

Density Mapping of Dating App Users across Time and Space in Mumbai, India

Benjamin Eveslage,¹ Purvi Shah,² Caleb Parker,³ Bitra George,² Jiban Baishya⁴

BACKGROUND

HIV programs have long focused on engaging key populations (KPs) through physical networks or in “hot spots” using in-person communication. Individuals who faced risks but steered clear of these hot spots in the interests of privacy or security were considered “hard to reach” or “hidden.” Many of these previously unreachable people are now reachable through online technologies and platforms. The use of social media and mobile technologies has expanded dramatically in recent years — particularly among KPs — but HIV programs have been relatively slow to respond to this change. As of 2018, there are an estimated four billion Internet users globally, with mobile phone and Internet penetration above 50% in most major global regions.¹ The average person spends six hours a day using Internet-powered devices and services. In particular, KPs have long been active users of online platforms and dating apps. Marketing data of social media platforms and dating apps suggest that the number of users who are men who have sex with men (MSM)² is higher than some official population size estimates reported by UNAIDS.³

Dating apps on smartphones make it easier and seemingly safer for MSM to find partners. How, then, can HIV programs use available data to better align HIV outreach activities with the specific times and locations of MSM dating app usage while maintaining safety and privacy?

METHODS

The USAID- and PEPFAR-supported Linkages across the Continuum of HIV Services for Key Populations Affected by HIV (LINKAGES) project in India, led by FHI 360, created density maps of the use of location-based dating apps in Mumbai to identify concentrations of users and enhance program coverage. Using ArcGIS software, Mumbai was overlaid with a gridwork of latitude/longitude points, each 2 kilometers apart (374 points), and a second group of points at a distance of 1 kilometer (410 total). Data collectors used Android smartphones and an app to set their phone's Global Positioning System (GPS) location for each of the plotted coordinates, then opened Grindr to count the number of nearby users who were online (Figure 1). The number of online users within 1 kilometer of each 2-kilometer separated point was collected three times daily (9 a.m., 3 p.m., and 9 p.m.) over five consecutive days in November 2017. The process was repeated for seven consecutive days in December 2017 for online users within 500 meters of each 1-kilometer separated point (9 a.m., 3 p.m., and 9 p.m.). Short videos animating the changing density of Grindr users throughout the week, as well as across different areas of Mumbai, were generated using Excel's 3D Maps feature. Individual location data were never collected during these activities, and data were not granular enough to target people in physical settings.

RESULTS

An average of 3,810 online Grindr users were counted across metropolitan Mumbai around the 374 2-kilometer separated points collected in November. The total number of users counted in Mumbai only includes those currently using the Grindr app at the time of data collection (noted by a green dot on the user profile), and it did not include users logged in to Grindr but not actively using the app. The number also only counts users within the sampling radius of non-intersecting circles and does not include users in the areas between these circular sampling areas. The highest number of online users was counted at midday on Saturday, Sunday, and Wednesday evening. On weekdays, counts increased later in the day.

The second mapping activity revealed high-density locations of dating app use, including several time-bound areas and six areas consistently having 23 or more online users within 500 meters of each coordinate (Figure 2). The implementation of density mapping using larger sample areas, such as the 2-kilometer separated points, resulted in skewed density visualizations (see top image in Figure 2). This is because the larger areas often include parts where there are no users at all (such as bodies of water or parks), which make coastal areas appear less dense even if there are a high number of users. Additionally, sampling large areas captured a higher number of users, but the number of dating app users in the densest areas of Mumbai was more than the number that can be viewed on Grindr's standard app (free version). Therefore, the most dense areas had incomplete data collection and did not stand out. This was corrected in the second round of data collection with smaller sampling areas of 1-kilometer separated points (see bottom image in Figure 2). Time-bound areas of high density are shown in the specific day and time heat maps in Figure 3.

Figure 1. Process used for mapping online Grindr users in Mumbai

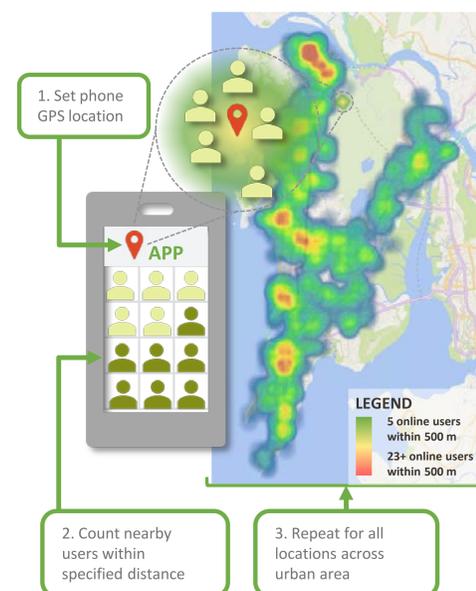


Figure 2. Density mapping in Mumbai compared 1-kilometer radius sampling (top) vs. more precise 500-meter radius sampling (bottom) showing clear high-density locations of dating app users

