What Can History Tell Us About the Potential Long-Run Human Fallout from COVID-19?

Based on Arthi & Parman. 2021. "Disease, Downturns, and Wellbeing: Economic History and the Long-Run Impacts of COVID-19," *Explorations in Economic History*, 79: 101381.

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Is the bulk of COVID-19 behind us?

- In short: history suggests **NO!**
- Much of the discussion to date around COVID-19 has understandably focused on stemming the immediate costs of the crisis—in particular, mortality, job losses
- However, there are potential outcomes of the current pandemic which also merit urgent attention: namely, **long-run damage to human capital and wellbeing**
- Why these outcomes, and why now?
  - The seeds for these adverse effects have already been planted
  - Damage to these outcomes could be tremendously costly both for affected individuals and for society
  - This damage is typically much easier and more cost-effective to remediate now, rather than after it has taken root and compounded

Why Might COVID-19 Cause Long-Term Harm?

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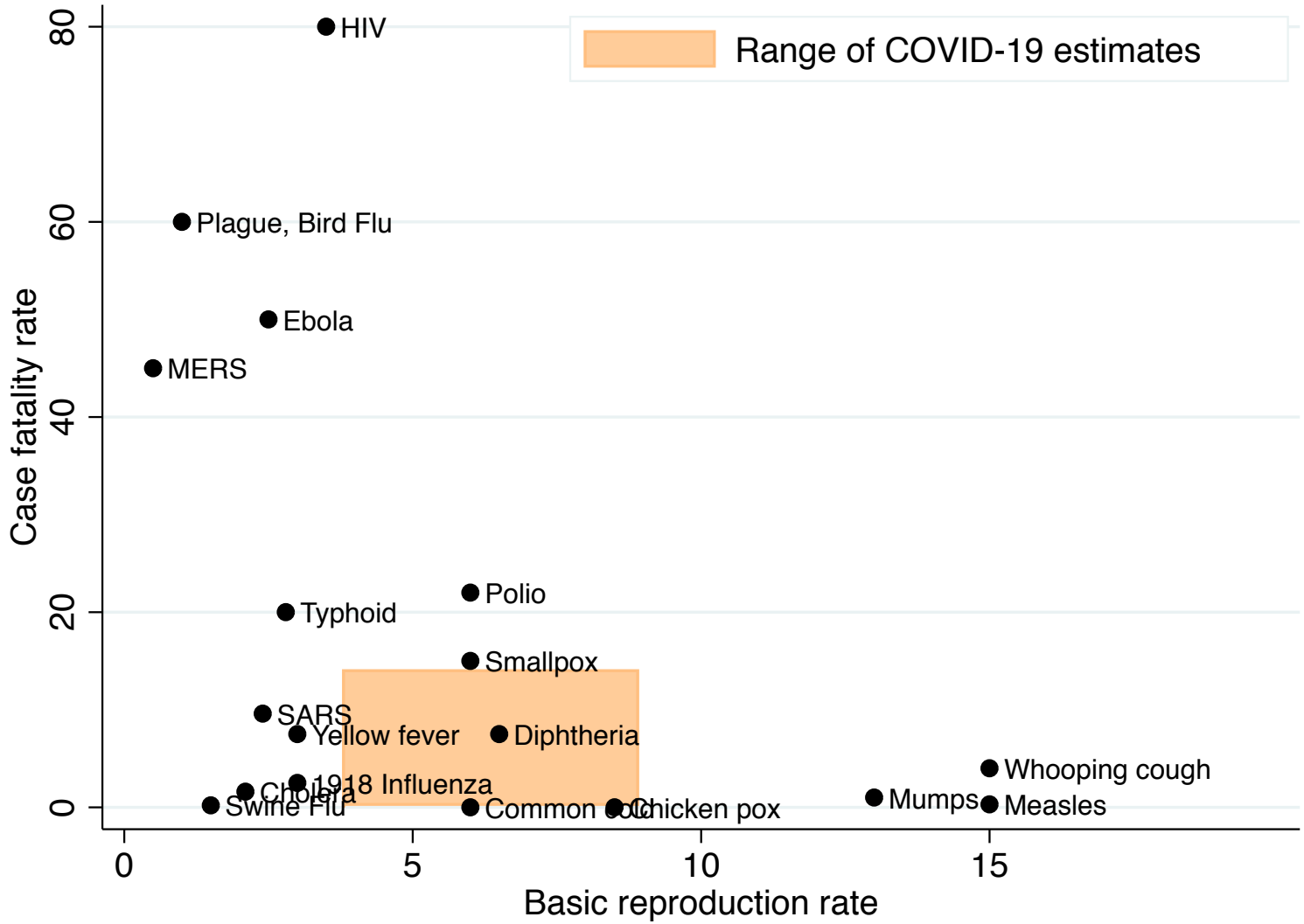
- **(1)** Key features of COVID-19's epidemiology—among them its extensive geographic reach, its relatively high ease of transmission, its comparatively low lethality, and its many emerging sequelae—have given rise to **widespread and potentially lasting morbidity among its many survivors**

