India Data Group

Reverse Planning: Migration Risk Mitigation

Shubhangi Dutta and Veer Shah, advised by Professor Ashish Goel

April 28, 2020

Background

Since the initiation of the lockdown on March 24th, 2020, migrant workers have been at the crux of the crisis in India -- many struggled to return to their home districts and states, and those who could not have faced challenges seeking shelter and food without their regular source of income. This situation poses a difficult problem for reopening the economy. As the government extends the lockdown, one of the immediate concerns is the risks associated with allowing open migration between and within states, as migrants return home, return to work, and potentially carry the virus across India to rural and remote areas with little healthcare infrastructure.

Objective

We aim to explore the potential risks associated with returning to a norm of inter and intra migration between states, with the goal of informing state and local governments of the likely risks that they may have to face once the lockdown is lifted. Thus, we map the risks of migrant flows for each district.

Data Sources

We use a combination of several data sources in our work. We leverage previous work done by Professor Clément Imbert in identifying migrant workers' home districts (where their families are) and work districts (where they migrated to work). Due to the difficulty of tracking migrants, Professor Imbert has compiled a list of data sources in order to achieve this:

- Census 2011 on permanent migration.
- NSS Employment-Unemployment Survey 2007-08 on seasonal migration.
- Census 2001 district-to-district migration matrix to guess which district permanent migrants are from and which district seasonal migrants go to (as in Imbert and Papp 2020).
- Monthly unreserved trips in 2014-15 from the Indian Railways (Firth and Imbert 2020).

Professor Imbert's work resulted in a "Migration Matrix" which includes a migrant's home state and district as well as their work state and district, and also differentiates between seasonal and permanent migrants (among many other variables).

We leverage this useful data source along with infection data by district as provided on the government's home page corroborated with data crowdsourced from the data science community. Using infection data, we quantify the risks associated with migrants from certain districts returning home.

Results

3. Where will migrants return to?

To know where is the home permanent migrants will return to, we use the Census 2011 combined with the Census 2001. For seasonal migrants, we use directly the NSS Employment Survey 2007-08:

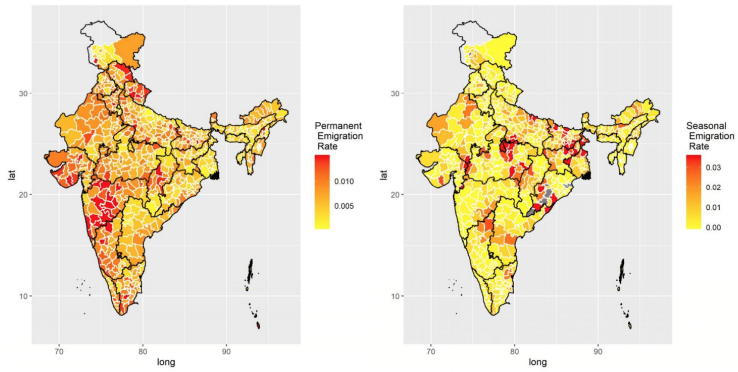
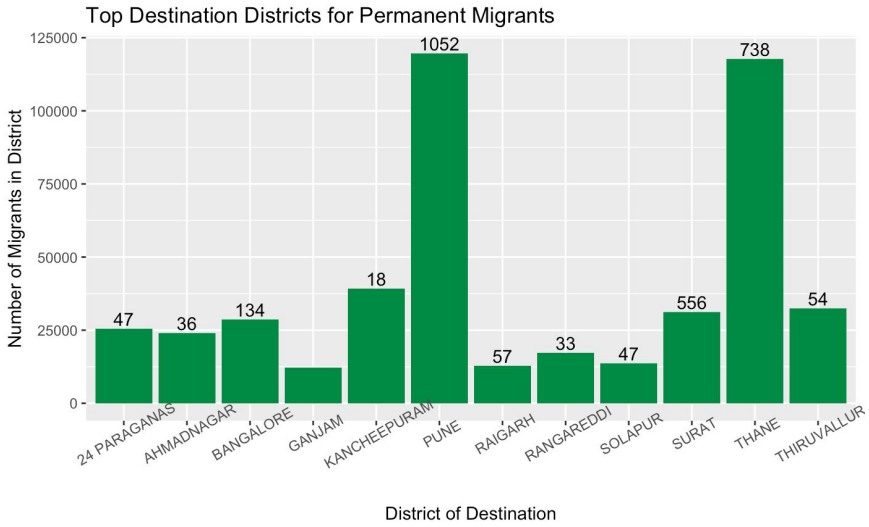


