COVID Lessons from India for other EMs

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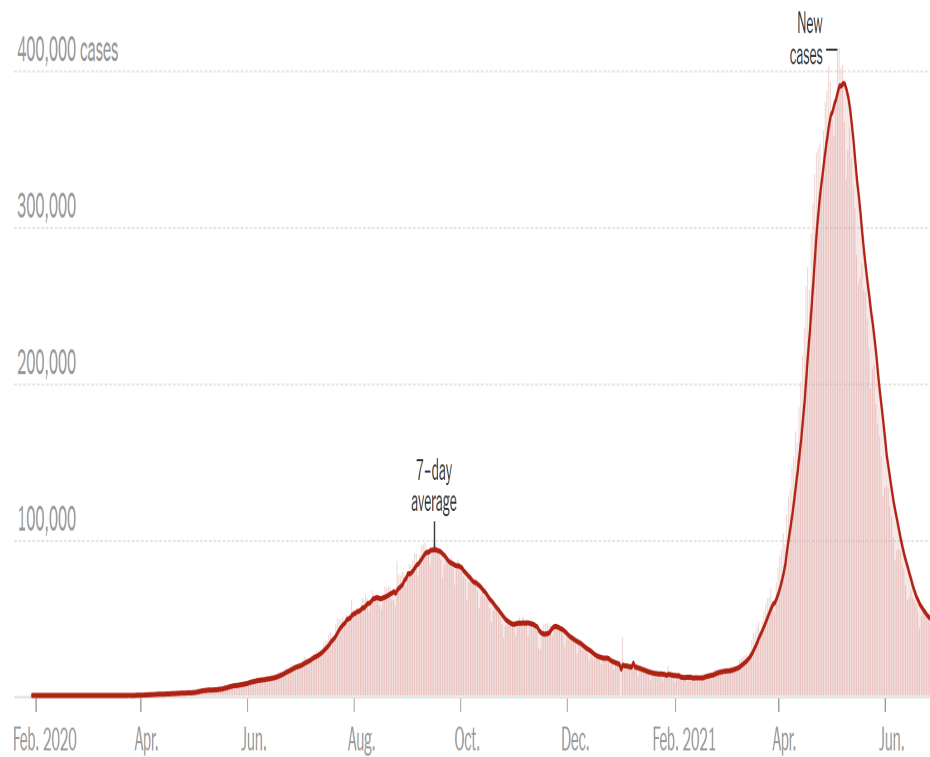Presentation for Markus Academy

1 July 2021

My experience with COVID

- New York
  - 1st wave, 2nd wave, vaccinations

- India
  - Infections and a critical patient in immediate family (2nd wave – Mumbai)
  - Several fatalities within one degree of separation (2nd wave – Mumbai, Delhi)
  - Close encounter with the medical healthcare system (15 April – 26 May 2021)

- Hard for me to separate COVID – the pandemic – from finance / economics
  - Exception: Perhaps the first "shock" of March 2020 reasonably exogenous?

- Are there lessons for Africa: Health? Vaccines? Economic/Financial policy?
  - *"What haunts me a lot is the Indian scenario which could very well happen in Africa . . . we are not out of the woods yet,"* John Nkengasong, Africa's CDC Director

Tracking Coronavirus in India: Latest Map and Case Count

New York Times   Updated June 28, 2021

New reported cases

400,000 cases

New cases

300,000

200,000

7-day average

100,000

Feb. 2020   Apr.   Jun.   Aug.   Oct.   Dec.   Feb. 2021   Apr.   Jun.

Vaccinations

Fully vaccinated

4%

At least one dose

19%

See more details ›

About this data

Latest trends

AVG. ON JUN. 27   14-DAY CHANGE   TOTAL REPORTED
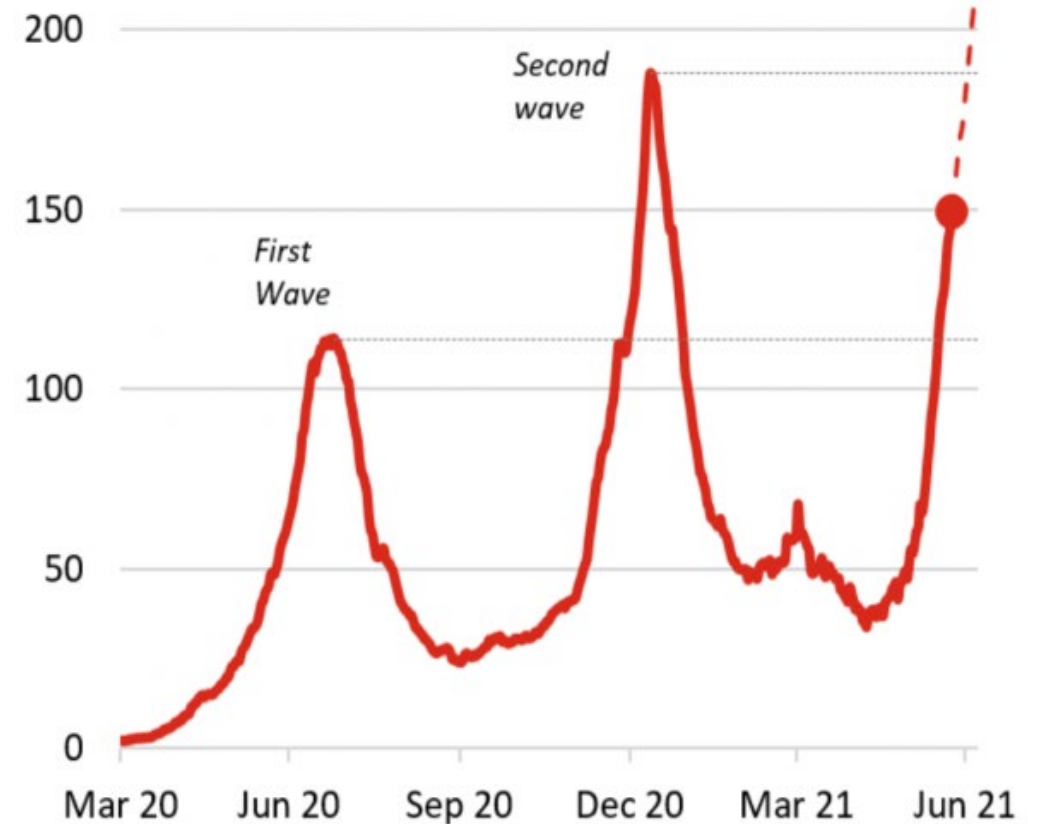
A perilous moment

Barely 6 months after the previous wave, infections in sub-Saharan Africa are surging once again.

(new cases, thousands per week)

200

Second wave

150

First Wave

100

50

0

Mar 20   Jun 20   Sep 20   Dec 20   Mar 21   Jun 21

Sources: JHU COVID Tracking Project and IMF staff calculations.

IMF

I. Flattening the curve... Lessons from the past

*"The farther back you can look, the farther forward you are likely to see."*
— **Winston Churchill**

The Spanish flu of 1918

- On the back of World War I: January 1918 to December 2020
  - Occurred over three waves
  - High infection rate (25-33% of world population)
  - High fatality rate (10% of infected cases)
- No pharmacological options; focus on social distancing efforts
- <u>India was one of the worst affected countries</u>
  - World War I returning troops brought the infection; famine made it worse
  - Estimates of 12-18 million fatalities (>5% of the population); second wave
  - Reduction of births in 1919 by 30% as young in 20-40 age group most affected
  - Healthcare system unable to meet the surge ->
    Increase in emotion against the colonial rule

Source: CDC, 2009

Fig. 6.1 '[Pandemics and Historical Mortality in India](#)', Chinmay Tumbe, IIMA Working Paper

Monthly Death Rates per 1,000
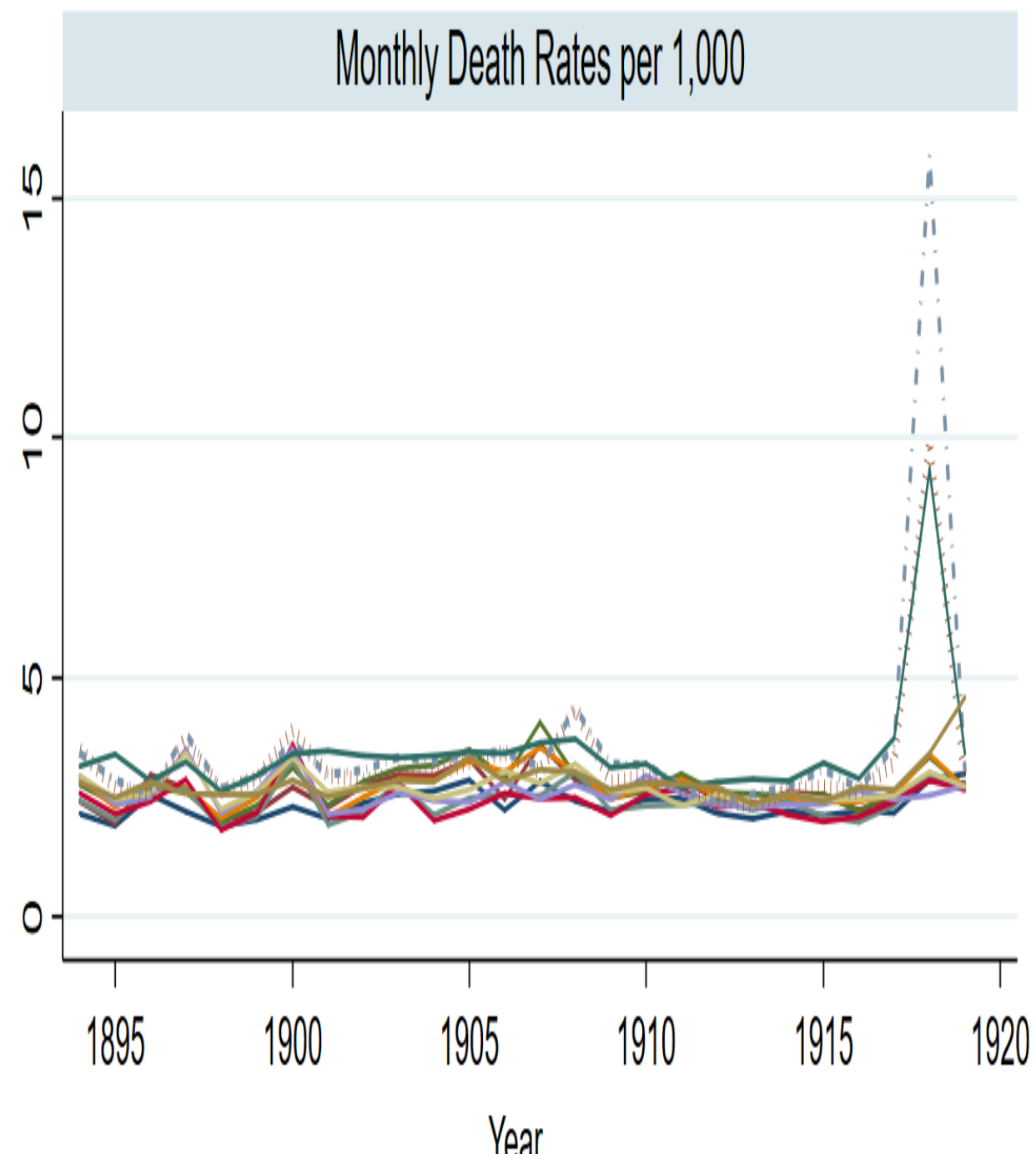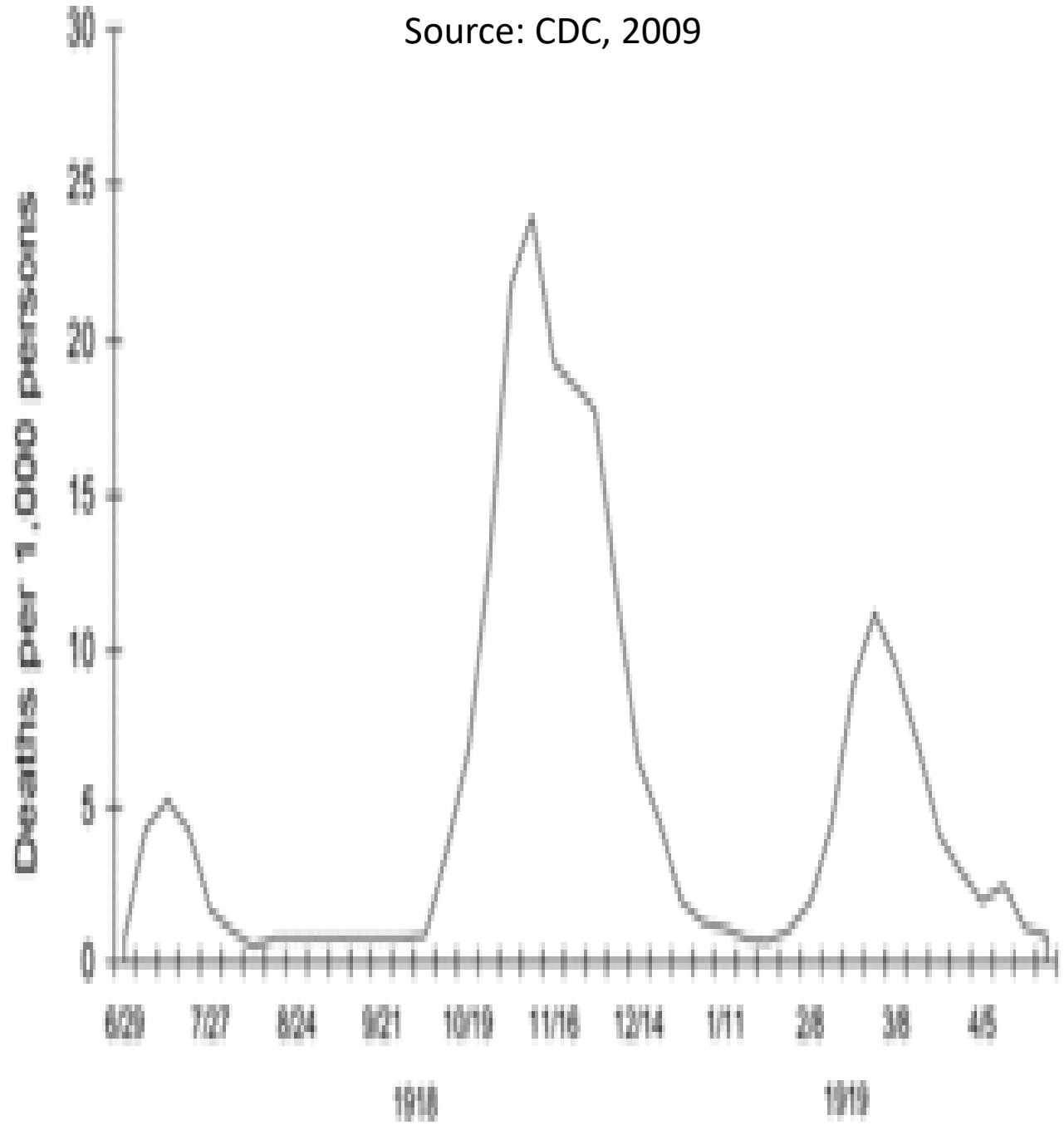
What worked then?