COVID-19 in context: epidemiological parameters



Case fatality rate as a percentage by basic reproduction rate for various diseases

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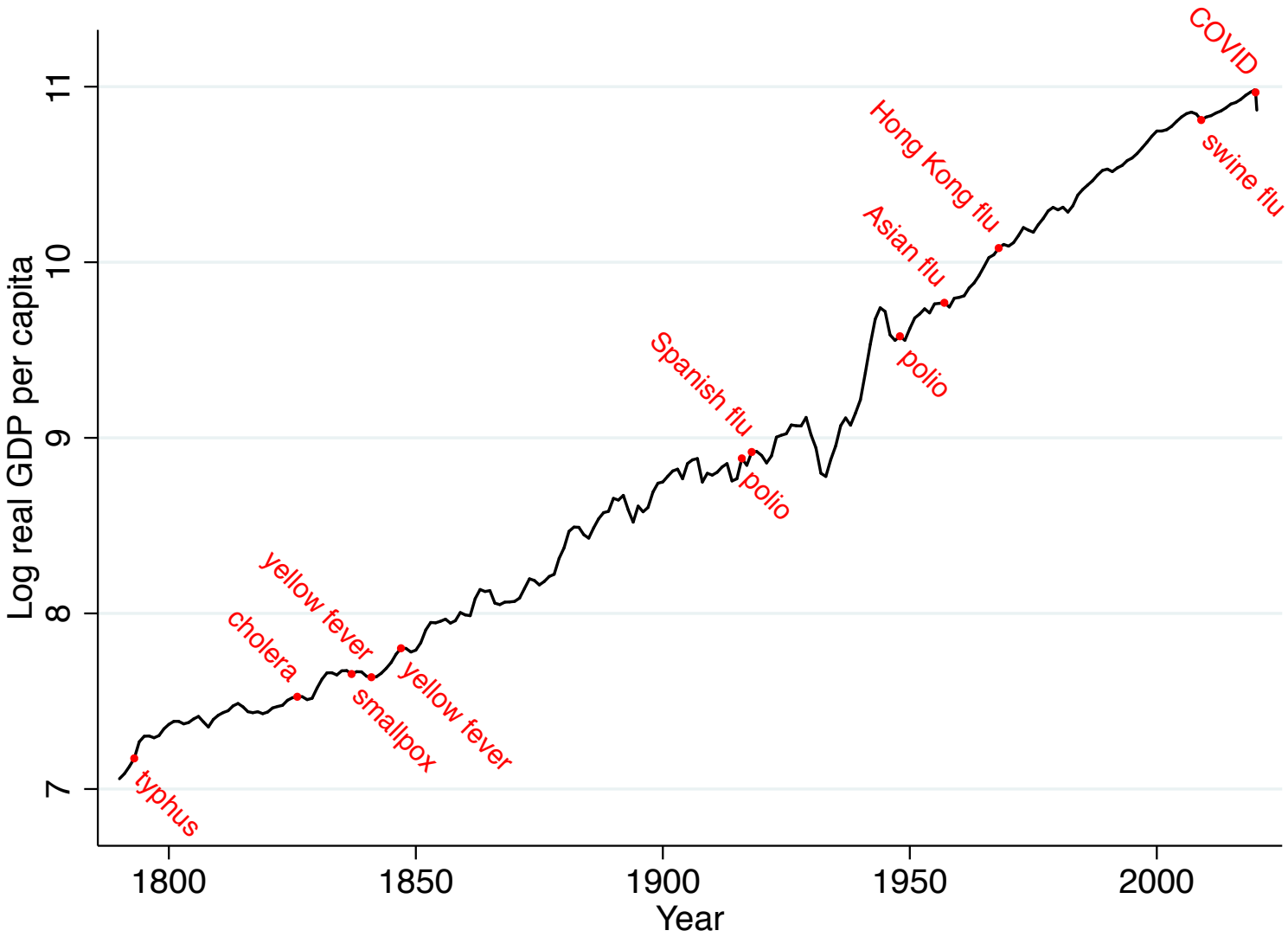
- **(2)** The pandemic has sparked an unprecedentedly large downturn, which in its own right has the **capacity to permanently scar trajectories of health and income**, even for those who do not fall ill themselves

