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With 1.9 million hospital beds why is India struggling?

Rodney P Jones, PhD
Healthcare Analysis & Forecasting, Oxfordshire, UK.
EMAIL: hcaf_rod@yahoo.co.uk

Abstract:

India has 1.9 million hospital beds yet is in the news for people unable to access hospital care for severe COVID-19 infection. "Reported" COVID-19 deaths for India are insufficient to explain this conundrum. This article is part of a wider series investigating gross under counting of COVID-19 mortality around the world, and how nearness-to-death drives the marginal changes in hospital bed pressures. It uses a new method for international bed comparison applied across Indian states. This new method is sensitive to both population age structure and nearness-to-death. Indian states have massive disparities in income with the richest state having average salaries 9-times higher than the poorest. In India, the distribution of beds follows wealth and not need. The 10 richest Indian states have bed provision equal to that seen in the most affluent Western economies, indeed far higher than the USA and the UK. The 10 poorest states have bed provision equivalent to that seen in the world's poorest countries. Gross under reporting of COVID-19 deaths is also occurring in India, as it is also occurring in many other less developed countries. A total of 20 Indian states (half of all states) are below the average for moderate developed countries, and it will be these states where hospitals will be overwhelmed. This is indeed the case with Ladakh, Chhattisgarh, Delhi and Goa having a high ratio of deaths per bed. To make matters worse the COVID-19 mortality reporting process in India appears to be unfit for purpose, especially in a pandemic. Alas the same can be said for many African countries and probably half of Asia. Some Asian countries do not even report COVID-19 testing and mortality.

Key Words: COVID-19 pandemic; testing; deaths; bed numbers; international comparison

Introduction

The COVID-19 pandemic has caught almost the whole world off guard. There are a few exceptions such as South Korea which had a well-rehearsed track and trace system instituted due to the threat of biological warfare from North Korea. This was then rapidly incorporated into an existing "Smart City" data system.[1] Other Asian countries had learned from the earlier SARS outbreak.[2] Many other countries have floundered caught between protecting their economy versus protecting their people. Many were unprepared for the

[1] How South Korea turned an urban planning system into a virus tracking database | Reuters
[2] An Expert Explains: What SARS taught East Asia, and what India can learn from Covid | Explained News,The Indian Express

rapid scale up of testing capacity required to monitor the pandemic.[3] The poorest countries simply could not afford mass testing. COVID-19 is also marked by explosive spread by "super spreader" individuals and events.[4] COVID-19 loves a crowd and hence thrives in high population density locations such as large cities and/or slums.[5,6]
An earlier article in this series has highlighted the role of gross undercounting of COVID-19 mortality in many countries.[7] In this article the link between nearness-to-death and the marginal pressure on hospital resources will be explored in greater detail with India used to illustrate many of the issues.

Hospital bed numbers in India

A recent study by Princeton University has estimated that India has 1.9 million hospital beds provided by state governments and private hospitals.[8] This study is especially important since numbers were determined at state level. While economists have known for over 40-years that the marginal changes in health care costs and hospital admission are driven by nearness-to-death rather than age per se, while age plays a secondary role.[9],[10] This has never been incorporated into health care capacity calculations which tend to rely on age. To remedy this important limitation a new method of hospital bed comparison has been developed which incorporates population age profile and nearness-to-death.[11,12,13] Such a model is essential to compare bed numbers between different Indian states due to their disparate profiles of age and deaths.