Richard J. Hatchett, Carter E. Mecher and Marc Lipsitch, "Public Health Interventions and Epidemic Intensity during the 1918 Influenza Pandemic," *Proceedings of the National Academy of Sciences*, June 2007:

"[C]ities in which multiple interventions were implemented at an early phase of the epidemic had peak death rates ≈50% lower than those that did not and had less-steep epidemic curves. Cities in which multiple interventions were implemented at an early phase of the epidemic also showed a trend toward lower cumulative excess mortality, but the difference was smaller (≈20%) and less statistically significant than that for peak death rates. This finding was not unexpected, given that few cities maintained NPIs (non-pharmaceutical interventions) longer than 6 weeks in 1918. Early implementation of certain interventions, including closure of schools, churches, and theaters, was associated with lower peak death rates, but no single intervention showed an association with improved aggregate outcomes for the 1918 phase of the pandemic."

Early warnings on COVID and its fallout

- Modeling by the [Imperial College, UK scientists](#) alerted in March 2020 that

- "suppression" measures (isolation, quarantine, etc.) will be necessary to contain spread and buy time so as not to run out of hospital beds

- "mitigation" measures that allow spread but contain it, hoping for building of "herd immunity", will immediately cause over-capacity problems

- Likely measures undertaken will entail economic disruption on a global scale, (only) some of which are already being witnessed
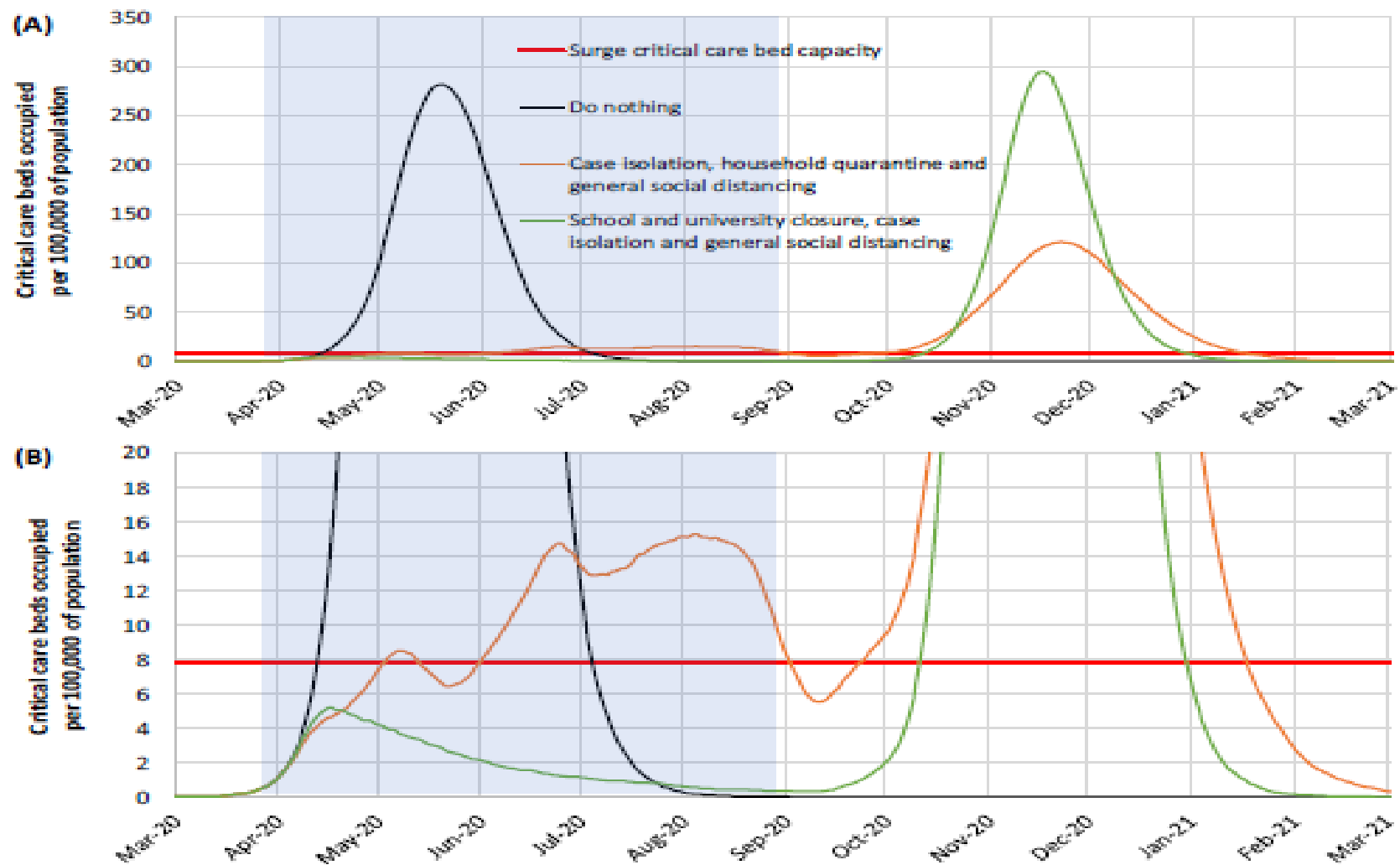
Figure 3: Suppression strategy scenarios for GB showing ICU bed requirements. The black line shows the unmitigated epidemic. Green shows a suppression strategy incorporating closure of schools and universities, case isolation and population-wide social distancing beginning in late March 2020. The orange line shows a containment strategy incorporating case isolation, household quarantine and population-wide social distancing. The red line is the estimated surge ICU bed capacity in GB. The blue shading shows the 5-month period in which these interventions are assumed to remain in place. (B) shows the same data as in panel (A) but zoomed in on the lower levels of the graph. An equivalent figure for the US is shown in the Appendix.
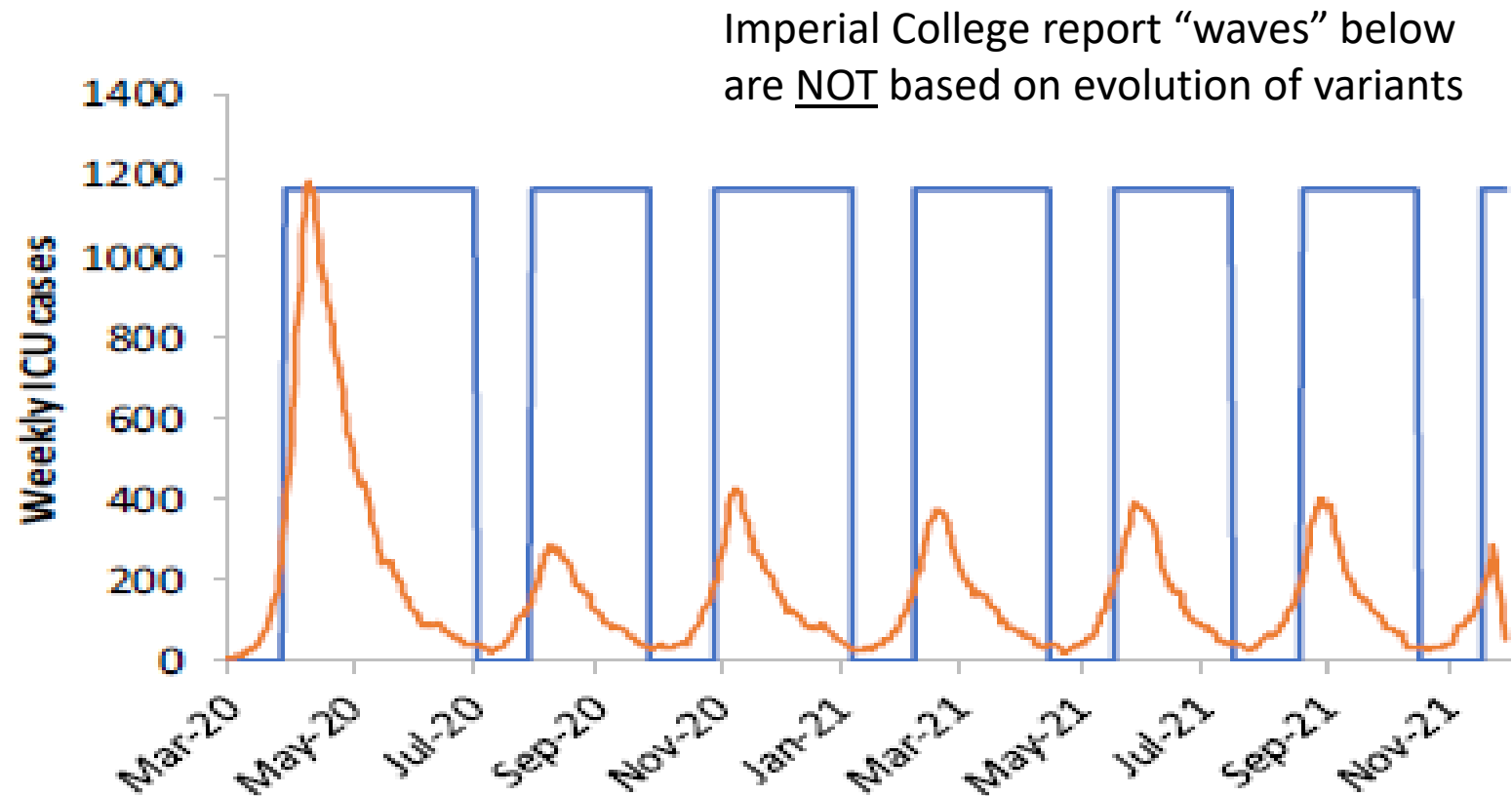
Imperial College report "waves" below are NOT based on evolution of variants

Figure 4: Illustration of adaptive triggering of suppression strategies in GB, for R₀=2.2, a policy of all four interventions considered, an "on" trigger of 100 ICU cases in a week and an "off" trigger of 50 ICU cases. The policy is in force approximate 2/3 of the time. Only social distancing and school/university closure are triggered; other policies remain in force throughout. Weekly ICU incidence is shown in orange, policy triggering in blue.

