Sntaching data

**Data and Methods**

The study area for the present research is the Greater Chennai City Corporation, a metropolitan area with a population of over 6.6 million during the latest census in 2011. It consists of 201 wards with an average surface area of 2.18 km2 (quartiles 0.97, 1.61 and 2.53) and an average population of 33,195 (quartiles 21,451, 36,560 and 43,622). In terms of surface area, the wards are similar in size to neighborhoods or census tracts that have been used in crime location studies elsewhere (i.e., Long et al. [2018](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR40); Townsley et al. [2015](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR60)), but due to the high population density in Chennai, the population sizes of wards are larger than those in most other studies.

**Crime Data**

We investigate all detected snatching offenses from August 2010 to July 2017 committed in the study area committed by offenders who lived in the study area. The offense data were obtained from the State Crime Records Bureau, Tamil Nadu, India. They include the time, date, and location of all recorded and detected snatching offenses, and they also contain the age, gender and address of the offender. The data consist of 1573 snatching offenses committed by 1152 offenders. Based on all snatching offenses reported to the police, the detection rate of snatching offenses in Chennai City is estimated to be approximately 35 percent. During a period of 7 years, 1573 cleared snatching offenses in a city of 6.6 million is a very low number in comparison to the numbers of similar offenses reported in western countries. Although India has no national crime victimization survey and does not participate in the International Crime Victimization Survey (Ansari et al. [2015](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR2)) it has been estimated that in Indian cities only between 6 and 8 percent of the victims of theft report to the police (Durani et al. [2017](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR24)), so that police recorded thefts grossly underestimate the real numbers of thefts. In many countries it has been found that whether victims report to the police depends on attributes of the victim, the offender and the offense (Goudriaan et al. [2006](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR29)), and India is probably no exception. Although some research suggests that the high rate of underreporting in India might not bias comparisons between geographical areas (Prasad [2013](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR50)), the high level of underreporting at least potentially jeopardizes generalizations, and thus forces us to be careful in drawing conclusions. We further address the issue in the final section.

In the data, the location of a snatching offense is marked with a nearby address. For example, a snatching on the parking near a supermarket would be recorded at the address of the supermarket. The exact locations and the recorded locations are therefore approximate, and might diverge by 100 or occasionally 200 m. The addresses of the offenders are complete addresses. The addresses of the offense locations and of the offenders’ residences were both geocoded using Google Earth.

Based on the recorded dates of the crimes, for each snatching offense the number of prior snatching offenses committed by the same offender was determined per ward. Thus, for each snatching offense it was recorded in which wards each of the offender’s previous snatching offenses (if any) had been committed.

Table [1](https://link.springer.com/article/10.1007/s10940-021-09514-9#Tab1) presents descriptive information about the 1573 analyzed snatching offenses, including the age and gender of the offender, and whether it was committed in the offender’s own ward of residence.

Most offenders are young adults in the 19–25 age range, and few of them are younger than 19 or older than 35. Snatching is an almost entirely male activity, with only 6 female offenders being charged for the offense over an eight-year period. Approximately 6 percent of the offenses were committed within the offender’s own ward of residence.

Table [2](https://link.springer.com/article/10.1007/s10940-021-09514-9#Tab2) documents how many of the 1573 offenses involved how many of the 1152 offenders. For the large majority (80 percent) of the offenders only a single snatching offense was recorded during the eight-year study period in Chennai City. The number of snatching offenses for the other 20 percent ranged from 2–17 offenses, with the majority having 2 (20 percent), 3 (4 percent) or 4 (2 percent) recorded snatching offenses. With respect to repeat offending, this implies that 421 of the 1573 offences (27 percent) were repeat offenses committed by the same offender.

For every detected snatching incident, the distance was calculated between the home of the offender and the centroids of each of the 201 wards. Based on these distances, Fig. [1](https://link.springer.com/article/10.1007/s10940-021-09514-9#Fig1) shows the distribution of the home-crime distance, which reveals the typical positively skewed distance decay pattern.

**Crime Generators and Attractors**

To measure geographic variations in criminal opportunity, and based on the extant Western and non-Western literature on crime generators and attractors (Bernasco and Block [2011](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR11); Haberman and Ratcliffe [2015](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR31); Long et al. [2018](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR40); Song et al. [2019](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR57)), we searched for and collected information on the locations of presumed crime generators and attractors. Based on advertised or well-known functions and services of ‘points of interest’ or ‘facilities’, we took into consideration whether a facility is likely to attract many people (its crime generator function) and whether it is likely to attract people that are suitable snatching victims because they carry CRAVED items (its crime attractor function).