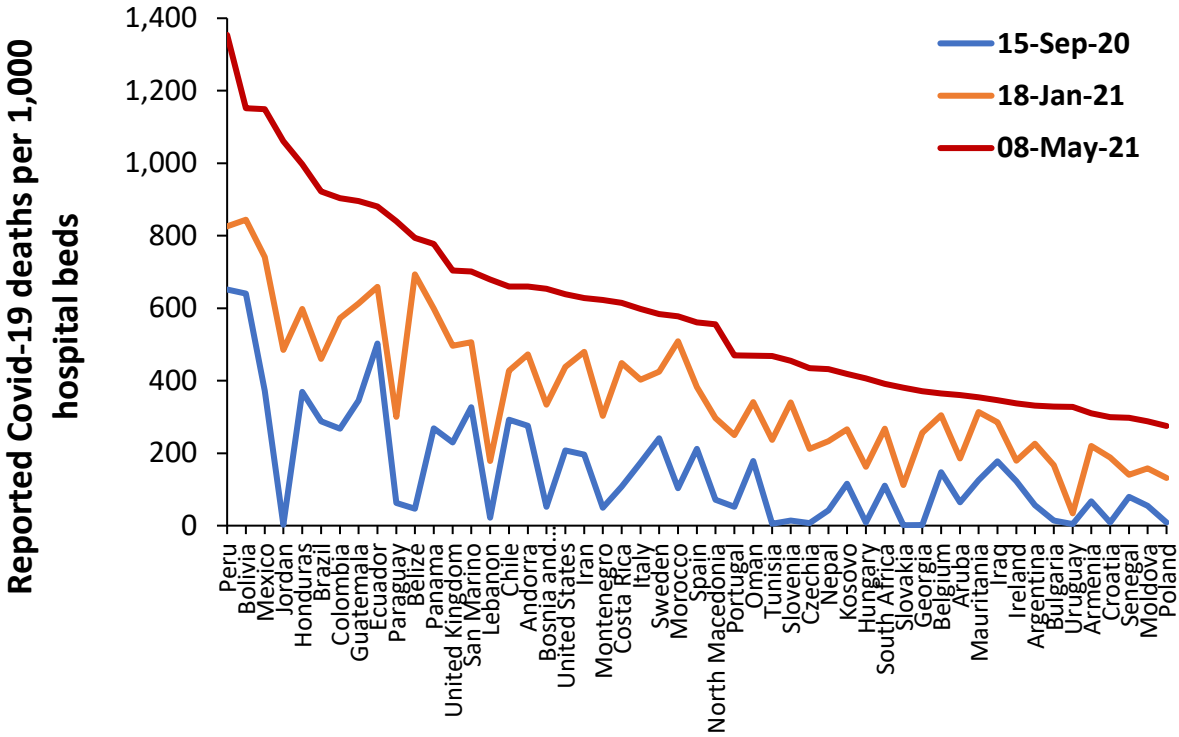
However, to put the situation in India into context Figure 1 shows the level of "reported" COVID-19 deaths per 1,000 hospital beds for the top 50 worst affected countries. As can be seen India is not in the top 50, mainly because COVID-19 deaths are being substantially under reported.[7]

While large countries like Brazil and India may have been attracting media attention it is important to note that countries on the left-hand side of Figure 1 will have experienced horrendous hardship. The UK is high up this list, but pressures in London were far worse than elsewhere. London only survived a catastrophe by ceasing all non-urgent elective surgery and during the most recent wave NHS England intervened to equalise pressures and

[3] Testing at scale during the COVID-19 pandemic | Nature Reviews Genetics
[4] COVID-19: The truth about super-spreaders (openaccessgovernment.org)
[5] http://www.healthfinancejournal.com/~junland/index.php/johcf/index
[6] https://doi.org/doi:10.3390/ijerph17145210
[7] The COVID-19 counting fiasco: Is the real total of deaths closer to 10 million? In-depth analysis from India and other countries. | Jones, PhD | Journal of Health Care Finance (healthfinancejournal.com)
[8] State-wise-estimates-of-current-beds-and-ventilators_20Apr2020.pdf (cddep.org)
[9] Proximity to death and health care expenditure increase revisited: A 15-year panel analysis of elderly persons | Health Economics Review | Full Text (biomedcentral.com)
[10] http://dx.doi.org/10.1136/bmjspcare-2011-000053.54
[11] https://doi.org/10.12968/bjhc.2018.24.12.617
[12] https://doi.org/10.1002/hpm.2950
[13] https://doi.org/10.1002/hpm.3094

patients were decanted out of London into hospitals with available capacity.[14] Basically, the whole of England was used as a massive bed pool. It was only the relatively small geographic size of England and the fact that the UK has a National Health Service which allowed such capacity equalization to occur. Far larger Federal countries such as the USA, Brazil and India do not have this luxury.