II. (Not) Flattening the curve… How does it work in practice?

An illustration of "overflow" in the Indian healthcare system during the second wave (joint work with Dr Tushar Gore)

A structural "patient-(over)flow" model
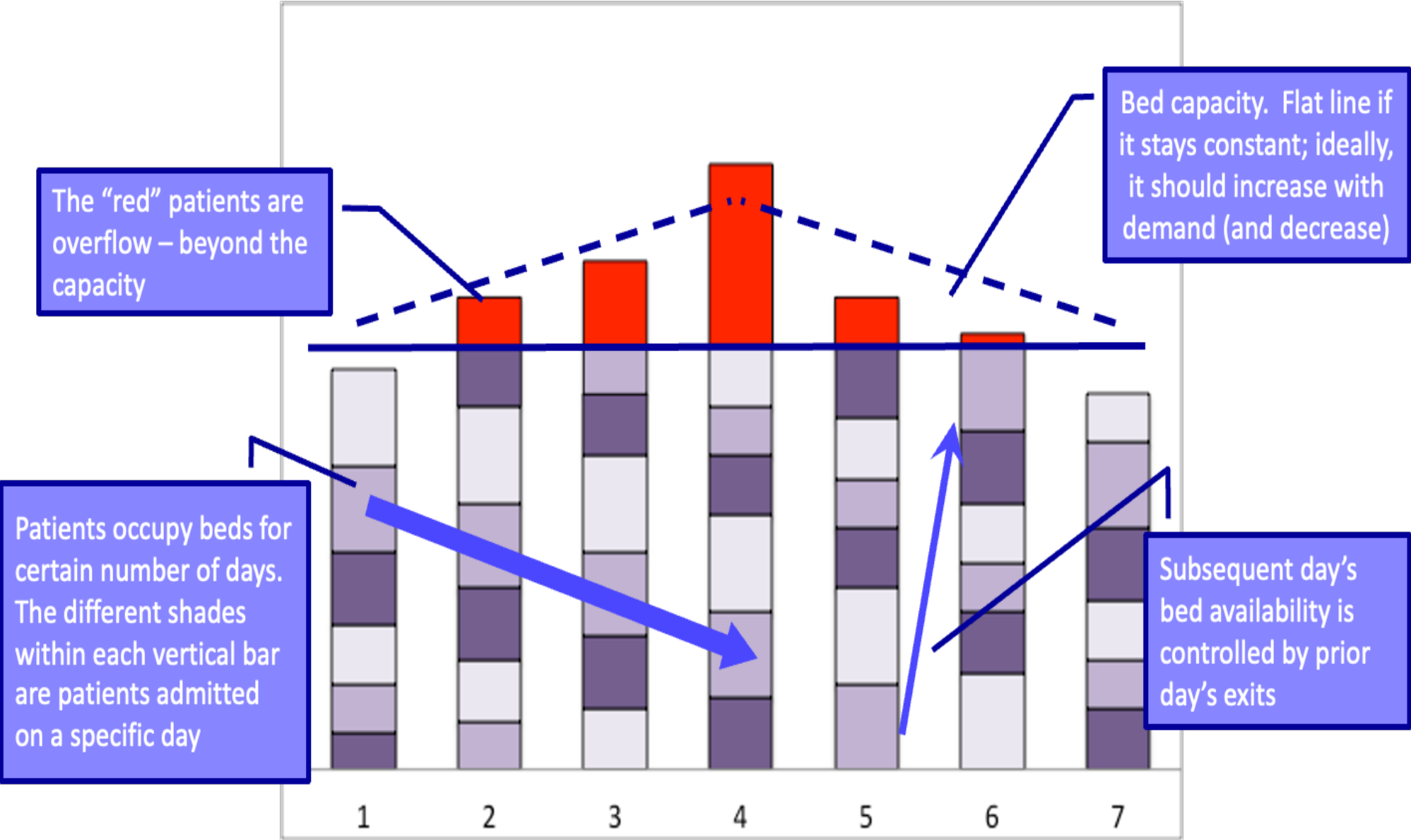
Inputs required to "calibrate" the model

- Percent of daily new cases that need hospitalization
  - First wave in India: 6% of active cases needed o2 / ICU assistance
  - Second wave in India: 12 - 15 (Baseline) - 18% hospitalizations of daily cases
    - UK evidence that "delta" variant twice transmissible

- A key problem: Reported cases understate true infections!
  - Extent of understatement partly reflects thoroughness of testing
  - It could also reflect capacity constraints on testing (infected staff/family, e.g.)
- Solution: Estimate daily total cases using seroprevalence surveys (antibodies)
  - First wave in India: 26x (in 70 districts for 29,082 individuals (10+) during Aug-Sep 2020)
  - Second wave in India: x could be greater but test positivity rate went up too…
    - A future serosurvey could help resolve x for the second wave

Inputs required to "calibrate" the model

- Number of days of hospital stay due to the disease (14 days)
  - Exits can be Recovery or Death

- Total capacity of o2 and ICU beds
  - Must be at an adequately granular (district) level of healthcare access
  - Example:
    - District with low healthcare capacity; another district with very high capacity
    - During a surge, the first will suffer overflow, but the second will have spare capacity
    - Can the o2 / beds in the second district be accessed by patients in the first district?
    - Aggregating data / analysis can lead to a HUGE policy mistake and complacency!

- Normal fatalities (unrelated to overflow)
  - Serosurvey's National Infection Fatality Rate (IFR): 0.1% (0.084% - 0.121%)

Good calibration requires DATA, DATA, DATA…

- <u>Disease- or wave- or variant-specific:</u>

  - Infection Fatality Rate (IFR)
    - ➤ Location-specific?

  - Hospitalization rate
    - ➤ Erroneous to measure realized hospitalization rate when capacity binds (biased downward)!

  - Number of days in hospital
    - ➤ Greater during a surge as only the most severely infected are hospitalized?
    - ➤ With limited o2/drugs/medical attention, complications and comorbidities manifest more
    - ➤ Secondary infections (bacterial, black fungus) can extend hospital stay to 3-5 weeks

Good calibration requires DATA, DATA, DATA…

- Location-specific at the right level of granularity:
  - Healthcare capacity (o2 + ICU beds, o2 + ventilators supply, medical staff)
  - Infections-to-cases ratio or Understatement in reported cases
    - ➢ Assessing healthcare adequacy for the *next* wave benefits from serosurveys right after the previous wave

- SIR models can be adapted to factor in healthcare capacity, but must be applied granularly and aggregated to obtain the right dynamics
  - National or state-level application unlikely to yield correct results
  - Fallacy of composition with region-specific constraints and limited risk-sharing

III. Dynamics of deaths and undercounts for six districts

Death undercounts can reach 30x in short periods of time in overwhelmed districts (joint work with Dr Tushar Gore)

State	District	Projected Pop 2021	% Serosurvey	Cases @ Endpoint	Deaths @ Endpoint	Actual Infections	Infection Undercount (x)	IFR @ endpoint
MP	Gwalior	2,417,398	12.30%	9,133	103	297,340	32.6	0.035%
MP	Ujjain	2,363,660	3.60%	2,565	87	85,092	33.2	0.102%
MP	Indore	3,898,101	7.75%	11,161	360	302,103	27.1	0.119%
Mah	Ahmadngr	5,102,114	8.70%	35,676	569	443,884	12.4	0.128%
Mah	Nashik	6,858,568	17.30%	63,172	1,145	1,118,652	18.8	0.096%
Kar	Blr Urban	11,102,644	29.80%	180,283	2,521	3,308,588	18.4 (9*)	0.076%

