acabemos con la poliomyelitis en Nigeria. Aseguremos la inmunización de todos los niños. ■ Ocufojogbe Harepato on Imunizashon. Ofojocoma nannafashonko vakuro polio. ■ 利国摆脱脊髓灰质炎。确保每个孩子获得免疫。 ■ حرروا النيجيريا من شلل الأطفال. اكلوا التمتع لكل طفل.

Example #1: Measles

Prevention cost: 2 vaccinations, cost <US \$1 to \$8

Costs if get measles:

- Cost of health care
 - Home treatment
 - Complications: 1/10 kids get ear infection; ~1/10 people have diarrhea/dehydration; ~1/20 kids get pneumonia

Source: [https://www.cdc.gov/measles/symptoms/complications.html?](https://www.cdc.gov/measles/symptoms/complications.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fmeasles%2Fabout%2Fcomplications.html)

[CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fmeasles%2Fabout%2Fcomplications.html](https://www.cdc.gov/measles/symptoms/complications.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fmeasles%2Fabout%2Fcomplications.html)

- Household economic burden: time off, more sick in household
- Controlling outbreak: US 2019: 63 cases - \$1M health care staffing = \$16'000/case
 - Only 91% vaccination rate in region

Source: US CDC https://www.cdc.gov/mmwr/volumes/68/wr/mm6841e1.htm?s_cid=mm6841e1_w

Herd immunity

- When sufficient people are immune (vaccine / had the disease) then infectious disease is harder to spread because people aren't getting sick
 - Not perfect – **unvaccinated can still get sick**
- Need vaccination rate of 93% - 96%, depending on disease (common infectious diseases)
 - NY region too low at <91%

Measles ROI



Per person vaccination costs

\$17 for 2 doses

\$30 for 2 visits to a health care provider

= \$47 total

Per case vaccination savings

\$465 average medical cost across pts

\$945 public health services

\$136 productivity loss

\$193 vaccinate kids & health care staff

= \$1'739 total

\$1'739 / \$47 = \$37 ROI

(or less, if including vaccination for entire region)

Source: Suijkerbuijk, A. et al. "Economic Costs of Measles Outbreak in the Netherlands, 2013–2014." (2015)

Vaccination ROI

- Study in Health Affairs (2016) found for every \$1 investment in vaccinations:
 - ROI of \$16 for savings from avoiding cost of illness
 - ROI of \$44 when including broader lifespan and quality of life
 - ROI of \$58 for measles

Source: Ozawa, S. et al. Return On Investment From Childhood Immunization In Low- And Middle-Income Countries, 2011–20 (2016)

Example #2: WHO

(2 yr budget)

Category	Amount (2 year budget)	% of budget
Communicable Diseases	\$805.400.000	18%
Noncommunicable Diseases	\$351.400.000	8%
Promoting health through the life course	\$384.300.000	9%
Health Systems (universal health coverage)	\$589.500.000	13%
Corporate services/enabling functions	\$715.500.000	16%
Polio	\$902.800.000	20%
WHO Health Emergencies Programme*	\$554.200.000	13%
Special programmes	\$118.400.000	3%
Total	4.421.500.000	100%