Figure 1: Top 50 world countries for the highest number of "reported" COVID-19 deaths per 1,000 hospital beds. Hospital bed numbers are before COVID-19 and are from a previous study.[11]



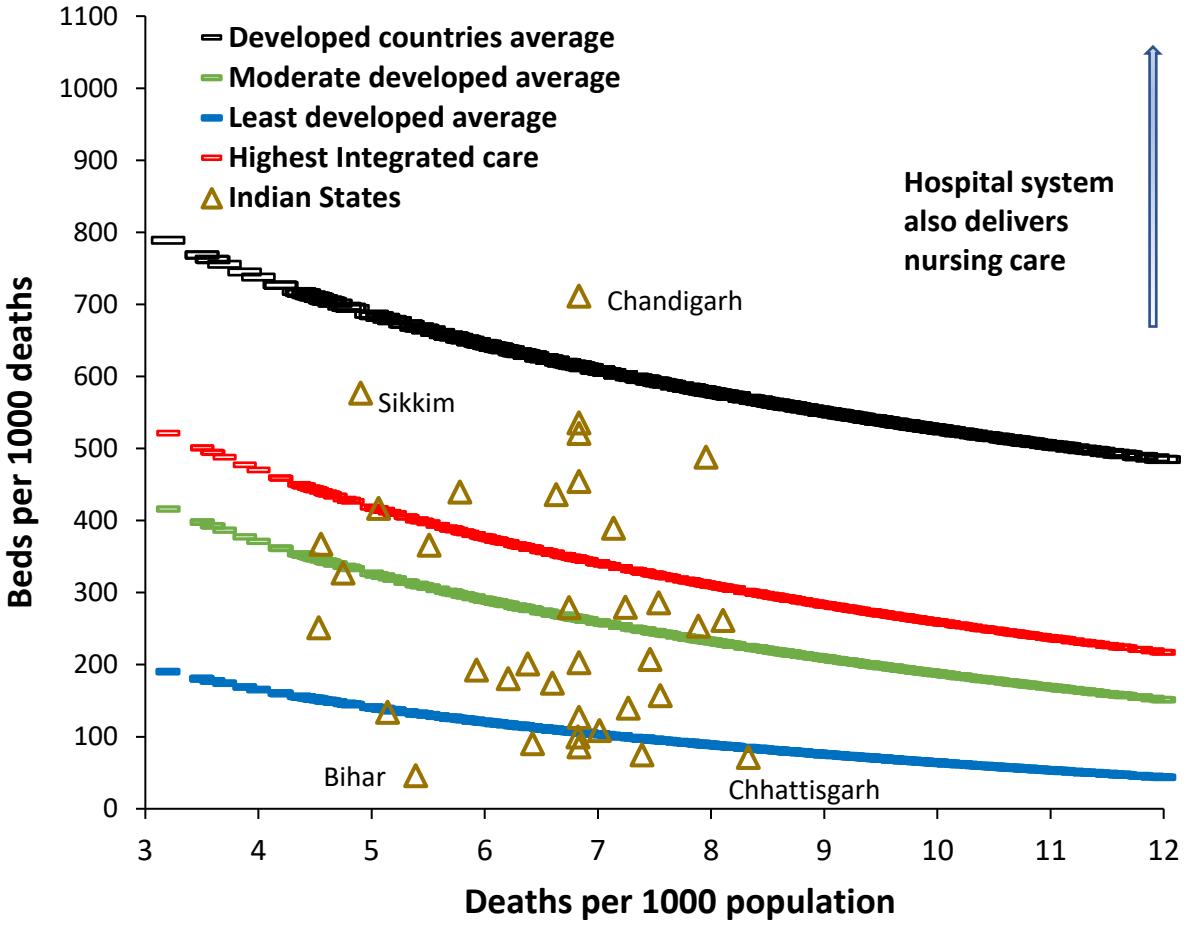
From Figure 1 we could be forgiven for thinking that India should not have a 'problem'. However, like the USA and similar countries India is a Federal collection of States with unequal financial resources. Figure 2 therefore explores how Indian states compared against each other and international benchmarks regarding bed provision before the arrival of COVID-19 and using the new method of bed comparison.

Total bed numbers include acute, mental health and maternity. Bed numbers for state-run hospitals are available, however, there are many private run hospitals about which no statistics appear to be collected. Researchers at Princeton University attempted to bridge this gap,[8] and have estimated a total of 1.9 million beds.