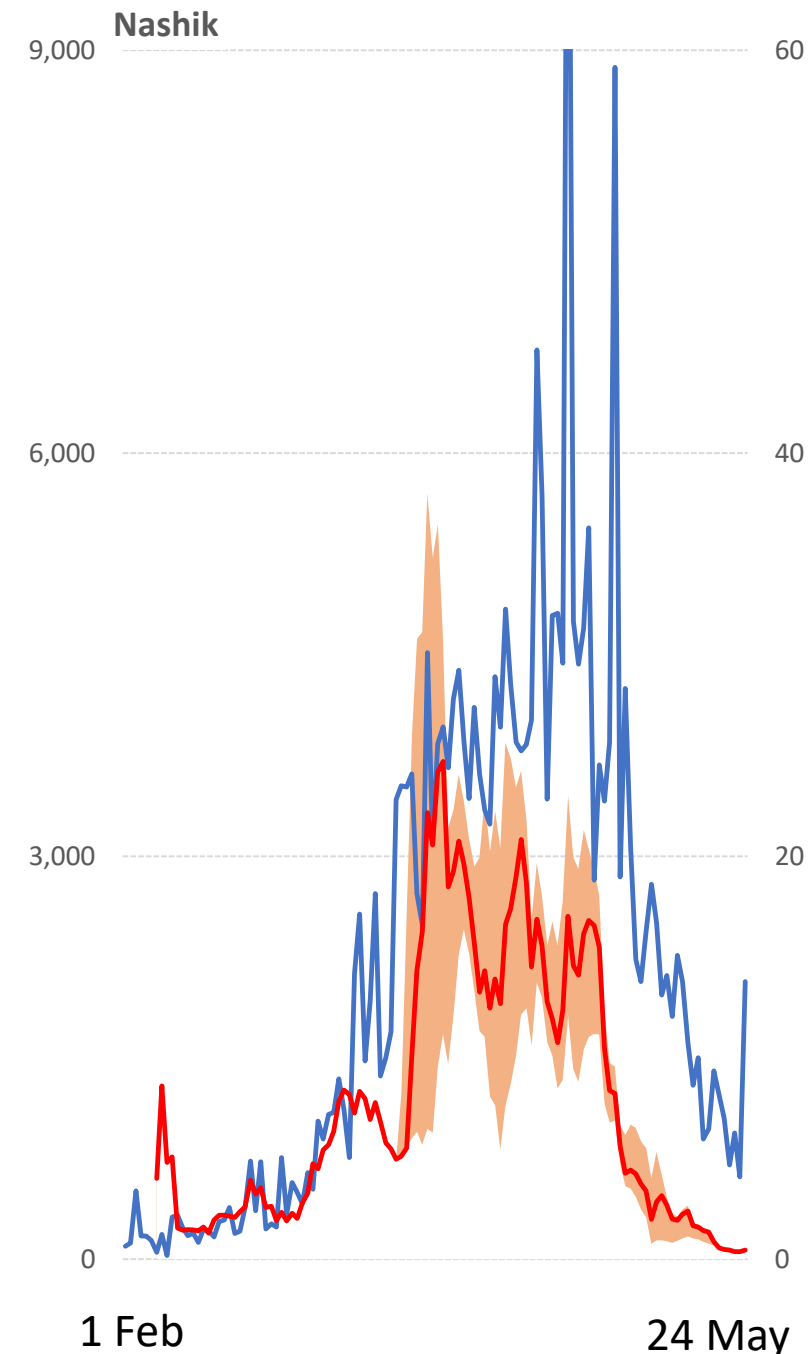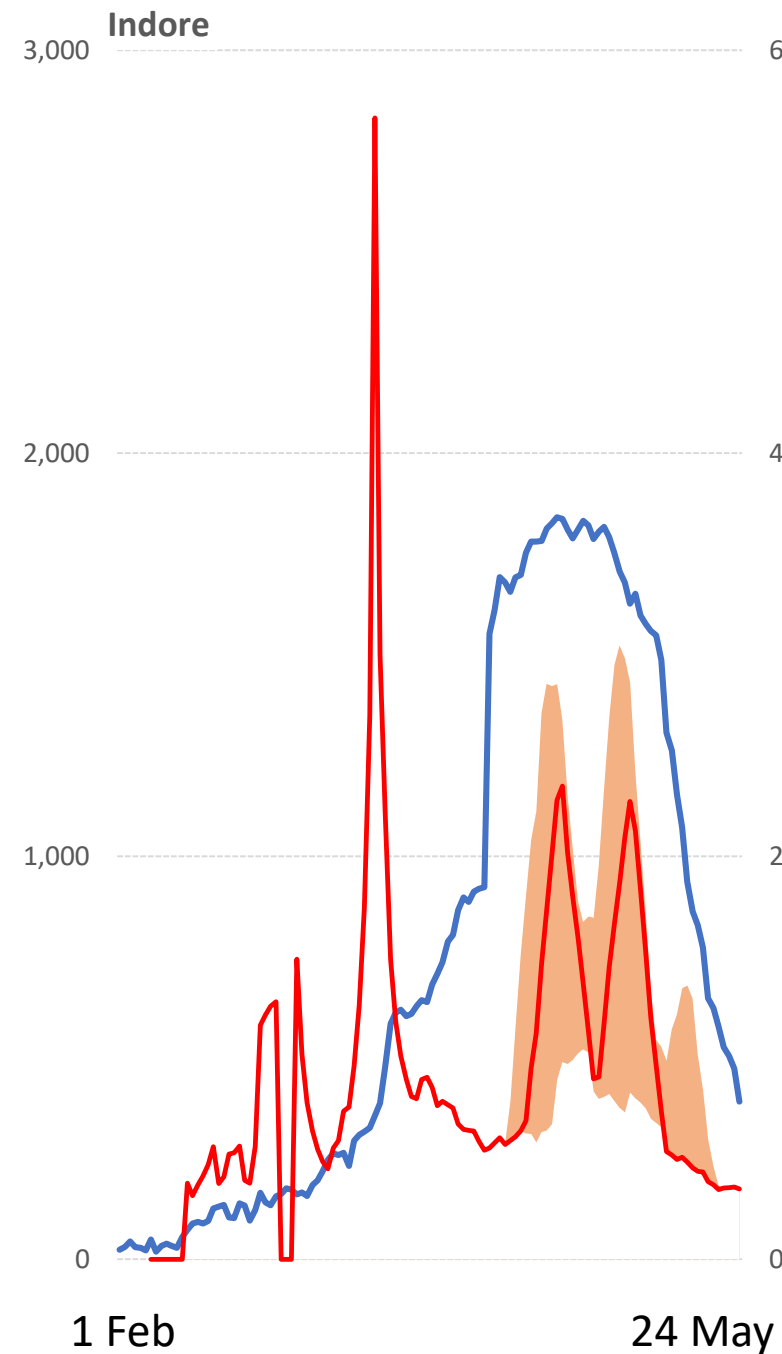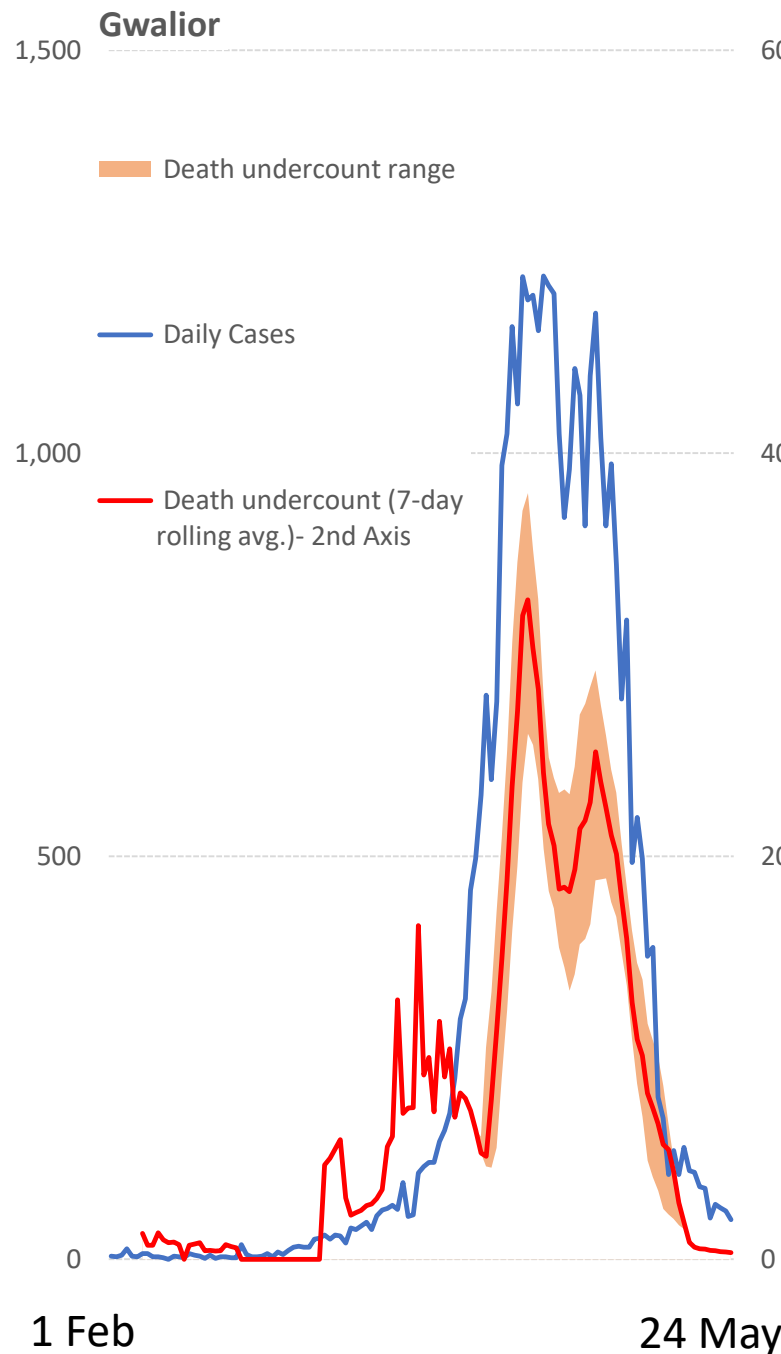| State	District	% Urban per 2011 Census	O2 beds	ICU Beds	Per 10,000 (O2 + ICU Beds)	Start of 2nd Wave	Max Undercount (x)	Cumulative Undercount (x)
MP	Gwalior	62.7	349	239	2.43	31-Mar	32	8.5
MP	Ujjain	39.2	212	135	1.47	31-Mar	95	7.3
MP	Indore	74.1	1,413	1,356	7.10	15-Mar	80	4.4
Mah	Ahmadngr	20.1	3,658	1,217	9.55	31-Mar	17	2.4
Mah	Nashik	42.5	3,448	1,003	6.49	15-Mar	24	4.7
Kar	Blr Urban	90.9	4,768	1,191	5.37	31-Mar	25*	7.0*

Applying the patient-flow model

- Results for three out of the six districts analyzed are reported below
    - In principle, analysis can be extended to ALL districts in serosurvey, subject to other data

As the second wave unfolds in Gwalior, Indore and Nashik…

I. *Daily death undercount* relative to the official statistics spikes up – going up to and beyond 25x – for a short period during April-May 2021 and subsides as the wave recedes.

- Anecdotal evidence (crematoriums, newspaper obituaries, Ganges)
- Registered deaths analysis reveals 30-40x for two states in Jan-May '21

Gwalior

1,500
1,000
500
0

Indore

3,000
2,000
1,000
0

Nashik

9,000
6,000
3,000
0

60
40
20
0

Death undercount range

Daily Cases

Death undercount (7-day rolling avg.)- 2nd Axis

1 Feb   24 May

Applying the patient-flow model

II. _Cumulative death undercount_ increases only to 5-10x depending upon the district as it averages deaths over a longer time period.

- Daily undercount multiples as cumulative multiples is a fallacy
- Overall pandemic death undercount for our 6 districts is in the range 3-9x

III. _Calculated IFR_ loses its property of being only disease-specific at 0.1% and gets driven by healthcare capacity constraints to 0.15-0.35%.

- IFR, percent hospitalizations, healthcare capacity – combine non-linearly to determine when the curve is in the "strike zone"
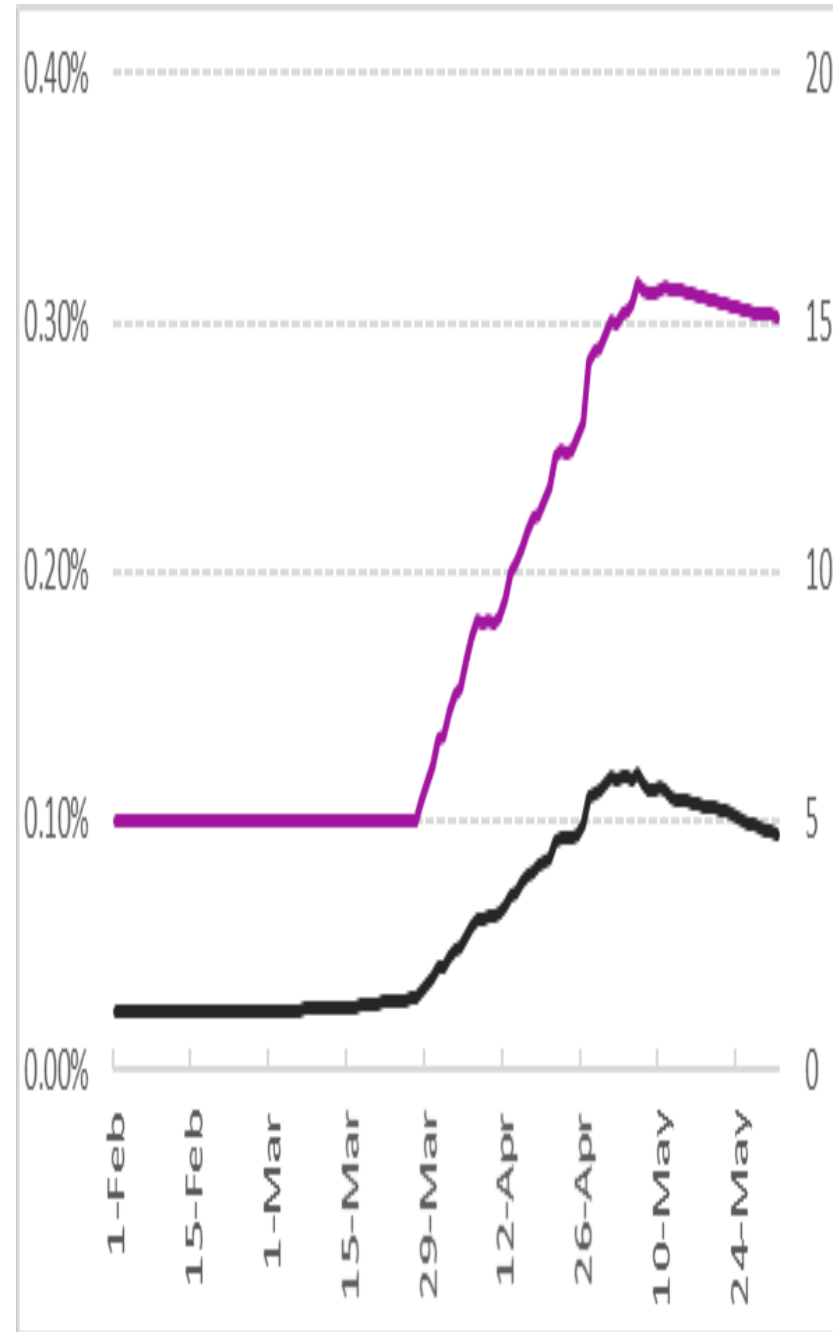- Structure of the patient-overflow model can guide econometrics such as the use of Tobit / censored regression models