Figure 3: Permanent migration rate (left) and seasonal migration rate (right) coming from each district of origin

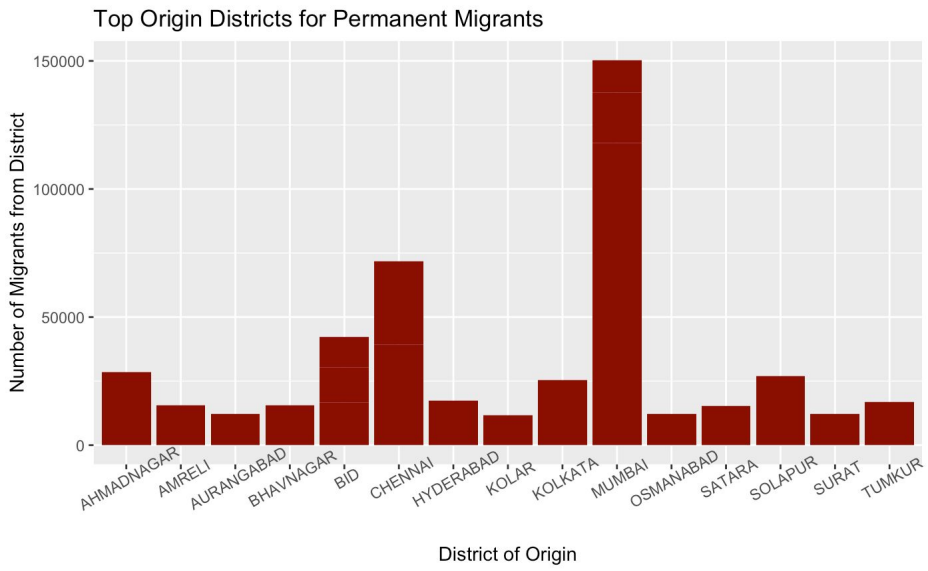
Figure 1: Professor Imbert's initial work on migrant movement

We seperate the workflow between permanent and seasonal migrants as their migratory patterns differ drastically, and their behavior when the lockdown may also be very different.

Permanent Migration



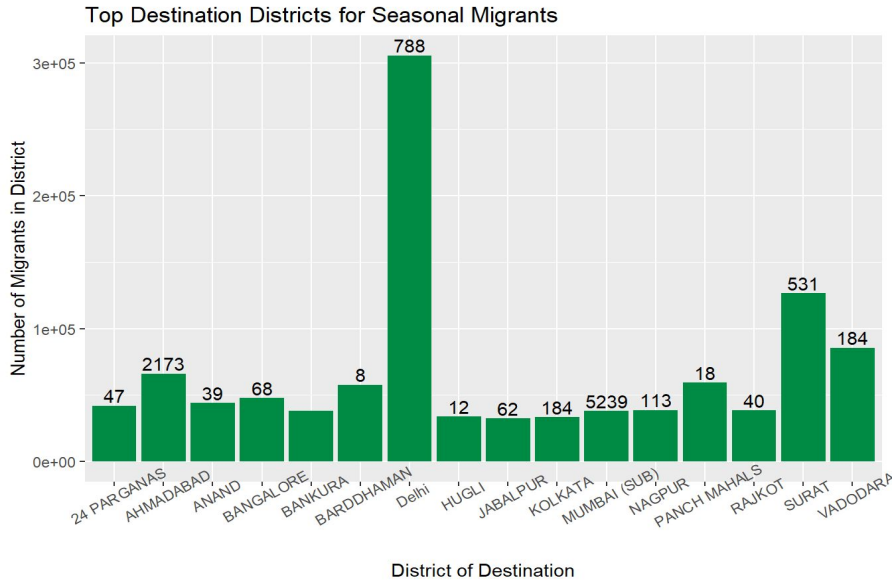
First, we plot the top destination districts for permanent migrants above, along with the respective infection rates in these districts. We note that these districts are a mix of dense urban regions as well as more sparse, rural towns. In order to understand where these migrants may travel to, we must understand where migrants' homes are, as this is likely where they will travel when the lockdown is lifted. For the same migrants in the graph above, we find the distribution of origin districts in the graph below.



