Methodology: Brookings India Health Monitor

The Brookings India Health Monitor brings together real time data, research, and analytics of India's healthcare sector on a common platform. This is created using publicly available data from across all states and Union Territories of India. It enables policy makers, corporates and researchers to access, monitor, and analyse real time health measures at a highly disaggregated district level. The monitor currently collates and visualizes data from the Census, Health Management Information System (HMIS), National Family Health Survey IV, and Rural Health Statistics.

The NFHS data currently consists of district, state, and national estimates of the percentage of the working population (age 15-50 for women, age 15-55 for men) with a particular category based on vital readings. For example, the monitor visualize estimates of the percentage of the population that has low BMI, healthy BMI, overweight BMI, and obese BMI. These can be disaggregated by male, female, urban, rural, both urban/rural, pregnant, non-pregnant (haemoglobin only). Additionally, bar graphs indicate the difference within a particular demographic by wealth index. The DHS created wealth index utilizes principal component analysis to assign a score to households based on answers to asset ownership questions. The methodology for the creation of the asset index can be found in the following link: https://bit.ly/2BBQsHo. The NFHS data through the heat maps allows for powerful demographic specific comparisons of geographic regions, while the bar graphs permit within-geographic region comparison between economic groups. The within economic disparities are extremely important as health failures for a particular demographic with a low asset index points to excessive scarcity, while health failure for that demographic with a high asset index points to bad decision-making. Health failures at different scarcity levels require different policy interventions, and hence the strength of these visualizations.

- BMI is split into anorexic, healthy, overweight, and obese
    - Based on WHO Standards
        - Combined all three classes of obesity into one.
- Glucose is split into low, healthy, and high and takes into account the last meal of the participant.
    - Based on American Diabetes Association standards.
- Blood Pressure is split into low, healthy, elevated, and severe and takes into account both systolic and diastolic measures.
    - Based on American Heart Association standards.
- Haemoglobin in split into anaemic, healthy, and high.
    - Based on National Institute of Health standards.

Additionally, the NFHS data looks at district, state, and national estimates of the percentage of the working population that self-reports itself as being afflicted with Asthma, Cancer, Diabetes, Heart Disease, and Thyroid Disease, the percentage that have been treated for that particular disease, and the percentage of the surveyed population that are uncertain as to whether they are afflicted.

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We have developed health indexes at state and district levels for Quality and Quantity of health infrastructure which will be updated on a real time basis. The Health Monitor consists of:

- Infrastructure Index (Methodology below)
- Maternal Care Index (In Process)
- Child Care Index (In Process)
- Communicable Diseases (In Process)
- Non-communicable Diseases (In Process)

Our aim is to democratize health data by making it publicly available through easy-to-understand, real time indexes at highly disaggregated level (district of India). We believe that having access to this information can be helpful for local level policy makers as well as to the health industry for core business or corporate social responsibility (CSR). Our informatics is already being used by the NITI Aayog and the Uttar Pradesh health ministry.

I. Health Infrastructure Index (HII):

The Health Infrastructure Index (HII) is calculated by collating the Health Infrastructure Quantity Index (HQNI) and the Health Infrastructure Quality Index (HQLI).

$$Health\ Indrastrustrue\ Index\ (HII) = Health\ Quantity\ Index\ (HQNI)\ \times\ Health\ Quality\ Index\ (HQLI)$$

I (a). Health Infrastructure Quantity Index (HQNI):

- The Health Infrastructure Quantity Index considers Sub Centres (SCs), Primary Health Centres (PHCs), Community Health Centres (CHCs), Sub Divisional Hospitals (SDHs) and District Hospitals (DHs) at a district and a state level.
- For Sub Centres (SCs), Primary Health Centres (PHCs) and Community Health Centres (CHCs), two variables are used: 'Availability' and 'Distance'. For Sub Divisional Hospitals (SDHs) and District Hospitals (DHs), only one variable is considered: 'Availability[1]'.

$$Quantity_d = \left\{\frac{SC^A + PHC^A + CHC^A + SDH^A + DH^A}{Total\ Population} \times 10{,}000\right\} + \frac{\{SC^D + PHC^D + CHC^D\}}{3}$$

A = 'Availability' (Total Number of Facilities)
D = 'Distance'
d = District

- 'Availability' for SCs, PHCs and CHCs is based on data collected by the Ministry of Health & Family Welfare under the National Health Mission and uploaded to the Health Management Information System (HMIS). This data is updated on a monthly basis.