COVID-19 in context: economic impact



U.S. log real GDP per capita with major epidemics highlighted, 1790-2019

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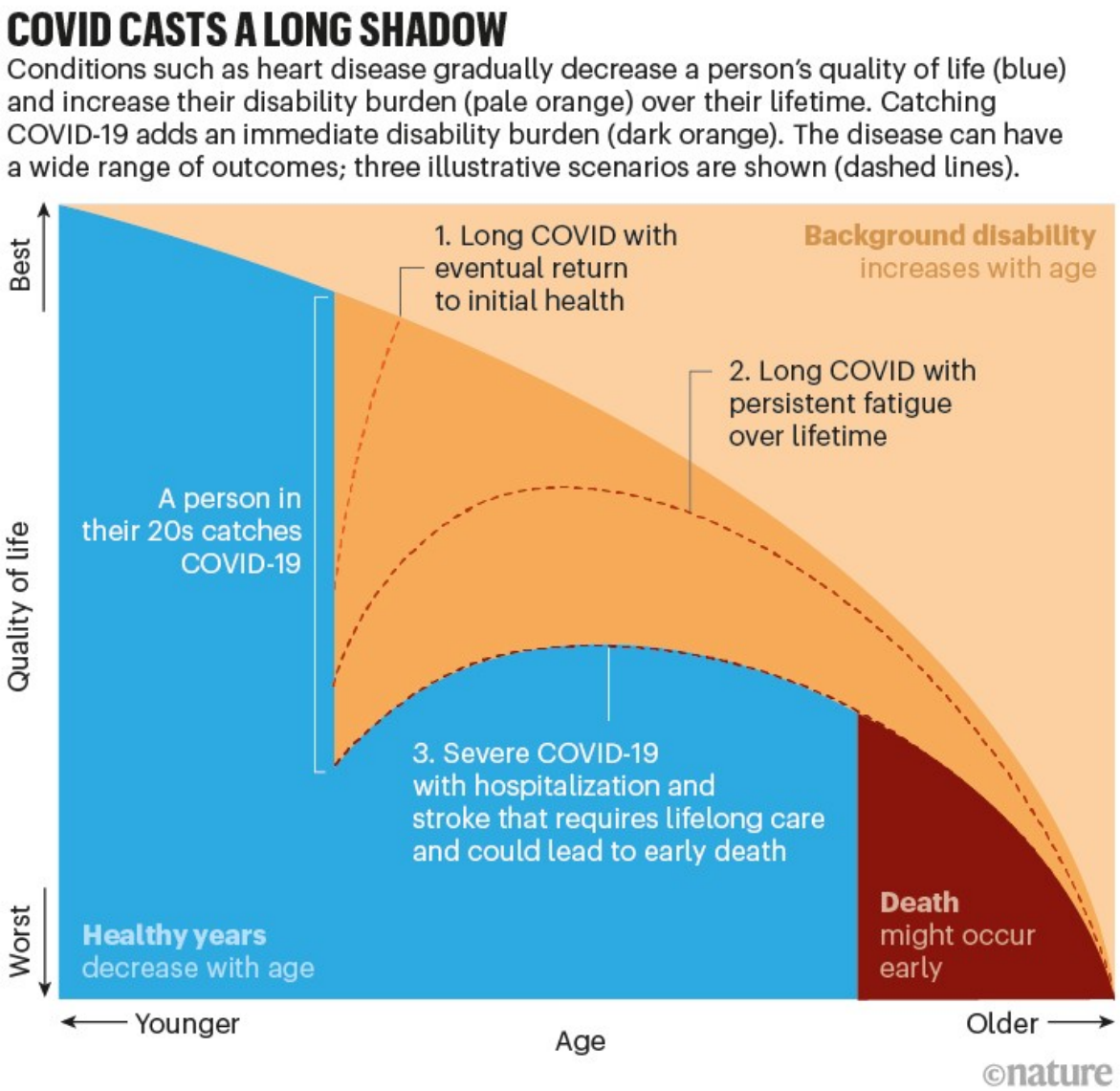
- **(2)** The pandemic has sparked an unprecedentedly large downturn, which in its own right has the **capacity to permanently scar trajectories of health and income**, even for those who do not fall ill themselves