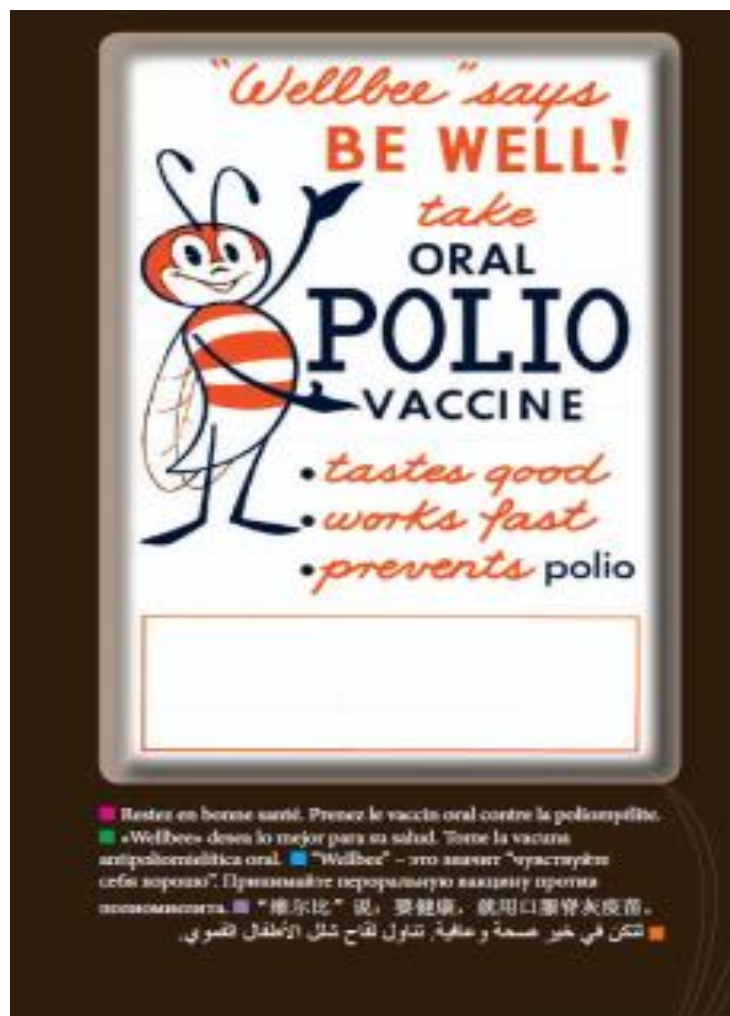
*Plus additional funded raised as needed for emergencies

source: WHO Program Budget 2018-2019

Public health messages: polio



Polio vaccination



Polio



Cost of treating 100'000 cases

- \$700 M (low income countries)
- \$750 Trillion (high income countries)

WHO 1 year budget for polio

\$450 M

$$\text{\$700 M} / \text{\$450 M} = \text{\$1.56 ROI}$$

Source: Zimmerman, M. et al. "Projection of Costs of Polio Eradication Compared to Permanent Control " (2020)

<https://academic.oup.com/jid/article/221/4/561/5576004>

WHO ROIs

- Other ways to spend \$450 M?