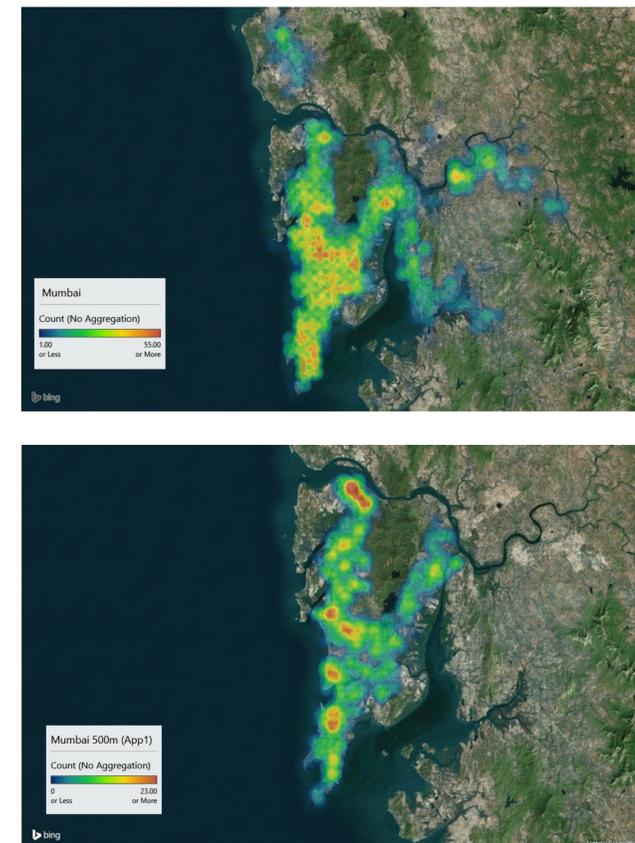
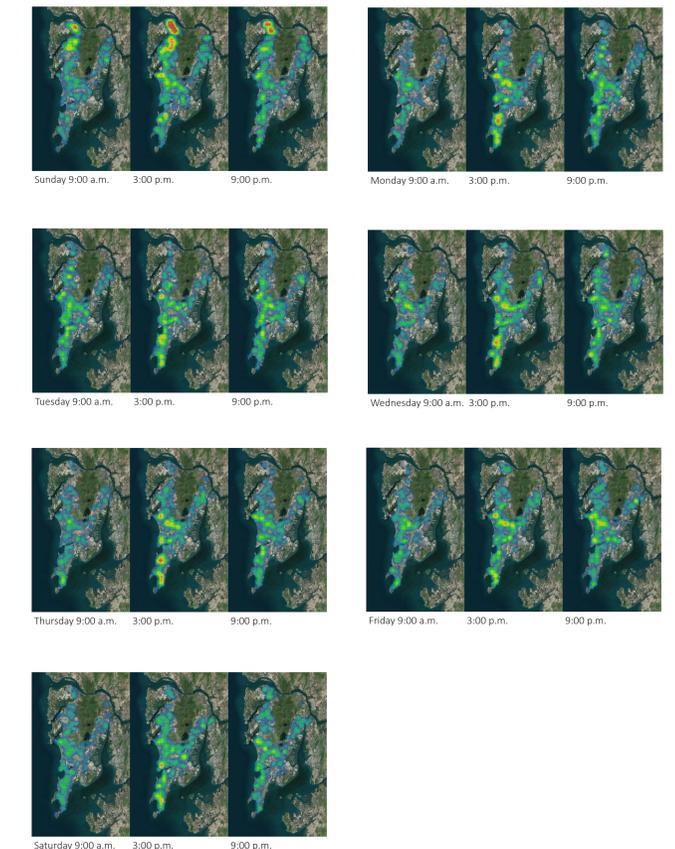


Figure 3. Time-bound areas of high density in the specific day and time across Mumbai



CONCLUSIONS

This activity successfully identified physical clusters of MSM online at specific times of dating app usage and estimated the total number of online users in Mumbai. The LINKAGES program in India is currently using these results to guide outreach to MSM on Grindr at high-density locations through peer- and advertisement-based approaches that are to be combined with location-specific referrals for services. Results of such mapping activities can be used to estimate reachable audiences on dating apps, guide outreach workers on the locations and times when outreach will be most effective, and pinpoint areas where targeted ads on dating apps may be best used to link the users to nearby HIV services.

AFFILIATIONS

- ¹ FHI 360, Washington, DC, USA
- ² FHI 360, India
- ³ FHI 360, Durham, NC, USA
- ⁴ USAID/India

REFERENCES

- ¹ Kemp S. Digital in 2018: world's Internet users pass the 4 billion mark. We are social blog [Internet]. 2018 Jan 30 [cited 2018 May 21]. Available from: <https://wearesocial.com/blog/2018/01/global-digital-report-2018>.
- ² Baral S, Turner RM, Lyons CE, Howell S, Honeremann B, Garner A, et al. Population size estimation of gay and bisexual men and other men who have sex with men using social media-based platforms. *JMIR Public Health and Surveillance*. 2018; 4(1). Available from: <http://publichealth.jmir.org/2018/1/e15/>.
- ³ UNAIDS. The key populations atlas. Available from: <http://www.aidsinfoonline.org/kpatlas/#/home>.

www.fhi360.org/LINKAGES