- **(3)** A wealth of theory and evidence on human capital formation suggests that **shocks to health and income tend to interact with each other, and to compound over time**

Visualizing COVID's long-run costs



Reproduced from Briggs & Vassal (2021)

The immediate health burden of COVID-19

Briggs & Vassal (2021) estimate that up to 30% of health burden from COVID-19 could be due to pandemic-induced disability, not death

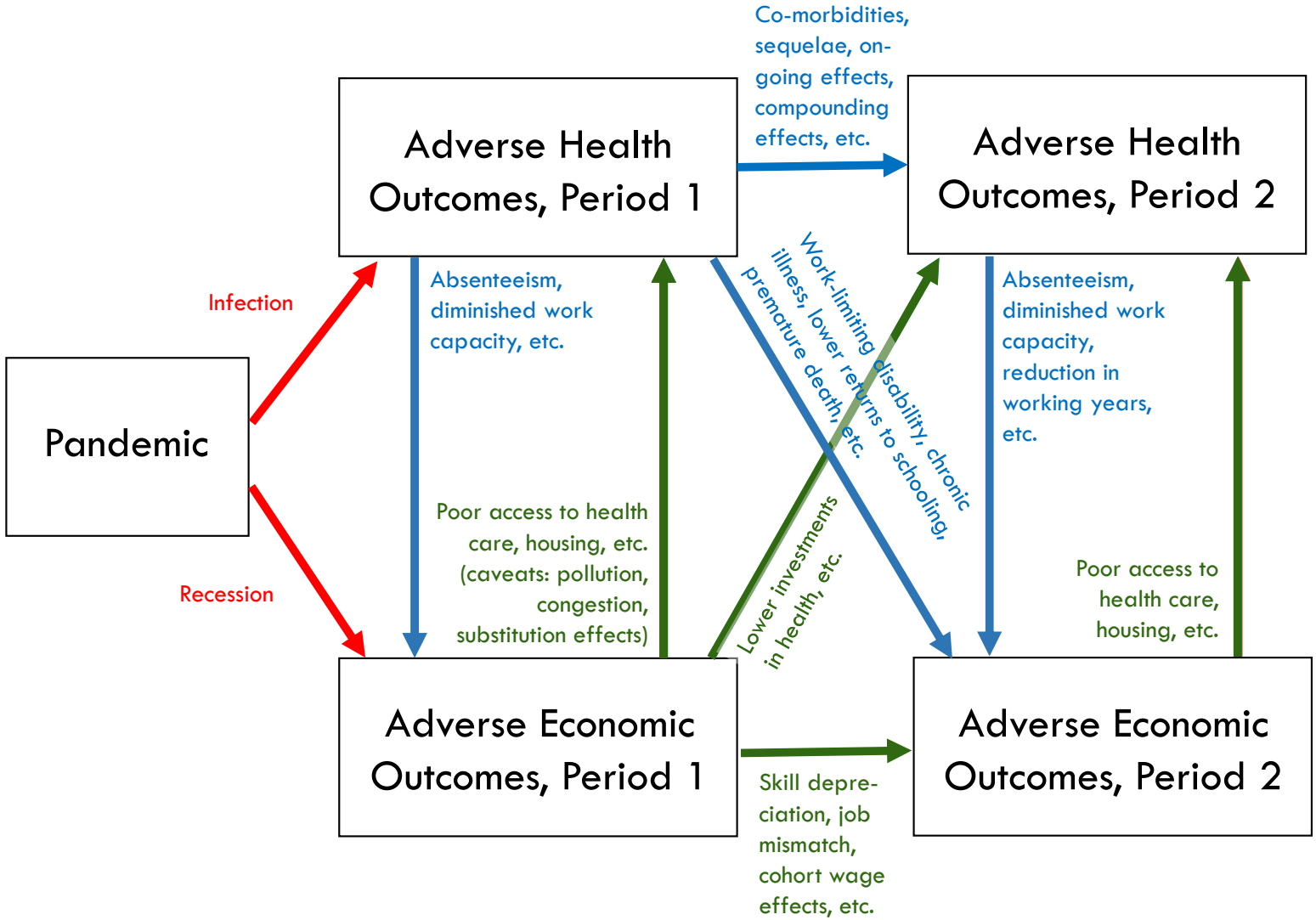
Summarizing recent studies, they show the COVID health penalty is already substantial:

- Co-morbidities: 6% of global population estimated to have 2+ conditions, many non-communicable, that raise risk of death/disability from COVID
- Sequelae: UK study shows 20% of those hospitalized with COVID-19 had a new disability following discharge; similar results from US for both hospitalized *and* non-hospitalized people
- Long COVID: Among adults not hospitalized, 10% have ongoing symptoms 12 weeks after positive test

These estimates do not yet account for:

- Potentially latent health issues (incl. in asymptomatic people, if any)
- The way the COVID *recession* may have impacted health/human capital
- Compounding and cross-pollinating effects over time (see, e.g., Heckman (2007), Almond & Currie (2011a,b))

Compounding & cross-pollinating effects (individual level)



In addition to all of this, broader effects include poorer quality of life and sense of physical and mental wellbeing; intergenerational transmission of ill health and low-socioeconomic status; increased strain on social safety net and medical infrastructure; reductions in economic output, in productivity, and in tax revenues; etc.

What Evidence Do We Have on Potential Long-Run Effects?

What might the fallout from COVID-19 look like?

- The facts of this pandemic suggest we might expect greatest harm only in the long run, with widespread generational scarring arising from short-run morbidity and economic disruptions
- The lack of close analogues and timescale issues make it difficult to extrapolate from recent experience; history offers a solution
- Next: examine how close historical analogues can inform our view of the potential long-run human impact of COVID pandemic/associated policies
  - Health channel: Focus on evidence from the **1918 Influenza Pandemic**
  - Economic channel: Focus on evidence from the **Great Depression**

Consequences through Health: The 1918 Influenza Pandemic

The 1918 Influenza Pandemic

Parallels COVID-19 in several key ways, including rate of transmission, global spread, and crude mortality rates

One of the most acute and widespread natural disasters in modern history (Taubenberger & Morens 2006)

- 500 million (1/3 global population) infected and symptomatic
- Case fatality rates at least 25x as high as other influenza epidemics
- Somewhere between 50-100 million individuals died globally

Timing, spacing, and age patterns were unprecedented

- Sharp, sudden, concentrated: 3 waves, with pandemic beginning Spring 1918 and lasting little over 12 months
- Distinctive W-shaped mortality profile (vs traditional U); half of influenza-related deaths during pandemic accrued to ages 20-40 (Taubenberger & Morens 2006)
- Morbidity profile follows this shape as well $\rightarrow$ potential for scarring

Short-run mortality effects & mechanisms

Baseline health status mattered: pandemic flu mortality was higher in locations with higher

- Pre-pandemic penumonia (bacterial condition with strong bio interaction with flu virus) (Acuna-Soto et al. 2011)
- IMR (proxy for population health) (Clay et al. 2019)
- Air pollution (environmental factor aggravating respiratory conditions) (Clay et al. 2019)

Pop density and related concerns (e.g., housing quality, number and composition of social interactions) mattered

- Pandemic came to cities earlier, and was worse there; effects linked to urbanization, residential crowding (Chowell et al. 2008; Mamelund 2006; Murray et al. 2006)
- Opposite gradient among urban/rural localities, where size was a virtue, suggestive of health sector capacity constraints (Acuna-Soto et al. 2011; Chowell et al. 2008)
- Transmission was localized, with tight spatiotemporal clustering (Grantz et al. 2016; Tuckel et al. 2006)