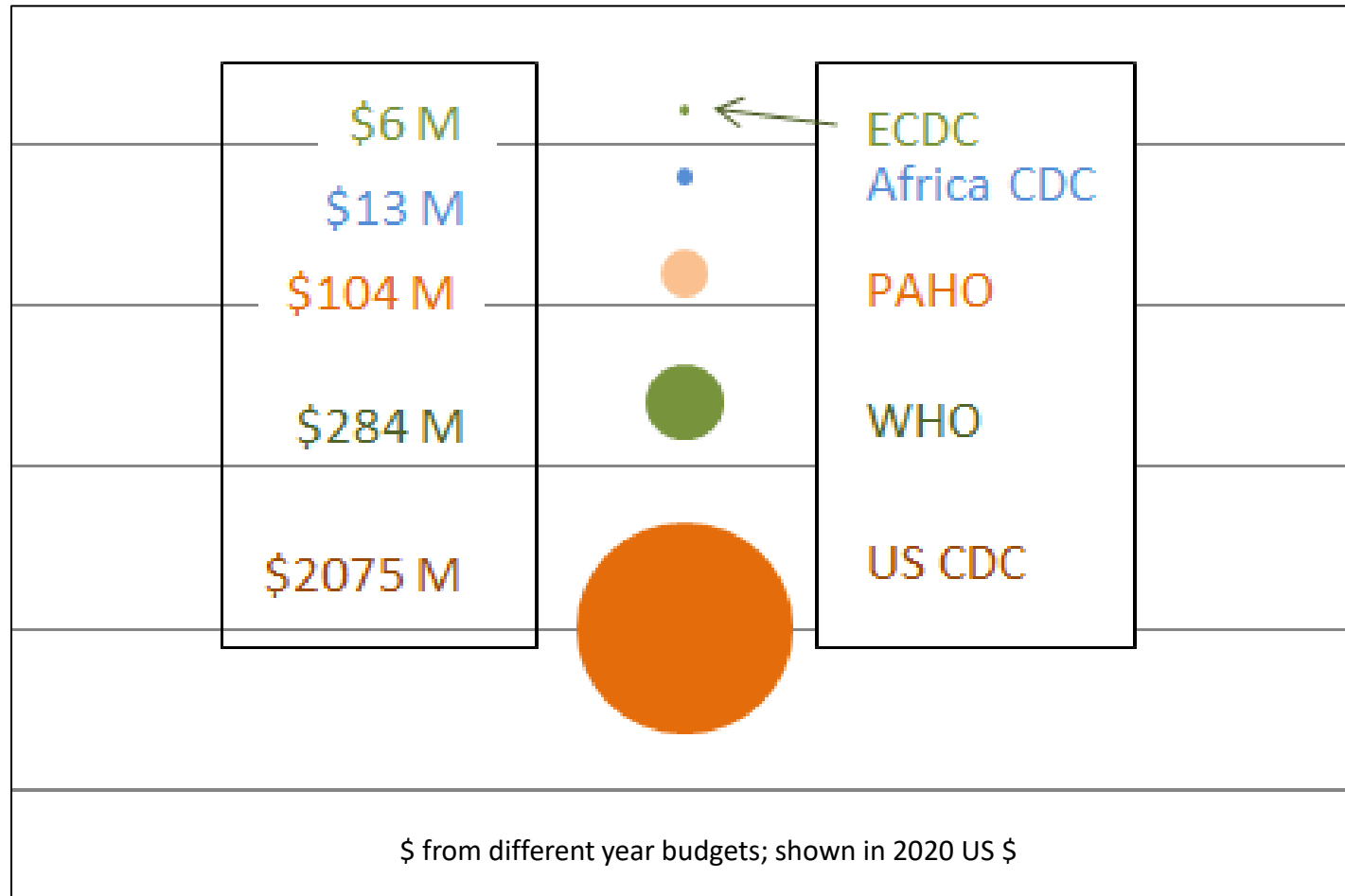
WHO Program	ROI	Lives saved
Universal health coverage¹	\$1.40	24.4 M
Making populations healthier¹	\$1.50 - \$121	3.8 M
Protection from health emergencies¹	\$8.30	1.5 M
Water and sanitation (WASH)¹	\$4.30	
Vaccination in low & middle income countries²	\$16 vaccine cost & supply \$44 economic & social benefits	

Source: 1. WHO. Proposed programme budget 2020–2021; https://www.who.int/water_sanitation_health/monitoring/economics/en/; 2. <https://www.jhsph.edu/departments/international-health/news/vaccine-return-on-investment-health-affairs.html>

“Pandemic” funding

- Line item funding for each organization for pandemic-related services (prevention, preparedness, monitoring, response to zoonotic and emerging infectious diseases, emergency response, etc.)
- Caveat - not spending entire funds on pandemics (preparedness for other health disasters)

Potential pandemic-related funding



COVID-19 ROI

- COVID-19 mortality rate
 - <300K deaths from COVID-19, 7% of infected
 - potential **maximum** 540M deaths / 7.8B population without quarantines, etc.
 - 540 M = 9 x annual global death rate of 60 M
 - **3,6 (actual) vs. 6.900 (potential) deaths per 100,000 world population**
- Water, sanitation & hygiene (WASH) deaths per 100,000 people
 - 46 out of every 100,000 people in Africa
 - 15 out of 100,000 in southeast Asia
 - 11 out of 100,000 in the eastern Mediterranean
- Non-Communicable Diseases (NCDs) – deaths per 100,000 people
 - >900 in Sierra Leone, the Ivory Coast
 - ~800+ in Guinea, Togo, Egypt and Yemen,
 - ~700 in Uzbekistan and the Ukraine
 - >500 in Zambia, Zimbabwe, Timor-Leste
 - 400 for the US, Ecuador and Germany
 - 350 for Greece, 300 for Switzerland and France