Gwalior
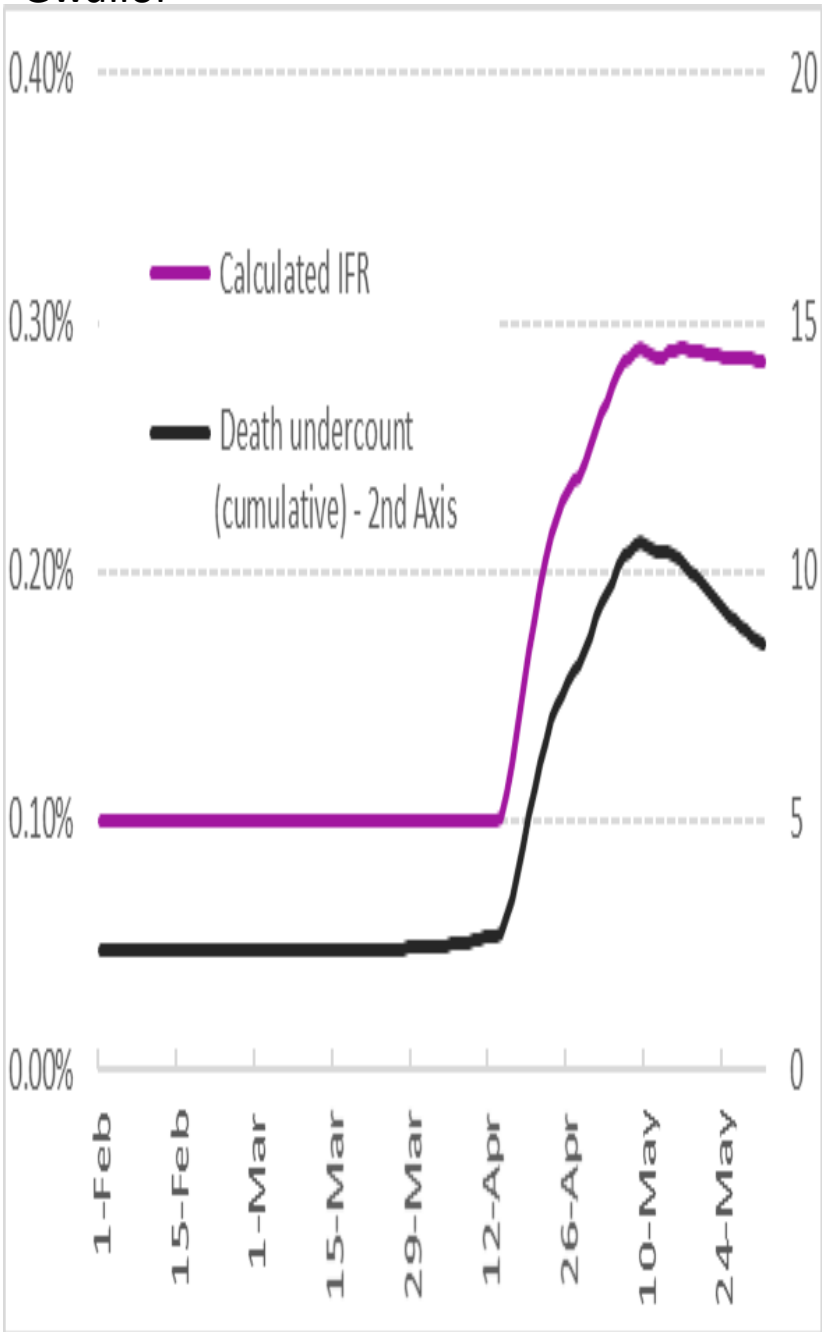
Indore

Nashik

- Calculated IFR
- Death undercount (cumulative) - 2nd Axis
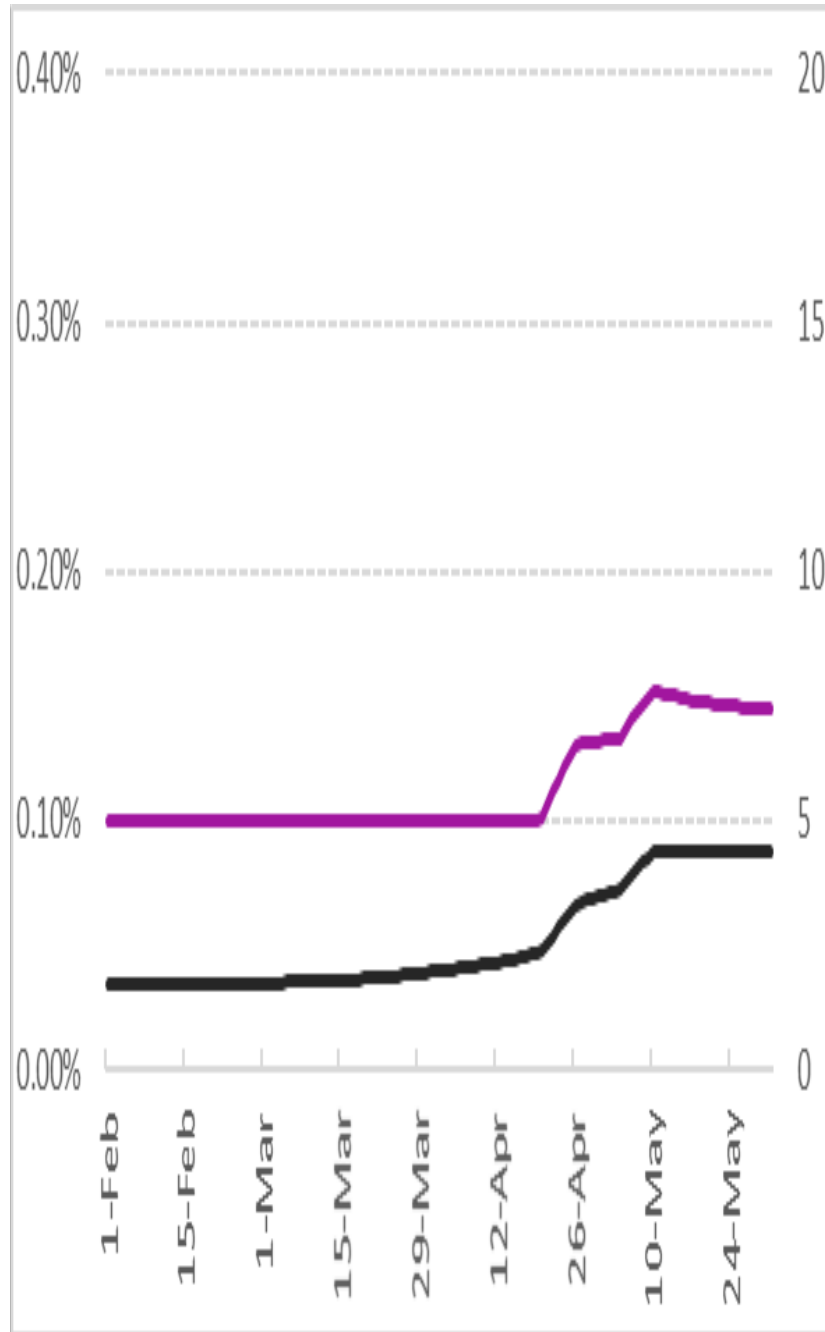
Calculated IFRs are low in a comparative sense... BUT death undercounts are high, especially urban

(Estimated) Cumulative Death Undercount (x)

% Urban population in district (2011 Census)
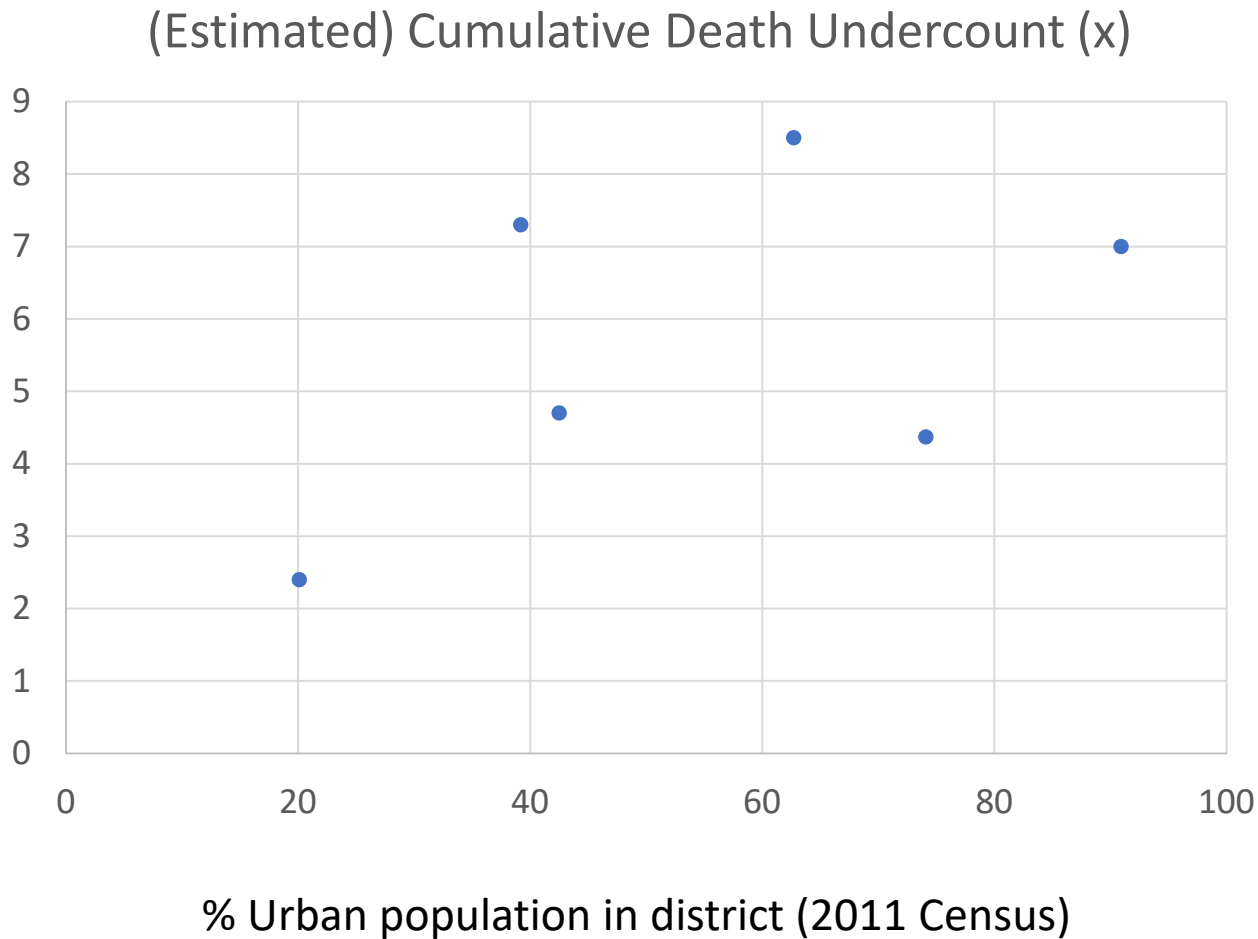
Six data points is too few, but...

Urban areas are more populated
Urban areas are more salient
Urban areas get more press coverage

Greater data suppression?
Worse in healthcare infra on
per capita basis?
More densely populated?

III. Implications of overflow and death undercount

Who bears the real cost of (not flattening) the pandemic (curve)?

Surprise, surprise… Mostly the poor!

(i) Why are deaths undercounted?

- Difficult to classify deaths into COVID or non-COVID, even in AEs
- Classification is particularly hard if testing is inadequate and overflow patients suffer fatality at home rather than in medical care
- But… there is WHO guidance and governments could make an effort
  - Are comorbidities simply an easy way out for data suppression at every level?