[14] Covid: Intensive care patients transferred from London to Newcastle - BBC News

The sheer power of the nearness-to-deaths effect is amply demonstrated by Covid-19. For example, in England during 2021 a COVID-19 hospital admission has an average length of stay around 9.6 days (including any time in critical care), there are 3 admissions for every death and 29.4 bed days per total COVID-19 deaths (deaths occurring in all locations).[15]

Figure 2: Beds in Indian states compared to international benchmarks. Population and deaths from HealthData.org[16]



For comparison, countries like Japan lie well above the international average because it counts nursing homes as hospital beds. Countries such as Australia lie at the international average, beds in England lie slightly above the line for the most highly integrated health systems (Singapore and New Zealand), however, England has nowhere near the level of integrated care to justify this low level of bed provision.[13] England therefore has fewer hospital beds than 9 Indian states.

[15] Healthcare | Coronavirus in the UK (data.gov.uk)

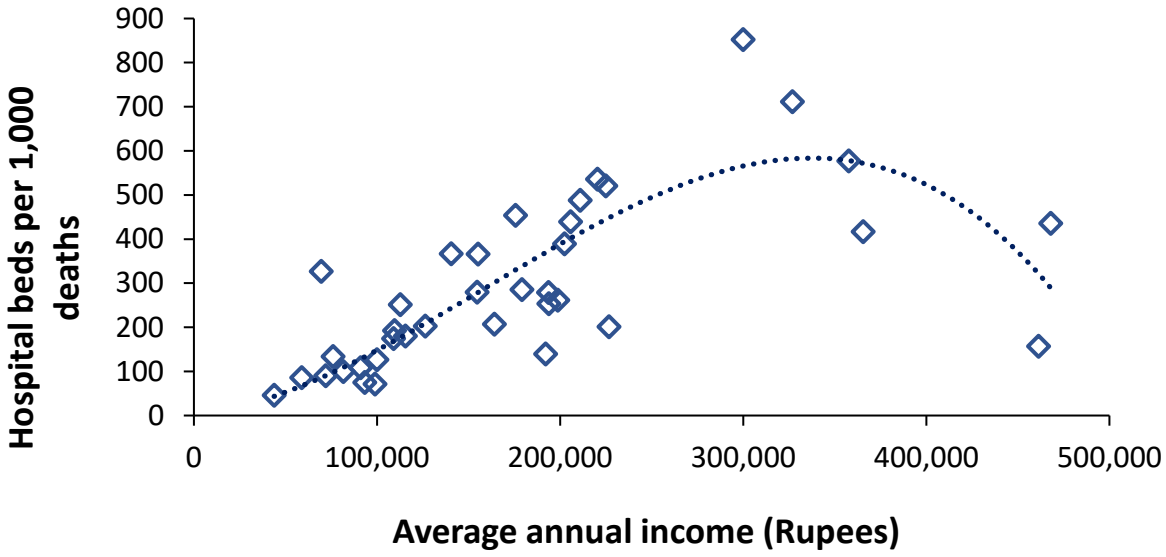
[16] GBD India Compare | IHME Viz Hub (healthdata.org)

India is a nation of stark contrasts and average income in Goa is 9-times higher than in Bihar. States with high bed provision include Chandigarh which is an administrative city district like Washington DC in the USA. Chandigarh serves as the capital city of both Punjab and Haryana states. It has a high literacy rate; the many public employees enjoy relatively high wages (4th highest average income) and will also benefit from state health insurance. It was India's first planned city and is said to be the cleanest city in India. It has a high proportion of world class private hospitals.

Sikkim is one of the smallest states, is largely rural, but hosts the large Sikkim Manipal Medical University and Hospital. It has the 3rd highest average income. On the other hand, Bihar (lowest bed provision) is a largely agricultural state and has the lowest average income in India. Chhattisgarh (shown on Figure 2) is in the bottom 10 lowest income states.

This huge range in relative wealth is reflected in the wide range in bed provision shown in Figure 2 from equivalent to the least developed/poorest world countries through to above the international average for developed countries. Around 10 Indian states have bed numbers equivalent to the world's poorest countries such as Uganda, Madagascar, Senegal, Benin, etc. The link between income and bed provision is illustrated in Figure 3.