[1] 'Availability' data is plotted on a per capital basis

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- This 'Availability' variable considers the total number of facilities at the SC, PHC and CHC level and then arrives at the per capita availability by considering the total population per district. This is not arrived at by considering the required number of facilities at each level because as per regulations, since certain districts[2] do not have a rural population, by mandate, they do not require certain facilities. Therefore no benchmarks may be used.

$$\left\{\frac{SC_d^A + PHC_d^A + CHC_d^A + SDH_d^A + DH_d^A}{Total\ Population} \times 10{,}000\right\}$$

- 'Distance' is based on data collected by the Census and has not been updated since 2011
- 'Distance' is shown as a % of villages having access to the facilities within a certain distance, as determined by regulations. For Sub Centres (SCs) and Primary Health Centres (PHCs) the prescribed distance is under 5 kms; for Community Health Centres (CHCs), the prescribed distance is under 10 kms. This data is based on the sample of villages for each district that was surveyed by the Census.

$$SC_d^D = (\%\ of\ villages\ in\ a\ district\ with\ access\ to\ SCs\ under\ 5kms)^3$$
$$PHC_d^D = (\%\ of\ villages\ in\ a\ district\ with\ access\ to\ PHCs\ under\ 5kms)$$
$$CHC_d^D = (\%\ of\ villages\ in\ a\ district\ with\ access\ to\ CHCs\ under\ 10kms)$$

- 'Availability' for SDHs and DHs are plotted using population as a metric. The population is taken from the 2011 Census for each district.
- A sum is calculated adding the figure so arrived for all the district in a particular state. The average of the said figure provides us with the Index number for states.

$$Quantity_s = \sum_{d=1}^{N} \frac{Quantity_d}{N}$$

s = State
d = District
N = Number of Districts in the State

I (b). Health Infrastructure Quality Index (HQNI2)

- The Quality Index is calculated using data from SCs, PHCs and CHCs. This is done only on a state level for the current index. All the data is collected from the Ministry of Health & Family Welfare's annual publication titled "Rural Health Statistics[4]".

[2] Rural Population missing for Kolkata, New Delhi, Central Delhi, Brihan Mumbai, Chennai, Hyderabad, Mahe and Yanam Urban Population missing for Lahul Spiti, Kinnaur and Nicobar. For these missing sub variables, we have used 0.
[3] Notations remain the same
[4] http://wcd.nic.in/sites/default/files/RHS_1.pdf

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- Each of the facilities are further divided into the following variables: 'Infrastructure' and 'Human Resources'; CHCs have an additional variable available: 'Supply'. Details of the Sub Variables are recorded in Table 1.
- Sub Variables under 'Infrastructure' are ratios of the sub variables to the total number of facilities (Ex: $\frac{\text{No.of SCs with ANM Quarters}}{Total\ Number\ of\ SCs}$)
- Sub Variables under 'Human Resources' are ratios of the 'In Position' figures for the sub variable to the 'Required' figures. (Ex: $\frac{No.of\ Radiographers\ In\ Position\ at\ CHCs}{Number\ of\ Radiographers\ Required}$)
- Sub Variables under 'Supply' are ratios of the sub variables to the total number of facilities in the state (Ex: $\frac{No.of\ CHCs\ having\ a\ regular\ supply\ of\ allopathic\ drugs}{Total\ No.of\ CHCs}$)

$$Quality\ Index_s = \sum_{j=1}^{7} \frac{SC^j}{7} + \sum_{j=1}^{14} \frac{CHC^j}{14} + \sum_{j=1}^{18} \frac{PHC^j}{18}$$

j = District

s = State

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Appendix:

- For Quality of PHCs, three sub variables under 'Human Resource' namely 'Pharmacists', 'Laboratory Technicians' and 'Nursing Staff' is a collated figure for PHC and CHC combined. To avoid error of double counting, it is considered only once under PHCs
- Due to lack of data reported by the Rural Health Statistics, 2015, certain sub variables are ignored for certain states. Table 2 lists out the same in detail:

Table 2: Missing Variables by State[5]

Name of State	Sub Variables for SCs omitted	Sub Variables for PHCs omitted	Sub Variables for CHCs omitted
Arunachal Pradesh			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Assam			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Bihar	- SCs without all-weather motorable road	-PHCs Without All-Weather Motorable Approach Road - SCs with at least 4 beds -SCs Without Regular Water Supply	
Mizoram			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Sikkim			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Uttar Pradesh			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Chandigarh		No Sub Variables considered	

[5] These are not reported in RHS (2015)

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Dadra & Nagar Haveli			General Duty Medical Officers (GDMOs) - Allopathic at CHCs
Delhi			No sub variables considered