- The issue might be that data on COVID deaths are highly politicized
- There are (short-term) political rewards to understating COVID deaths
  - Populist leaders care about perceptions or narratives, and their management
  - Myopic focus on quarterly economics? So ensure lockdowns are not forced early on or required to be stringent (gamble and then cover-up/fudge)
  - Election pressures and relative tournaments among regions/parties

(ii) Impact on the rich and formal economy

- COVID, a tragically great equalizer once there is overflow
  (*"Golden lads and girls, like chimney sweepers, must come to dust"*)
- Lack of testing means treatment becomes symptoms-based for all
- Deaths that can be avoided materialize, including in wealthier/younger groups

- Once higher income brackets also cannot get access to healthcare, they withdraw sharply from discretionary expenditures
  - Evidence that higher income brackets suffer significant income loss (see here)
  - Growing discussions among rich Indians to emigrate, create foreign bases

# (iii) Impact on poor, female, informal economy

- <u>Poor</u> can't
  - get tested easily (slum areas in metros, weak rural testing)
  - afford medical care (treatment of secondary infections, post-COVID physiotherapy)
  - can't access doctors through informal channels during lockdowns
  - receive eligible support if deaths are not attributed to COVID
- <u>Loss of earning members, hunger, bankruptcy, illiteracy, scarring effects</u>

- During lockdowns, <u>women</u> bear the brunt of domestic chores, child-raising

- <u>Informal economy</u> dependent heavily on contact-intensive services
  - Fall in discretionary expenditures leads to the biggest loss of jobs in this space
  (See State of Working India 2021: One year of COVID-19, Azim Premji University)
  - Not adequately captured or reflected in official statistics such as GDP

(iv) Scarring effects – the rising inequality

Based on the work of Professor Ananth Narayan, SPJIMR, and Dr Sajjid Chinoy, JP Morgan Chase
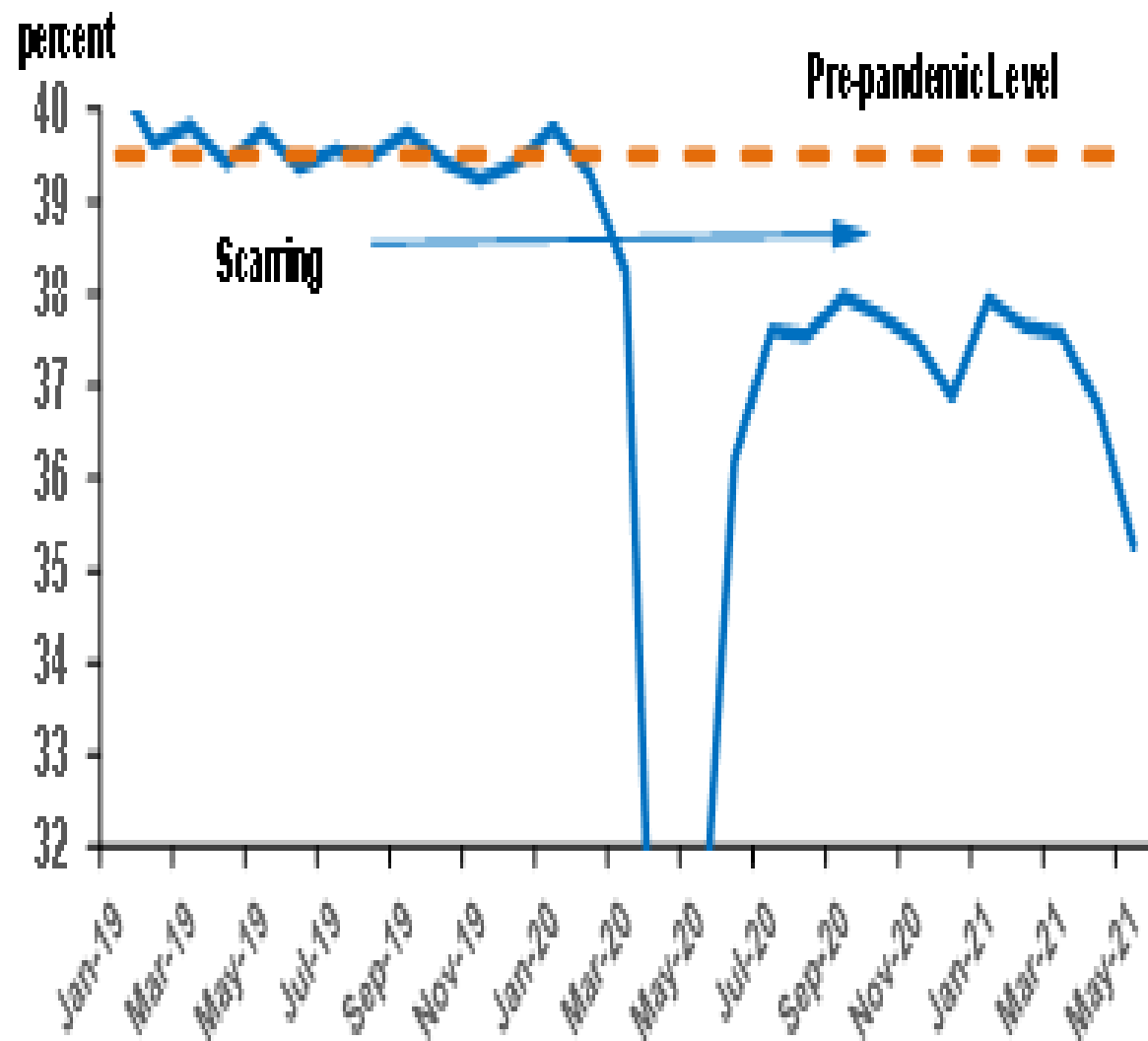
- Nominal GDP contracted 3.2% in FY21, corporate sales fell too, but listed company profits grew by 15%; Goods and Services Tax (GST) collections rose too
- Effective unemployment rate rose to 12.5% from 7.5%, worsened in second wave
  - Unlisted companies, worker wages "squeezed" in contrast to listed companies

- Consumption stress at the bottom of the pyramid
  - Four-wheeler sales grew, but two-wheeler sales massively contracted
  - Premium motorcycle sales grew, but mid-level and entry-level sales shrunk
- Banks and non-bank financial firms focused on bottom of the pyramid witnessed higher non-performing loans relative to urban-focused banks

- Depressed current and future spending proclivity of households in Reserve Bank of India surveys; conversely, household savings rates rose
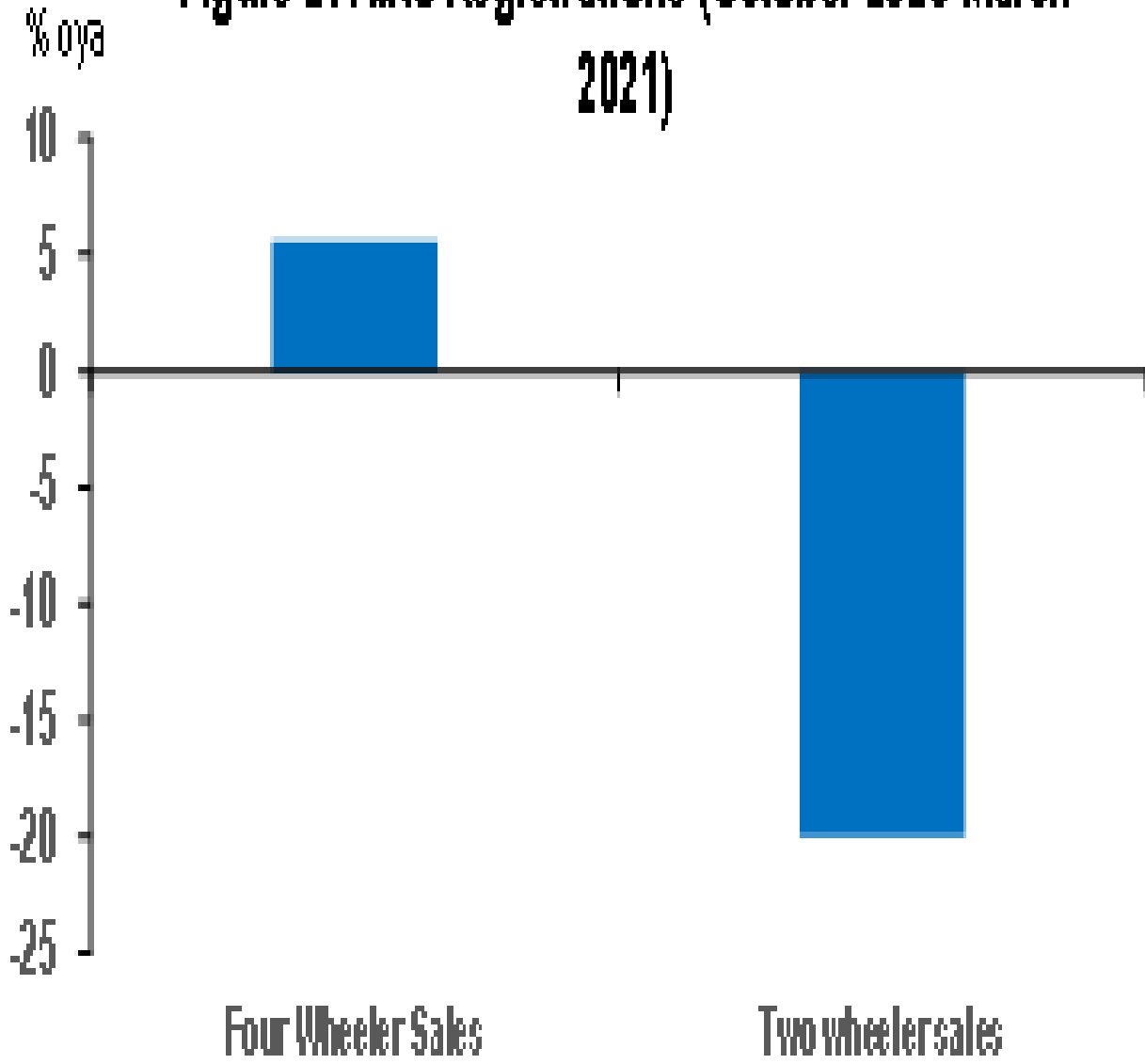
Chart 1: GST Collections
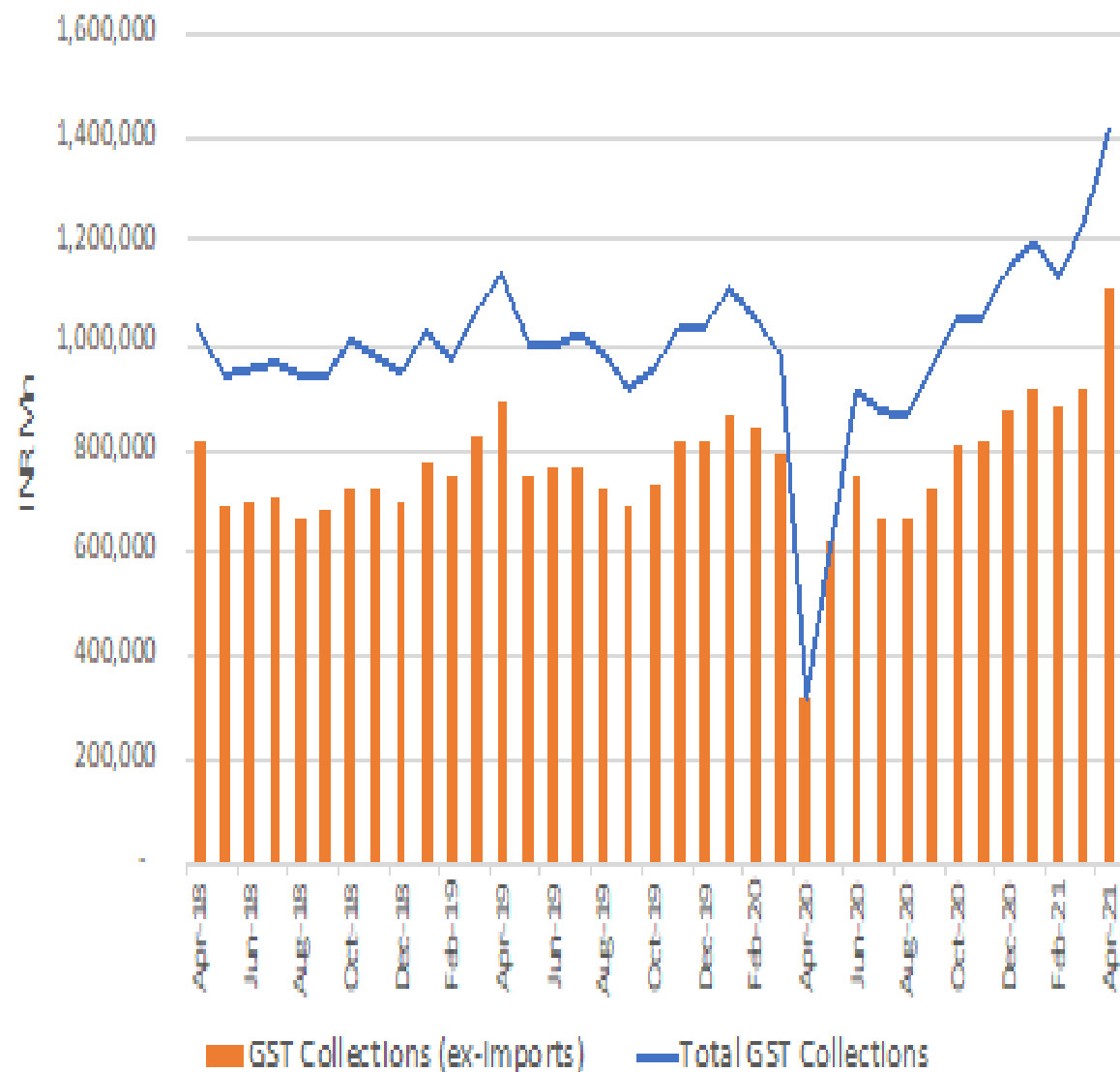
Source: CEIC, Ministry of Finance (India)

Figure 1: India: Employment/Population

Source: CMIE

Figure 2: Auto Registrations (October 2020-March 2021)

