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Visualizing COVID Restrictions: Activity Patterns Before, During, and After COVID-19 Lockdowns in Uttar Pradesh, India

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Abstract

Globally, restrictions implemented to limit the spread of COVID-19 have highlighted deeply rooted social divisions, raising concerns about differential impacts on members of different groups. Inequalities among households of different castes are ubiquitous in certain regions of India. Drawing on a novel data set of 8,564 households in Uttar Pradesh, the authors use radar plots to examine differences between castes in rates of activity for several typical behaviors before, during, and upon lifting strict lockdown restrictions. The visualization reveals that members of all castes experienced comparable reductions in activity rates during lockdown and recovery rates following it. Nonetheless, members of less privileged castes procure water outside the household more often than their more privileged peers, highlighting an avenue of improvement for future public health efforts.

Keywords

visualization, inequality, COVID-19, public health

In March 2020, the Indian government implemented nationwide lockdowns to contain the spread of the novel COVID-19 virus. This first set of lockdowns, some of the strictest in the world, were kept in place for three months (Hale et al., 2020). Given that pandemic restrictions have highlighted existing inequalities globally (Kapoor, Ravi, and Shiva Kumar 2021; Gupta, Malani, and Woda 2021) and caste inequality is ubiquitous in the Uttar Pradesh region of India (Goli, Maurya, and Sharma 2015), researchers may expect the impact of restrictions to be stratified along caste lines. We examine differential impacts across caste by visualizing data on key behaviors. To do so, we capture frequency of activity before, during, and after the 2020 lockdown period and identify meaningful differences across households of different caste categories.

We leverage a unique sociocentric network data set that was collected in 120 Gram Panchayats (large village areas) in two rural districts in Uttar Pradesh, India, as part of a health systems accountability intervention in 2016 (Mohanan et al 2020). In October 2020, we fielded a phone survey of 10,133 households in these 120 villages and asked them how frequently they engaged in a list of 11 typical behaviors. We asked households to report these frequencies across three time periods: prior to the implementation of COVID protocols, during their enforcement, and after the restrictions were lifted. Each household rated the frequency with which they engage in each activity on an ordinal scale, ranging from 1 ("never") to 10 ("every day").

Figure 1 shows three radar plots, one for each period, displaying the mean response of each caste to each behavior. Contraction of the lines toward the center of the plot represents a mean reduction in behaviors, whereas space between the lines indicates differences between castes.

Our results suggest very few differences greater than 1—a full step in our scale—in behaviors across respondents of different castes. Prior to the enforcement of COVID-19 public health protocols in the region, members of the General caste reported leaving their house to procure water less often (mean = 2.98) and attending religious events more often (mean = 4.66) than their counterparts in the Scheduled