Figure 3: Link between income and hospital bed provision in Indian states. Income from[17]



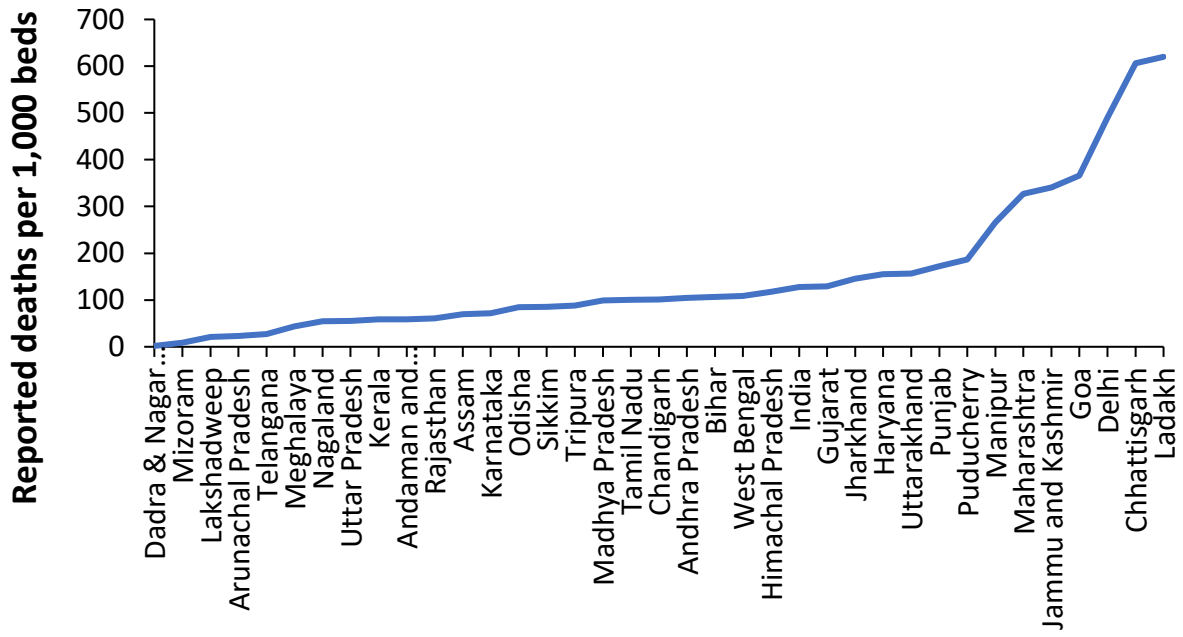
As to be expected there is scatter around the trend line since both beds and income are estimates. Annual income is based on persons with salaries and many of India's population including farmers, etc receive no 'salary' as such. The 'available' funds at state level will also vary and will influence the relative number of state hospital beds.

[17] Per Capita Income of Indian States 2019-20 (jagranjosh.com)

Reported COVID-19 deaths per bed in Indian states

Clearly the pressure on beds will depend on the level of real COVID-19 deaths in each state and Figure 4 attempts to give an estimate based on "reported" deaths. While data in all states is likely to be an under estimate those on the right hand side will be experiencing the highest pressures. Spread of COVID-19 will vary greatly depending on the weighted state population density (including proportion living in slums), while reported deaths will depend on each state's testing strategy and the effectiveness of the COVID death reporting process.

Figure 4: Reported COVID-19 deaths (9th May 2021) per 1,000 hospital beds (before COVID). Reported deaths from MyGov.In[18]



Conclusions

Generations of health service panners have been told that planning is all about age. Age per se only plays a minor role, however nearness-to-death is a far more logical measure of resource utilization. The absolute number of deaths then becomes an important primary indicator of resource pressures. Clearly the surge in admissions will precede the surge in deaths, and it is the rate of change in admissions and deaths which drives the pressures. However, one simple measure goes a long way. See further reading.

Further reading

This is part of a far longer series available at http://www.hcaf.biz/2020/Covid_Excess_Deaths.pdf, also available from Research Gate. See also http://www.hcaf.biz/2010/Publications_Full.pdf

[18] COVID19 STATEWISE STATUS | MyGov.in