We can again see that these districts are a mix of dense urban regions as well as more sparse, rural towns. Identifying the districts with the largest risk, we identify 10 of the top 20 destination districts with the highest infection rates, and trace where the migrants from these districts originate from: Mumbai, Ahmadnagar, Solapur, Tumkur, Bid, Bhavnagar, Amreli, Satara, Osmanabad, and Kolar. This is yet again a mix of urban regions and sparse townships. Two insights are clear from this analysis:

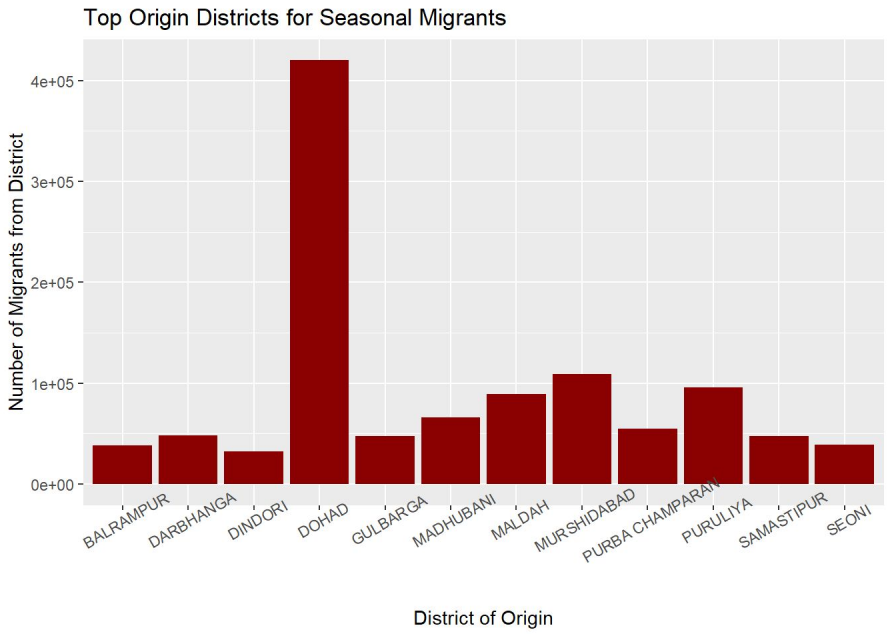
1. The burden of providing healthcare falls on the rural and remote areas.
2. In dense cities like Mumbai, tracking migrants and their movement into the city will be the biggest challenge.

Seasonal Migration



We plot the top destination districts for seasonal migrants above, along with the respective infection rates in these districts. Similar to permanent migrants, these districts are a mix of dense urban regions as well as more sparse, rural towns. In order to understand where these migrants may travel to, we must understand

where migrants' homes are, as this is likely where they will travel when the lockdown is lifted. For the same migrants in the graph above, we find the distribution of origin districts in the graph below.



Noticeably, these districts consist mostly of sparse, rural towns. Identifying the districts with the largest risk, we identify 10 of the top 20 destination districts with the highest infection rates, and trace where the migrants from these districts originate from: Dohad, Maldah, Madhubani, Purba Champaran, Darbhanga, Samastipur, Seoni, Balrampur, Murshidabad. This list comprises nearly only rural and small cities. It is clear that for the seasonal migrant case, if they indeed return home, then providing support to rural areas must be a priority as these areas could see their healthcare systems be overwhelmed.

Next Steps

There are a few shortcomings of this analysis that must be enumerated:

1. The work above is done on a snapshot of the data. All data used in the construction of these graphs and analyses are from infection data at the end of April. Extending this analysis to update with new data, and include rates of change of new cases would be much more informative.
2. This work assumes the behavior of both permanent and seasonal migrants would be to return home. Work to validate this assumption, or qualify the results above would add further nuance.
3. Much effort is driven in epidemiological modeling of the virus in India, including compartmental models like SIER models. Adding migrant patterns to this analysis could help understand the potential spikes in cases that districts could experience after the lockdown is lifted.