Source: WHO SDG indicator data

Policy Decisions (Questions)

- If don't fund vaccine for COVID-19
 - Lead to economic meltdown
 - Short-term implications (deaths)
- Ignore other health issues (for now)?
 - Short-term deaths (cholera, etc.)
 - Longer-term implications (future disease, health costs, deaths)

Source: WHO SDG indicator data

US CDC Budget Priorities

CDC FY20 budget (started 1 Oct 2019)

Funding category	FY20 US \$	FY20 %
Immunization and Respiratory Diseases	\$ 803 M	10%
HIV/AIDS, Viral Hepatitis, STI and TB Prevention	\$ 1.273 M	16%
Chronic Disease Prevention and Health Promotion	\$ 1.239 M	16%
Birth Defects, Developmental Disabilities, other	\$ 160 M	2%
Environmental Health	\$ 213 M	3%
Occupational Safety and Health	\$ 342 M	4%
Injury Prevention and Control	\$ 677 M	9%
Public Health Scientific Services	\$ 555 M	7%
Cross-Cutting Activities and Program Support	\$ 358 M	5%
Building and Facilities	\$ 250 M	3%
Public Health Preparedness and Response	\$ 850 M	11%
Global Health	\$ 570 M	7%
Emerging and Zoonotic Infectious Diseases	\$ 622 M	8%
Total	\$ 7.919 M	100%

Source: CDC FY20 Operating Budget

US health care spending - NCDs

- \$3.5 trillion (T) annual US health care spending
- Chronic and mental health conditions account for 90% of health care spending
- US CDC's FY20 budget - 16% chronic disease prevention
- Outreach for behavior changes



Health spending on chronic diseases and mental health

\$3.15 trillion (T)
(90% of \$3.5 T total spending)

CDC budget for NCDs

\$1.2 billion
(16% of budget)

Source: US CDC

<https://www.cdc.gov/chronicdisease/about/costs/index.htm>

US health care spending - STDs

- ~\$22 B US health care spending on HIV (*1 M people with HIV*)
- Sexually transmitted diseases – 16% US CDC funding (\$1,3 B)
- US CDC spends 6% of annual health care costs (\$1,3 B/ \$22B)