Short-run mortality effects & mechanisms

Factors affecting adoption of public health recommendations mattered, above and beyond association with povery

- Illiteracy (Clay et al., 2019; Grantz et al., 2016) and foreign-born status (Tuckel et al. 2006) predicted higher pandemic mortality
- Spillovers to native-born emphasizes importance of neighborhood-level disease transmission

Considering these mechanisms, easy to see the hand of income

- Though some studies explicitly do, difficult to disentangle from correlated mechanisms
- Can operate on individual and institutional (e.g., city or country) levels, with both richer people and localities—and the interaction of these—theoretically better equipped to weather the crisis
- Majority of studies document huge net impact of income
  - Nearly half the 30x cross-country variation in excess mortality explained by baseline pc income (Murray et al. 2006)
  - Tract-level homeownership (whether a proxy for wealth or other features of high-SES pops) predicts lower mortality (Grantz et al. 2016; Shanks & Brundage 2017)

Demographic effects

Reductions in sex ratio

- In US, due to temporal and cross-disease spillovers between influenza & tuberculosis (Noymer 2011)
- In Brazil, due to fragility of male fetuses (Guimbeau et al. 2020)

Changes in marriage and fertility behavior

- Norway (Mamelund 2004): Fear & uncertainty, social distancing, peculiarities of marriage law → deferred childbearing → drop in fertility in 1919 → baby boom in 1920
- Sweden (Boberg-Fazlić et al. 2017): short-term (selective) fertility rebound, but long-term reduction: marriage markets disrupted, income lost, rise in FLFP where male mortality high
- India (Donaldson & Keniston 2014): increase in child quality *and* quantity following rise in farm income among survivors

Phenomena which change the sex and age composition of the population, or the average health status of successive cohorts, are likely to have long-lived effects on economic development, population health, and individual wellbeing

Long-run effects

Lethality and peculiar age profile give rise to long-run effects $\rightarrow$ We might expect similar of COVID-19 since most who become sick survive

In some parts of US, about 1/3 of all childbearing-age women fell ill $\rightarrow$ scope for fetal insults through maternal morbidity (see, e.g., Barker (1992), Heckman (2007), Almond & Currie (2011))

Long-run effects

Early-life (especially fetal) exposure to 1918 pandemic led in later life to:

- Reductions in human capital: educational attainment, wages, socioeconomic status ↓; poverty, incarceration, welfare payments, physical disability, subjective health, various diseases ↑ (Almond 2006; Almond & Mazumdar 2005)
  - This despite pandemic-induced culling through ↑ miscarriages, stillbirths, IMR (Guimbeau et al. 2020; Mamelund, 2004)
  - Even in high-SES samples (Ogasawara 2018)
  - Men tend to be more severely affected, possibly due to sex differences in resilience to shocks
  - Parental investment reinforced rather than compensated (Parman 2015)
- Worse marriage prospects: Women suffer marriage market penalty, marrying earlier, to less well-educated spouses (Fletcher 2018)
- Intergenerational harm: lower education, occupational prestige, and family SES up to 3rd generation (Cook et al. 2019)
  - Could be due to combination of epigenetics, marriage market effects, role of income/education in facilitating children's access to human capital inputs

Consequences through the Economy:

The Great Depression & Other Historical Crises

Historical crises

Extent of economic disruption under COVID substantially greater than in other recent pandemics

Under COVID-19, neither mortality-related demographic change, nor morbidity/mortality-related labor supply appear responsible for the recession; likewise, limited evidence of role of lockdowns

- Instead, evidence points to some combination of disease-control responses and fear/uncertainty over virus that is responsible for the disruption
- These are themselves a function of political will, capacity for coordination, and medical tech/virus novelty
- Common misconception that shutdowns are primarily responsible, but Kahn et al. (2020), Goolsbee & Syverson (2020), and others suggest this isn't the case

Recessions of primarily economic origin may be better analogues

- Indeed, magnitude of disruption and government spending response is much closer to Great Recession and Great Depression