% oya

Four Wheeler Sales / Two wheeler sales

Figure 4: Motor Cycle Segmentation

% oya, FY21

Entry / Mid-Level / Premium
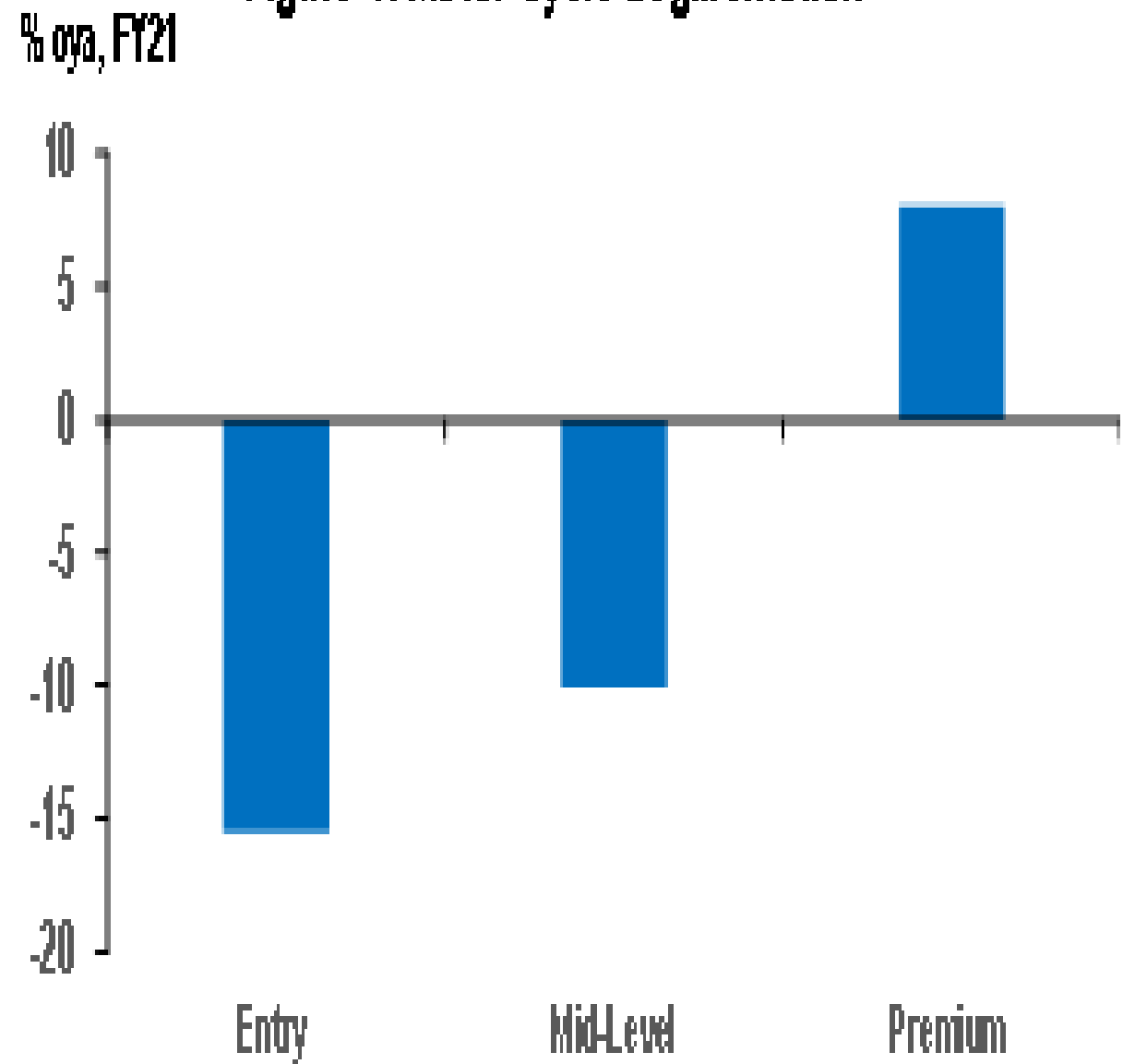
Figure 5: Household Spending Perceptions

%, Net responses

One-year-ahead

Pre-Second Wave

Current

85

70

55

40

25

Source: RBI, SBI | Sep-17 | Mar-18 | Sep-18 | Mar-19 | Sep-19 | Mar-20 | Sep-20 | Mar-21
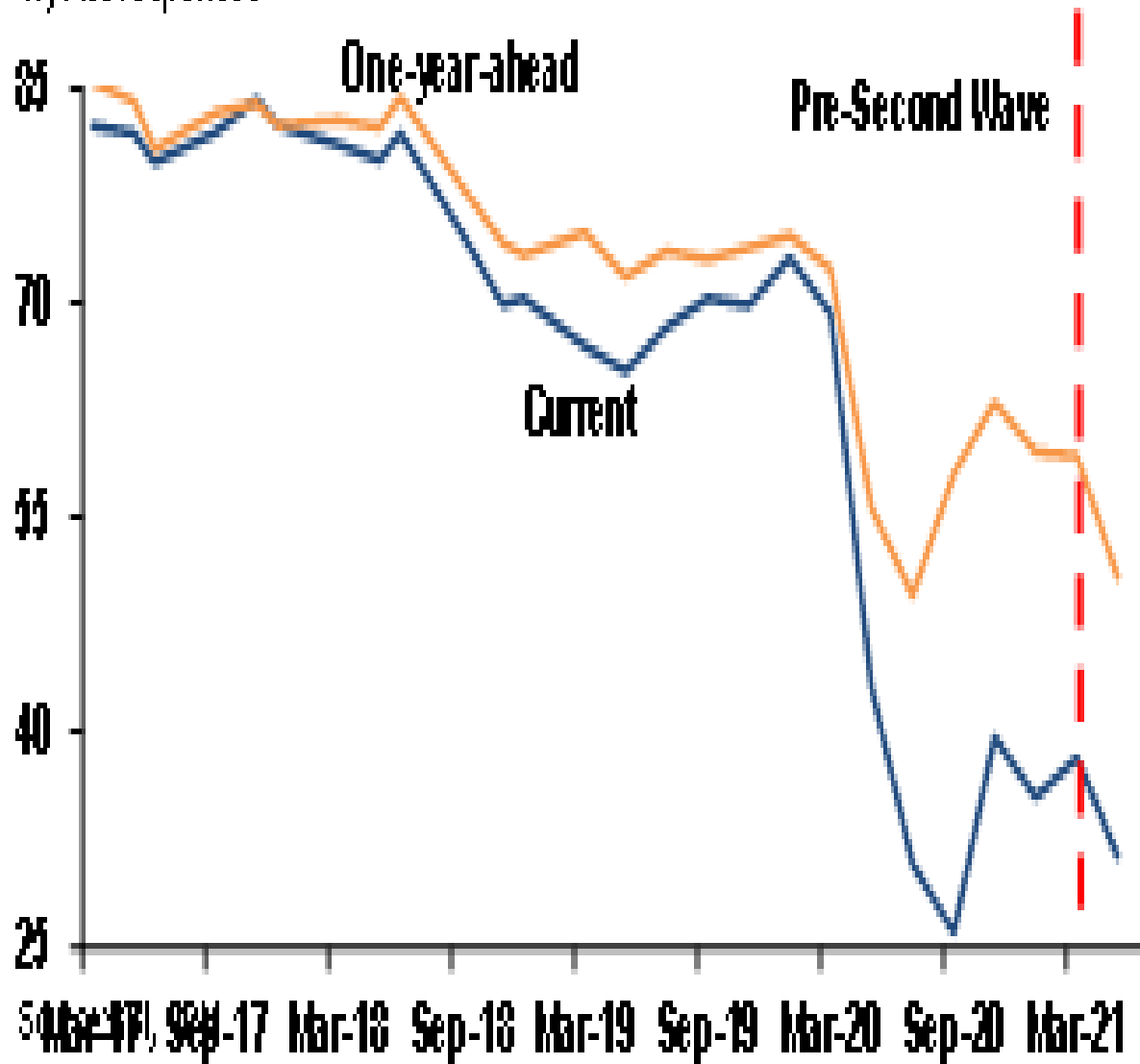
Figure 6: Gross NPAs + Restructuring (4Q FY21)

10%

8%

6%

4%

2%

0%

HDFC Bank | ICICI Bank | SBI | Bandhan | Shriram Transport | Mahindra and Mahindra
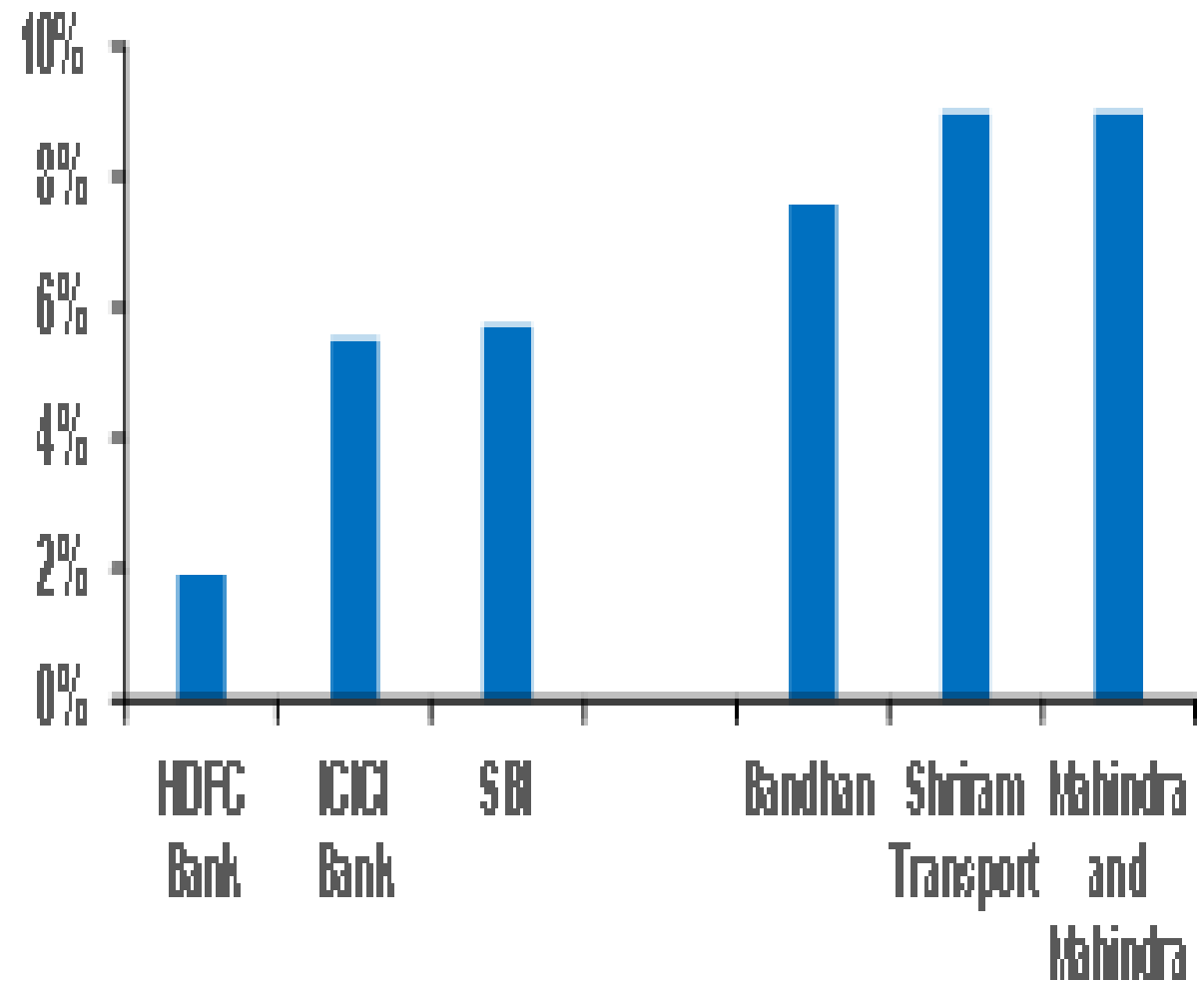
(v) Pandemic lingers on…

- Initial response to surge is delayed due to paucity of data or lack of internalizing spillovers

- Overflow then leads to an over-reaction around its peak

- Death and infection undercounts imply reopening is then too swift
  - Cycle of … under-reaction, over-reaction, under-reaction, …
  - Behavioral cycle not adequately data-contingent (Imperial College report)
  - Akin to driving fast with too many blind spots?