Health spending for
HIV /AIDS

\$21.5 billion

CDC spending on
HIV / AIDS

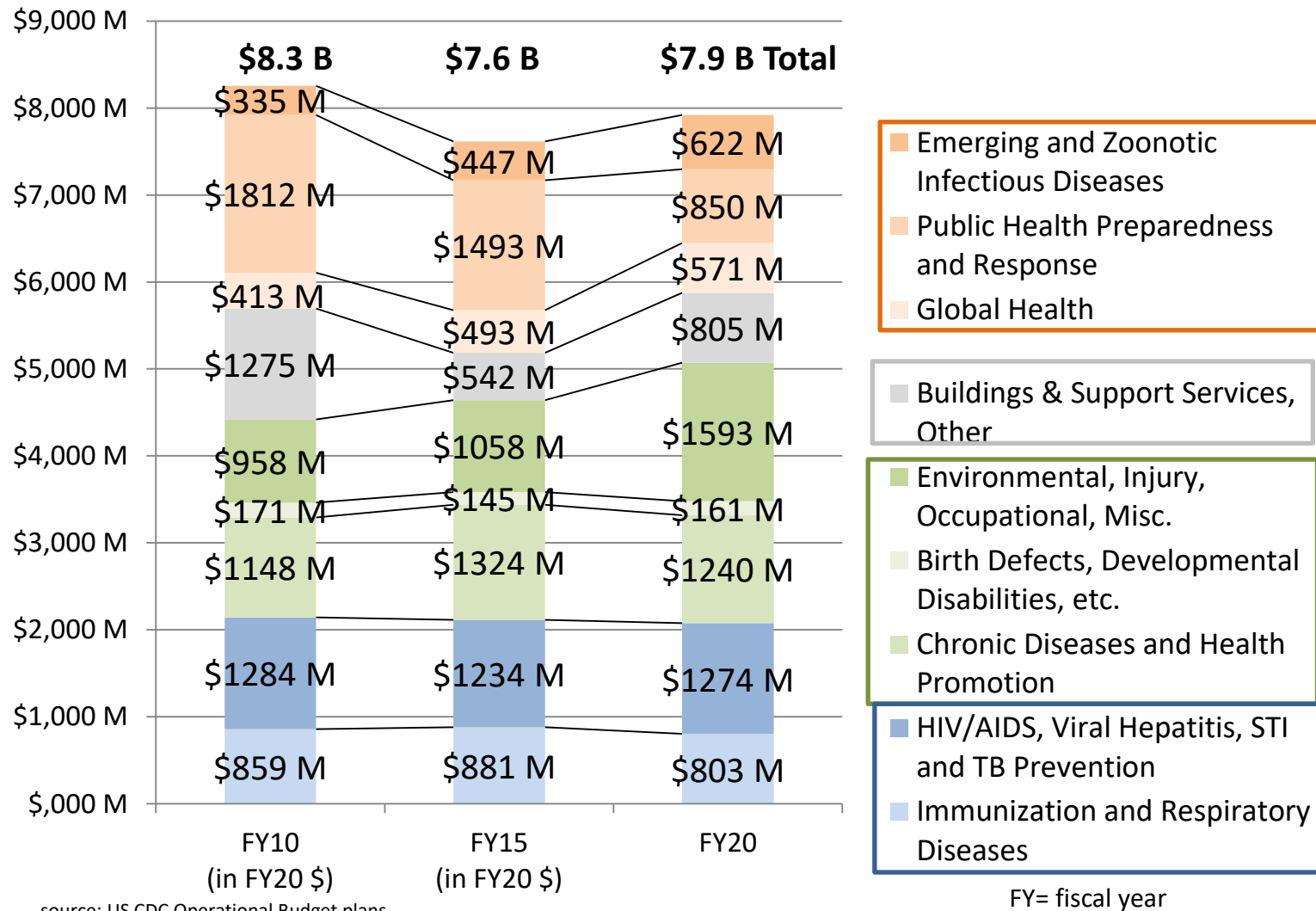
\$1.3 billion
(16% of budget)

Source:

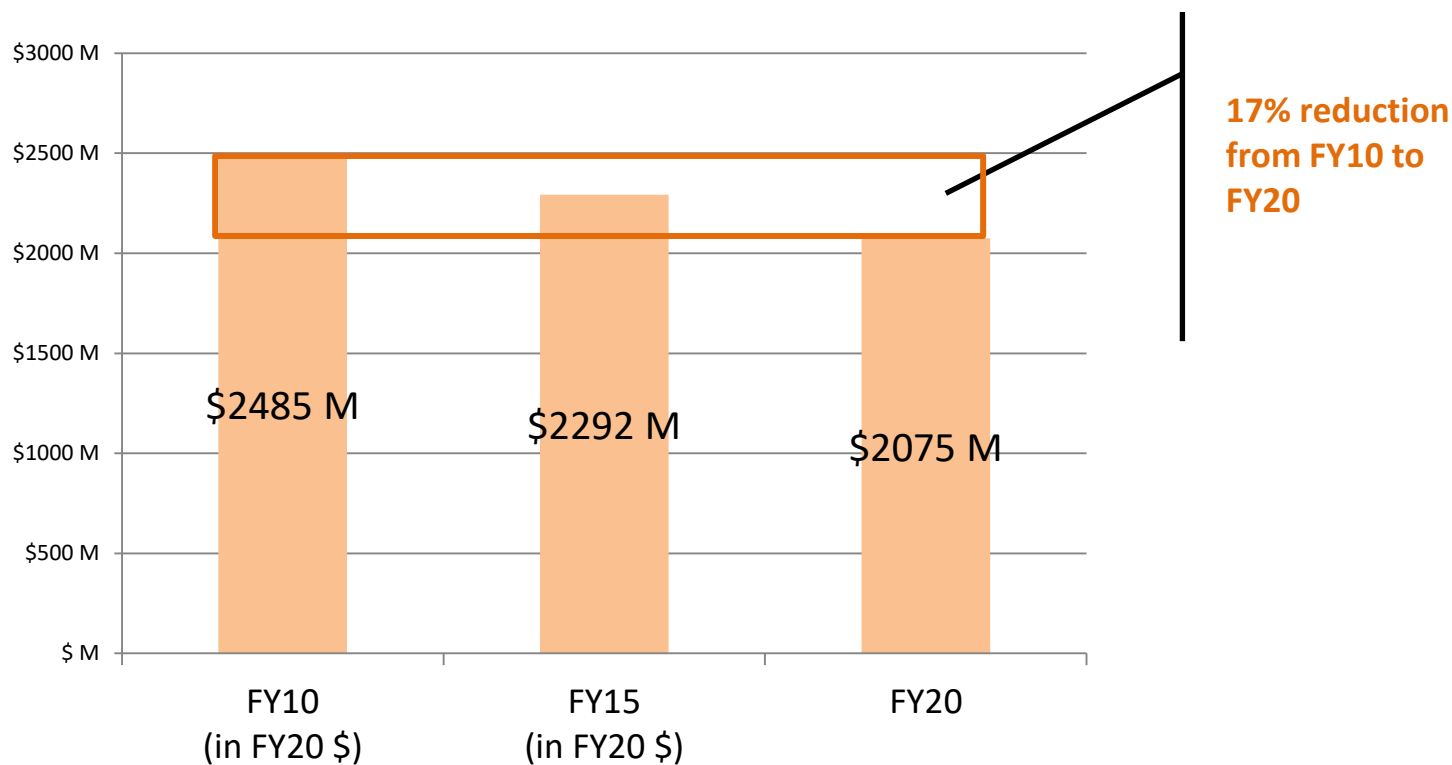
US CDC underfunded?

- Has spending decreased because US CDC budget cut?
- Look at funding in past 10 years