Business cycles & health in the short run

Net effect of downturns on morbidity/mortality is ambiguous *ex ante*

Particulars of the setting (e.g., size, nature, and origin of the shock; baseline level of population health; and strength of social safety nets) govern which effects dominate (Arthi et al. 2017; Cutler et al. 2016)

Several channels through which recessions may improve health

- Removing individuals from environmental and workplace hazards—pollution, traffic accidents, etc. (Muller 1989; Chay & Greenstone 2003)
- More time for breastfeeding, childcare, exercise, elder care, etc. (Dehijia & Lleras-Muney 2004; Miller & Urdinola 2010; Ruhm 2000; Stevens et al. 2015)
- Limiting capacity for unhealthy behaviors such as drinking and smoking (Ruhm & Black 2002; Ruhm 2005)

But recessions may also harm health:

- Compromised access to nutrition, shelter and medical care (Painter 2010; Griffith et al. 2013)
- Psychological stress leading to suicide or risky behavior (Eliason & Storrie 2009; Sullivan & von Wachter 2009)

Business cycles & health in the short run

Typically, net effects positive in HIC, but opposite in developing/historical settings (see, e.g., Baird et al. (2011) and Ferreira & Schady (2009))

- Where levels of baseline income/health are low, safety nets are weak, and cutting-edge medical technology is less available, even small losses in income can be devastating (Costa 2015; Heckman 2007)
- Moreover, there is less scope for offsetting positive spillovers and behavioral changes seen in more modern/affluent settings

Many historical recessions indicate countercyclical mortality

- Even in the presence of adaptive migratory responses, 1860s Lancashire Cotton Famine raised mortality in cotton regions, particularly amongst elderly (who were more sensitive to income shocks), amongst cotton hh (who faced unemployment and reduced hours), and among non-tradeables workers (whose livelihoods depended on success of local cotton industry) (Arthi et al. 2020a)
- Stuckler et al. (2012) find mixed evidence of beneficial health effects of Great Depression: small reduction in all-cause mortality, but only effects on heart disease ($\downarrow$), traffic fatalities ($\downarrow$), and suicide ($\uparrow$) could plausibly be attributed
- Fishback et al. (2007) find that had New Deal relief spending not intervened, Great Depression would have depressed birth rates and elevated death rates

Long-run and scarring effects of recessions

Long-run scarring channel may be especially relevant in settings where most people survive an adverse shock, only to contend with latent fallout

- Some effects stem from immediate impact on hh income $\rightarrow$ *in utero* nutrition (see Arthi (2018) and Fishback & Thomasson (2014) on Depression era)
- Other penalties arise from disruption to labor markets and human capital acquisition $\rightarrow$ labor-market scarring
  - Much of the evidence, taken from college graduates in 2008 Recession, is mixed—some suggest effects that diminish over first decade, others suggest effects are cumulative and permanent (see Rothstein (2021) and Kahn (2010) for in-depth reviews)
  - Effects often heterogeneous by skill; may be driven by mismatch in initial job placement (Faberman & Mazumder 2012; Liu et al. 2016; Oyer 2006; Sahin et al. 2014; van den Berge 2018), lower initial wages (Oreopoulos et al. 2012), reduced working time (Cockx & Ghirelli 2016), and delays in finding employment (Genda et al. 2010), among other factors.
  - Moreover, strategic responses to these shocks, such as migration (Feigenbaum 2015), temporary exit from the labor force (Hershbein 2012), and human capital acquisition (Charles et al. 2018, Barr & Turner 2015), may themselves have implications for short- and long-run labor market prospects, as separate from those arising directly from the initial shock

Long-run and scarring effects of recessions

These studies suggest downturns may have important "overhang" for directly-affected cohorts and the wider economy → Very-long-run and even intergenerational evidence on these issues can be especially valuable

Recent work on the Great Depression offers this perspective

- Moulton (2017) finds substantial earnings penalty amongst less-educated American men just entering the labor market in 1930; age-at-exposure penalty disappears in less-affected states
- Arthi et al. (2020b) show younger workers crowded out of best local jobs by older ones; while this is a short-run penalty, long-run implications may be positive (particularly in rural sector/South), considering rapid urbanization and incipient decline of ag sector
- Feigenbaum (2015) finds that by 1940, intergenerational mobility had fallen for men growing up in cities severely hit by the Depression; migration was a chief mechanism, and superior destination choice by rich sons emphasizes capacity of large adverse shocks to exacerbate rather than level preexisting inequalities