- Third, fourth, … wave? More hosts for the virus? Further variants? Global spread?
  - Uncertainty can lower consumption, boost precautionary saving, slow down economic recovery

IV. Lessons for policy in EMs

Uncertainty about virus outbreak and variants requires robust policy planning

(ia) First and foremost, flatten the cases curve

- Country-level exceptionalism against COVID?
    - Some countries like India had lower case/infection fatality rates in first waves
    - Inadequate testing? Underreporting of deaths (COVID vs co-morbidities)?
    - What matters is not absolute fatalities, but relative to healthcare capacity
    - <u>Robust / Resilient approach</u> is to assume no such exceptionalism and prepare instead for a stress/wave/surge in future

- Spanish flu, Imperial College report, India's second wave experience should all alert EMs that the first and foremost response to rising infections has to be with non-pharmaceutical interventions (NPIs)
    - <u>Keep infections within healthcare capacity, avoid deaths that can be avoided</u>
    - Support the affected economy in a second step, seek external help as needed

Three-speed vaccination
The rollout in sub–Saharan Africa is the slowest in the world.
(doses administered per 100 population)

Vaccination rates in Africa have fallen behind

Vaccinations by GDP per capita, circle size represents population

● Africa ● Rest of World

Sources: Our World in Data and IMF Staff calculations.
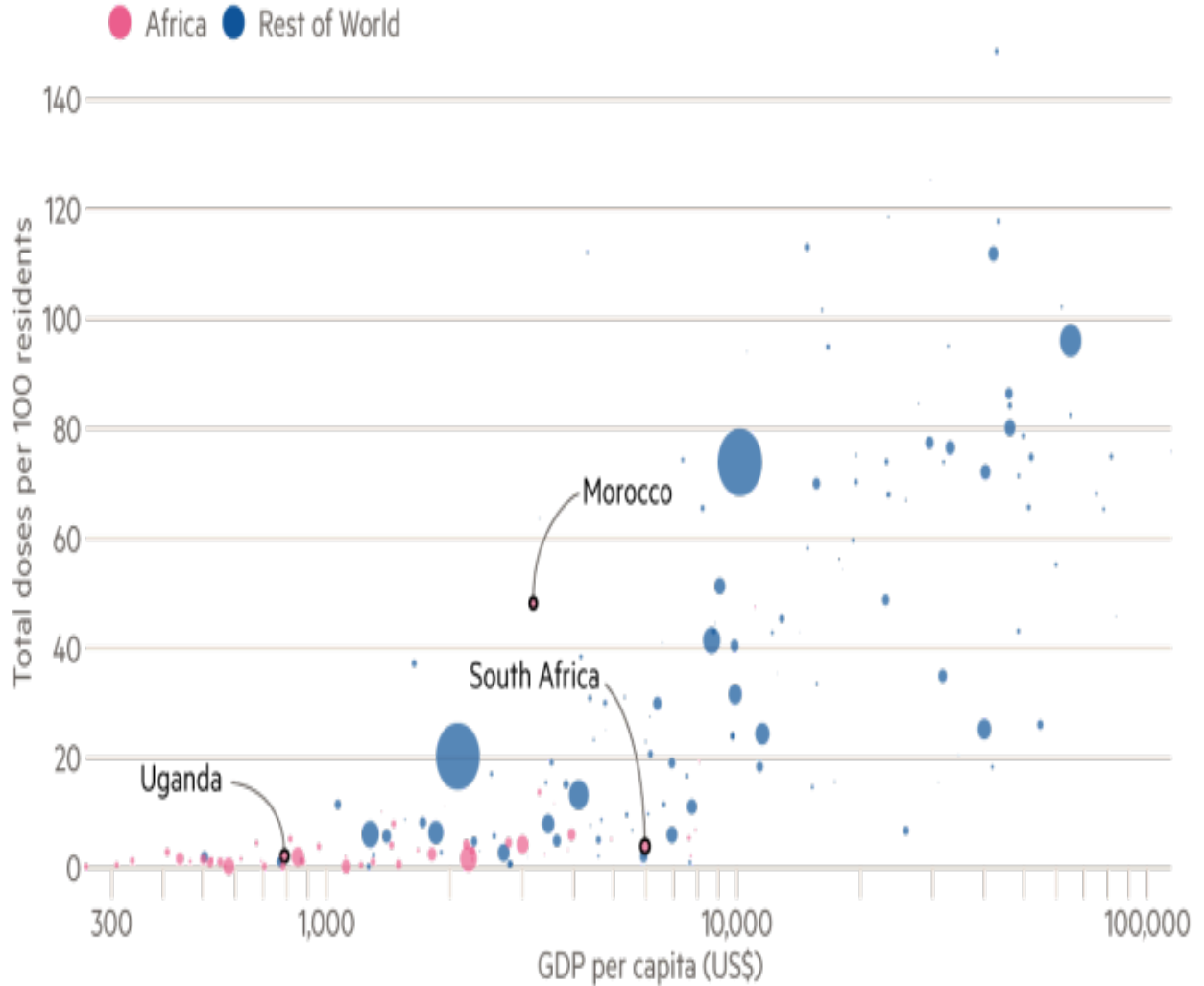
Source: Our World in Data, World Health Organization, national sources, FT research.
© FT

(ib) Vaccinate, vaccinate, vaccinate…
Flatten the cases curve

- <u>Vaccinations are the pharmaceutical (only?) end to the pandemic</u>
- Frankly, the <u>costs are not super-high</u>, especially with access to aid
  - Ruchi Agarwal and Gita Gopinath. *A proposal to end the covid-19 pandemic*. Technical report, IMF Staff Discussion Notes no. 2021/004, 2021.

- <u>Bottlenecks</u>?
  - Production capacity (easing as AEs reach herd immunity status) and storage
  - Lack of political conviction (hubris, nationalism, and exceptionalism biases)
  - Corruption (crony capitalism, connected to the King, friends of the trustee)
  - Distribution gridlocks and wastage
  - Some vaccination sites are effectively "super-spreader" event venues

(ib) Vaccinate, vaccinate, vaccinate…
   Flatten the cases curve

- What is the alternative? Unfortunately rather unpleasant

  - <u>Indian experience: New Delhi</u>
    - ➢ Several waves already
    - ➢ 56% population with antibodies in Dec 2020: "herd immunity?
    - ➢ It was the most severely affected metro in mid-March to May 2021!

  - <u>UK evidence</u>
    - ➢ Doubly-vaccinated do not need hospitalization with delta variant
    - ➢ Hospitalizations and fatalities declining in the UK even as overall cases have risen again
    - ➢ Yet, lockdowns have had to be extended during the Summer

  - <u>US evidence</u>
    - ➢ Poorly-vaccinated states showing rise in delta variant infections; what's next?

(ii) Build resilience in healthcare infra capacity

- Healthcare capacity – normal time or contingent – needs planning

  - o2 beds/supply, ICU beds, Ventilators, o2 concentrators, oximeters

  - Medical staff (early graduation of final year medical candidates and nurses?)

  - <u>Any one resource in scarce supply can constrain; non-linearity is staggering</u> (beds w/o o2, doctors without nurses and drugs!)

  - Overflow -> Infected stay home -> Transmission worsens

  - Plan ahead, deploy decisively, and rearrange resources aggressively (internationally, if needed – no loss of pride in trying to save human lives)

(ii) Build resilience in healthcare infra capacity

- Ex-ante versus ex-post resource allocation tradeoffs
  - Creating buffer capacity for resilience may seem costly upfront
  - <u>Ex-post resource allocation is difficult and fraught with political deadlocks</u>
  - Move around o2? Beds? Medical staff? How much goes where?
  - What data is to be used? Can regions/districts hoard? Who controls data?
  - Burden-sharing works poorly if rules are not pre-arranged

- <u>Resilience requires buffer capacity, contingency plans, stress tests, …</u>

- <u>India's "delta" statistics useful to conduct granular stress scenarios</u>

(iii) Calibrate a special rural response

- <u>India's first wave</u>:
    - Abrupt lockdown announcement led to a migrant worker crisis as they tried to find their way back to hinterlands
    - Rural areas eventually less affected by the virus; rural economy remained resilient
- <u>India's second wave</u>: Rural data?
    - Anecdotally (conversations w/ auto-drivers), rural India affected severely
    - Entire villages and smaller townships infected; residents shell-shocked
    - No testing, no healthcare preparation for COVID, no death registrations

- <u>What can Africa do?</u>
    - Create <u>dashboards for each village</u> of test/hospitals/beds/doctors/nurses
    - Work with <u>NGOs and corporations with rural reach</u> to boost healthcare infra
    - <u>Vaccination drives</u> with aid/support from multilateral agencies, foundations, NGOs

(iv) Facilitate data-dependent decision-making

- Imperial College report had already suggested targeted lockdowns and quarantining based on continued testing – as early as March '20

- <u>Testing thoroughness, integrity, and comprehensive coverage, including of fatalities, all key to analyze the wave well in real time</u>

  - Infections-to-tests ratio will nevertheless remain greater than one

  - <u>Seroprevalance surveys on regular basis by age group can serve as guidelines for knowing how to inflate the reported cases curve</u>

(iv) Facilitate data-dependent decision-making

- [Real-time data dashboard](#) – granular and aggregated – needed on healthcare capacity (o2, o2 beds, ICU beds, ventilators, doctors, nurses)
  - Data sourcing must be digitized and automated to reduce suppression and obfuscation risks
  - Data dissemination and aggregation must be centralized to improve any ex-post resource reallocation and risk-sharing

- Involving experts helps as they work with and decide based on data
  - Data and classification protocols, Household surveys, BIG data analyses
  - Working with community-based organizations / NGOs

- All countries must join internationally funded efforts for real-time genome-sequencing to understand the evolution of variants and risks they pose

(v) Focus on poor, women, informal, and workers

- Is <u>Monetary policy</u> fixing market failures or inducing regulatory ones?
  - Appears to be <u>fueling income equality</u> by encouraging inflation, leverage, asset-price bubbles that favor corporates, formal economy, markets/ speculators
  - Booming corporate profits a sign of rebound or squeezed workers and savers?
  - "Taper" risk to EMs from asynchronous rebound of AEs and policy normalization

- <u>Stock/Bond markets do not capture adequately the informal economy</u>

  - In many EMs, more than 50% workforce is in unorganized and in MSMEs
  - Large bankrupt firms can bounce back swiftly; do they really need scarce financial resources?

(v) Focus on poor, women, informal, and workers

- Fiscal policy is perhaps what is mostly called for in a pandemic-style shock which has sharp inequality-inducing implications

  - Direct transfers likely work the best as shocks are highly heterogenous

  - Focus on those affected: poor, women, informal economy, workers (wages)

  - Provide them free vaccines with private distribution; get international aid

  - Incentives to build healthcare capacity in inaccessible rural areas and slums/ghettos: mobile testing, hospitals, supplies; vaccination drives; orientation to masking norms (salient advertisements from superstars)

(vi) Pandemic as an opportunity to formalize

- Informal economy is beautiful in normal times, but highly vulnerable to shocks such as financial crises, pandemics, climate change, …

- <u>Is there an opportunity for EMs to structurally reform by accelerating the formalization of their LARGE informal economies</u>?

  - Universal basic income, one-off fiscal transfers, pension enrollments
  - Unique identification and seamless authentication
  - Digital bank wallets (central bank digital currency?) and payments
  - Public credit registry and account aggregators
  - Embedded finance where sharing economy works with financial institutions such as banks to help originate and collect on micro-credit
  - Improve birth/death registrations, children's vaccinations, schooling/literacy

Final thought: Global compact on pandemics?

- India's delta variant is spreading rapidly across the globe
- AEs have the advantage of vaccinating faster and rebounding sooner
  - Yet, *No one is safe until everyone is safe*
- Global inequality across countries as stark as (starker than?) within countries
- Is COVID a one-off or is there a recurring risk of zoonotic diseases?

- Do we need a <u>Global Compact on Pandemic Response</u>?
  - Share international best practices, scientific methods, research on virus strains
  - Optimize vaccination investment, capacity buildup and rollout
    - Where are gains to vaccinate the highest at the present?
  - Build resilience by creating buffers (funds, PPE, drugs, medical personnel)
- <u>Is the world ready to help the next India in need?</u>

Thank you Markus and to you all!

"In God, we (may) trust. All others must bring data" – Edwards Deming ☺