History of US CDC funding



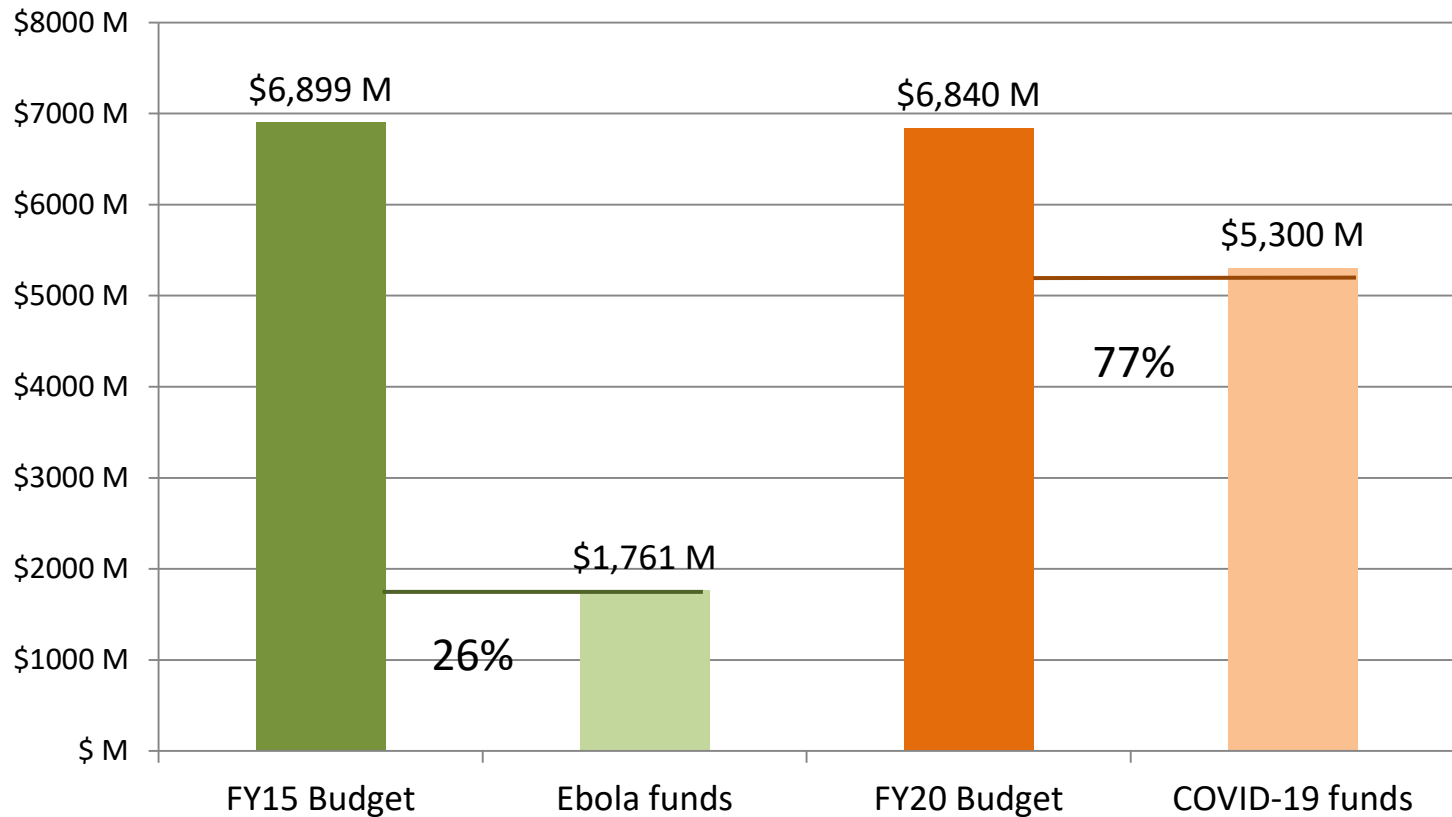
US CDC pandemic funding



Funding for Emerging Infectious Diseases, Public Health Preparedness and other epidemic-specific sub-programs in CDC Operating Budget

FY= fiscal year

US pandemic supplemental funding



FY= fiscal year

Public policy decisions are tough

- Where should public health/disease control organizations prioritize?
- Long view – infrastructure improvements
- Current crisis – pandemic unseen since 1918
- Not easy to decide