Who Is Most Affected? Inequality & Crisis

Demographics and distributional effects

Understanding the demographic profile of effects can (among other things) help when targeting policy responses

COVID-19:

- Much of the early policy conversation has been about the age profile of mortality risk and transmission, and/or urban-rural status
- Has highlighted and exacerbated preexisting socioeconomic inequality
  - In the US, disproportionate exposure of women, minorities, and low-income people to pandemic risks (e.g., through low-income jobs, frontline jobs)
  - Additionally, poorer access among these pops to quality healthcare, avoidance strategies (e.g., through low incomes, systemic barriers)
  - Baseline health status/human capital often lower, rendering them more vulnerable to adverse shocks
  - These groups, along with young workers, have also had substantially higher-than-average unemployment rates during this period (up to nearly 2x)
- Similar pattern for other modern pandemics including H1N1 (Quinn et al. 2011)

Demographics and distributional effects

Historical Pandemics:

- Outsize impact on low-SES and minority populations also has historical precedent
  - Impact of denser housing, worse conditions, higher occupational exposure, poorer access to treatment among poor: 1918 influenza pandemic hit poor first and hardest (Sydenstricker 1931; Mamelund 2018)
  - Avoidance/adaptation among rich: in 19th C yellow fever outbreaks and plagues in earlier centuries, wealthy residents fled the city (Dittmar & Meisenzahl 2017; Dinges 1995; Isenmann 2014)
- Many of the same mechanisms apply today as in the past, but others set it apart
  - Cities are much healthier today, but they are also more prevalent, much denser, and better connected via modern transport to other cities and to rural areas $\rightarrow$ pandemics become faster to spread and harder to control
  - Even in rural areas, nature of modern work places individuals in closer contact: to wit, workers at rural meat processing facilities have case rates an order of magnitude higher than general pop (Dyal et al. 2020)

Responding effectively to pandemics in short term, and dealing with fallout in long term, will require knowledge of distributional effects over time and space, and within societies

What Actions Might We Take Now to Help Mitigate Long-Run Damage?

Address the root cause

Get the pandemic under control both domestically and globally (e.g., through mass vaccination)

- Critical to successful economic reopening
- Reduces number of infections from which health/economic harms follow
- Lowers probability of mutuations that prolong and worsen the pandemic

Identify and redress incipient damage

Monitor and **account for non-mortality harms**, such as pandemic-induced disability, quality of life changes, employment outcomes, etc.

- Related: pay attention to groups facing the greatest burden of these less-visible, less-salient harms (namely, young people)

Target assistance to most-affected & most-vulnerable communities

- Health channels: women, racial minorities, foreign-born (because of disease exposure); young people (because of time horizon)
- Labor market channels: same as above + young children who may have missed out on school in quantity/quality terms, those at key transition points in their career/education (e.g., new labor market entrants)

Invest "preemptively" and aggressively, rather than waiting for for costs to snowball

- Interventions are most effective the closer to the original insult
- Reduces human suffering, spillovers to families of those affected
- Promotes growth, prosperity; reduces inequality, costs to safety net

Create the conditions for resilience

Invest in public health infrastructure that will allow us to respond swiftly and decisively to the next crisis

- "Once in a lifetime" pandemics have been becoming more frequent and in some cases, more transmissible/more deadly
- Investing in disease surveillance, public health/healthcare/medical infrastructure, institutions and procedures, etc. can help us be better prepared to manage the next one, and so, minimize or even altogether avoid short- and long-term harms

Improve baseline socioeconomic conditions

- Priorities: reduce poverty, reduce inequality, improve affordable access to health care (especially preventive care)
- Poor initial conditions make people BOTH more vulnerable AND less resilient to shocks, and limit ability to remediate them
- A same-sized shock will have a larger adverse effect on someone of lower health status/SES than on someone initially better off
- This is not only undesirable for its own sake, but also because these inequalities negatively impact *all* our health/living standards

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