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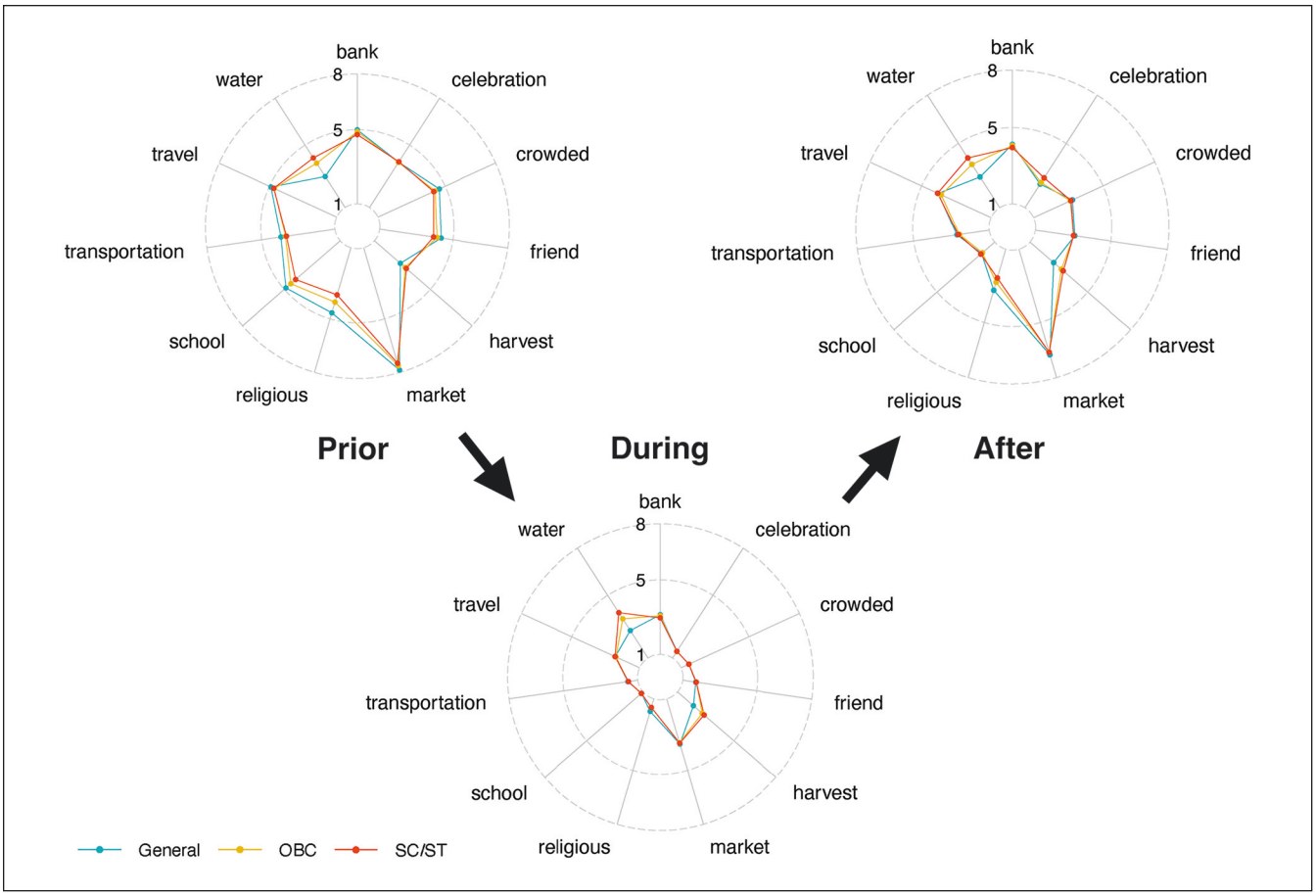

Figure 1. Radar plot displaying mean activity frequency by type of activity and caste.
Note: The label for each activity is displayed. Households for which caste could not be identified are removed (n = 1,569). The mean activity levels for general caste households ("General," most privileged, n = 1,671), other backward castes (OBC, medium privilege, n = 4468), and scheduled castes/tribes (SC/ST, least privileged, n = 2,425) are presented as colored lines. Dotted concentric circles mark increasingly high mean activity frequency, from 1 (center) to 8 (outer ring). The leftmost radar plot (labeled "prior") displays mean activity levels prior to lockdown restrictions, the center radar plot (labeled "during") displays mean activity levels during to lockdown restrictions, and the rightmost radar plot (labeled "after") displays mean activity levels after restrictions were lifted. The radar plots were produced using the R package *ggradar* (Bion 2021). The supplement provides a detailed description of the activities and measurements used for the visualization.

Castes/Scheduled Tribes (SC/ST) (means = 4.18 and 3.65, respectively). In the period when protocols were enforced, frequency of engaging in all behaviors decreased for all castes, yet the difference in water procurement between General (mean = 2.75) and SC/ST castes (mean = 3.89) remained meaningful in size. After the protocols were lifted, most respondents reported a return to activities, although less frequently than before the lockdown. Caste differences in water procurements remained largely unchanged across three periods. Religious event attendance, which contracted for all groups, returned to levels similar to the first period for general castes. SC/ST castes worked more than General castes on harvesting, with the difference increasing from an average difference in means of .43 in the period preceding protocol enforcement to .66 in the period following it. Across all periods and behaviors, Other Backward Caste households report mean behaviors that fit in between the other castes, and differences with the other two castes are less than 1.

Our figure highlights a significant contraction of behaviors across all castes during the protocol enforcement period and the success of public health measures put into place in the region, an important approach to curtailing the spread of COVID-19. Despite the severe inequalities that exist between castes in this region, the lockdowns do not appear to place a disproportionate burden on the activity of lower caste households. An exception is the persistent inequality in water procurement, indicating that the underlying differences in access to water for drinking across caste line is an avenue of improvement for future public health efforts in the region.

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Supplemental Material

Supplemental material for this article is available online.

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James W. Moody is a professor of sociology at Duke University. He has published extensively in the field of social networks, methods, and social theory. His work has focused theoretically on the network foundations of social cohesion and diffusion, with a particular emphasis on building tools and methods for understanding dynamic social networks. He has used network models to help understand organizational performance, school racial segregation, adolescent health, disease spread, economic development, the development of scientific disciplines, and much more.