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Thank you and questions

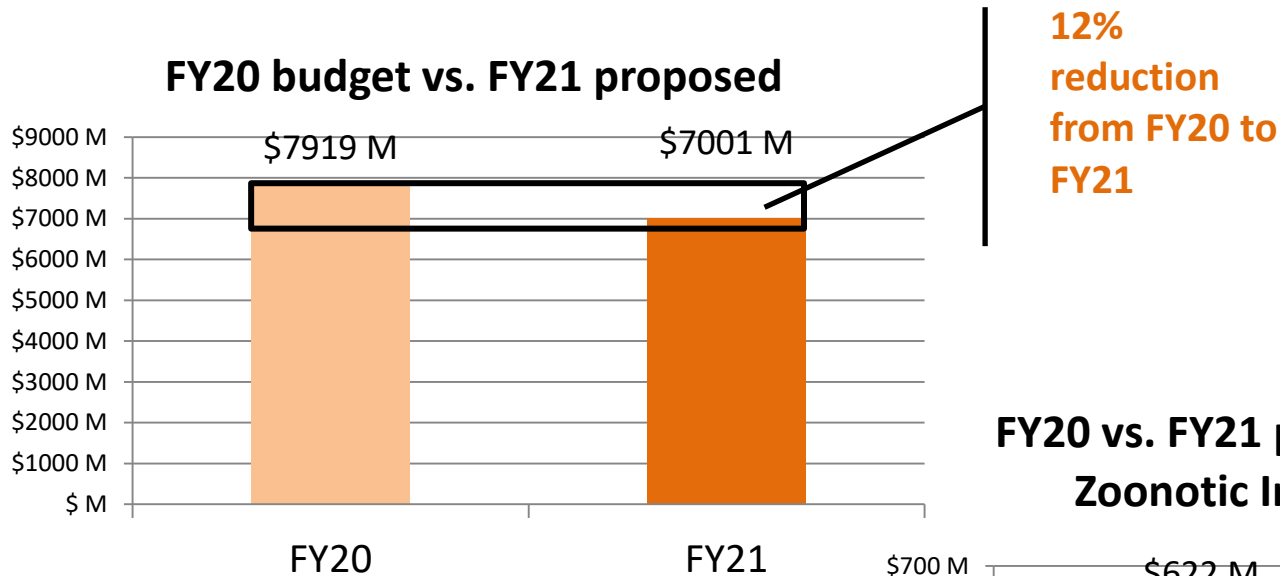
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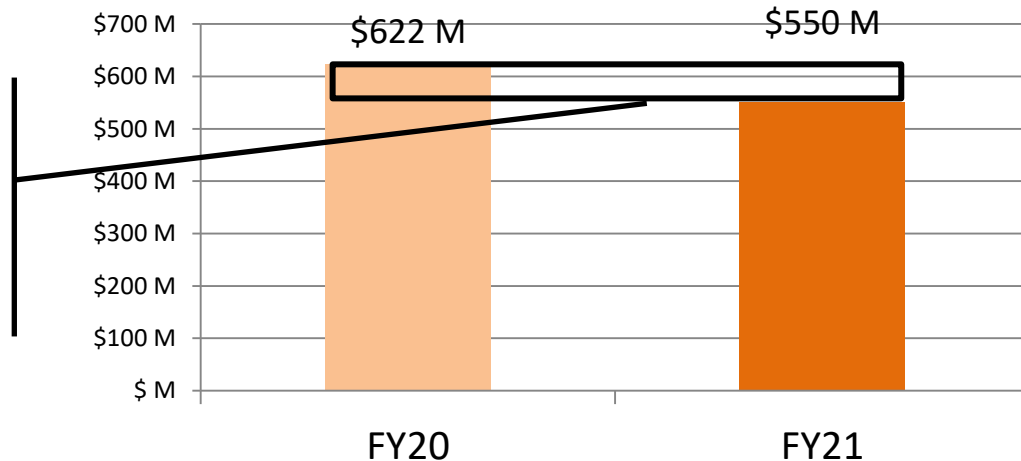
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CDC Budget: FY20 actual vs. FY21 president proposed



**12% reduction
from FY20 to
FY21**

FY20 vs. FY21 proposed: Emerging & Zoonotic Infectious Diseases



Budget timeline

- *5 February 2020 – cruise ship quarantined*
- 10 February 2020 – Budget presented by president
- *11 February – COVID-19 gets named by WHO*
- 10 March 2020 – “Not going to change CDC budget”
- *11 March 2020 – WHO declares pandemic*
- 19 March 2020 – Funds added to FY21 proposed budget for CDC, to total 8,3 B

COVID-19 timeline: <https://www.weforum.org/agenda/2020/04/coronavirus-spread-covid19-pandemic-timeline-milestones/>