Transport hubs are a potentially important category of crime generators. Chennai is a densely populated city. It has a huge transport infrastructure, and 75 percent of Chennai residents use public transport (OLA Mobility Institute [2018](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR48)). We distinguish between *train stations* and *bus stops*. Train stations include MRTS stations, metro stations, and suburban train stations. Bus stops include bus stops and bus depots. People in transit may be suitable snatching victims if they wear or carry CRAVED items and are distracted.

*Schools and colleges* and other *educational institutions* also serve as meeting points for a large part of the population, in particular young people. Schools and colleges are distinguished from other educational institutions because schools and colleges are typically large-scale but fewer in number than other educational institutions, which tend to be much larger in number but much smaller in scale. For adults, *government offices* (attracting both workers and visitors) were included as potentially relevant locations where people meet many others.

As everywhere else, in Chennai retail facilities that sell tangible items are widely available and attract many customers. They include *supermarkets*, *textile stores* (including clothing and fabric shops), *vegetable markets*, and *general stores*. Their environs provide snatching opportunities because they bring together large volumes of people in a single place, although the potential victims do not necessarily carry CRAVED items. The same holds true for facilities that provide services for *personal care*, such as barbers shops, beauty parlors, saloons and spas, and for *restaurants*. Facilities that provide medical services include hospitals, but also include a wide variety of facilities that provide *medical services* or sell medicines.

Gold plays a major role in the culture of India. According to the World Gold Council, a market development organization and data repository for the gold industry, India is one of the largest markets for gold. It states that gold has a central role in the country’s culture and plays a fundamental part in many religious rituals and personal life events, in particular weddings, which alone generate approximately 50 percent of the annual gold demand of India (World Gold Council n.d.). Most gold is worn during festivals, rituals and while going to the temple. Besides festivals and special occasions, gold is also part of the daily clothing and accessories of Indians. For this reason, the environs of *temples*, so-called ‘*marriage halls*’ and *jewelry shops* can be attractive locations for snatchers. The same argument applies to *mosques* and *churches*, places of worship for Muslims and Christians, two large religious minorities in Chennai.

Googles location information, as made accessible through the Google Maps/Earth software, was used to establish the coordinates, names and categories of facilities expected to function as crime generators and attractors. Google Earth has been shown to provide reliable, complete and cost-effective data on many phenomena (P. Clarke et al. [2010](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR21); Kelly et al. [2012](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR37); Taylor and Lovell [2012](https://link.springer.com/article/10.1007/s10940-021-09514-9#ref-CR58)). Therefore, we used Google Earth to access Google location services data on all facilities in Chennai.

Based on the literature and taking into consideration particular features typical of India and Chennai city, 35 keywords were used as search terms in Google Earth Pro to get details of 23 types of facilities. For example, textile stores were searched using keywords ‘textiles’, ‘clothing’ and ‘fashion’. To ensure complete coverage of the study area, the geographic selection was defined as ‘near Chennai’. Appendix 1 provides an overview of facility categories and keywords used in the search process. In addition to English keywords, we also applied search terms in the regional language (Tamil), such as *Maligai Kadai* (grocery shop), *Kalyana mandapam* (marriage hall).

The search results of each keyword were saved and merged in a single master file using ArcGIS V10.3. These search results contained many duplicates. We considered as ‘pure duplicates’ two or more cases where the name of the facility (e.g., “Kilpauk”), the type of facility (e.g. “Metro station”), and the coordinates (latitude and longitude) were all equal. These duplicates refer to a single facility that was found with multiple keywords in the same facility type (in the case of metro stations, the keywords were ‘MRTS station’, metro station’, and ‘suburban train station’). We considered as ‘partial duplicates’ one or more cases where the name of the facility, the latitude and the longitude were all equal, but the category labels were different. For instance, many facilities that appear in the search result of ‘clothing’ also appear in the search result for ‘textiles’. Similarly, facilities listed under keywords ‘beauty parlor’, ‘saloon’ and ‘spa’ displayed a great deal of overlap and evidently referred to the same facilities that provide similar services. Duplicates, as based on the latitudes and longitudes of the facilities in the same facility type, were deleted.

A more complicated issue arises with respect to cross-category duplicates in the search results. In this case, identification by longitude and latitude is not enough, as multiple different and physically separated facilities can share coordinates because they are hosted in the same building. Therefore, to identify potential duplicates in the listed facilities we required them to not only share coordinates but also their names. Thus, two facilities with different coordinates, or with equal coordinates but different names, were assumed to not be duplicates.

If two (or more) facilities had the same coordinates and the same name but were listed with different functions, we assumed they hosted multiple functions and they were not seen as duplicates. For example, if two facilities with equal coordinates and names were listed under ‘textile store’ and ‘jewelry store’, we assumed the facility served both functions and none were deleted. An exception was made for those cases were one function evidently encompasses the other function. For example, as the more general category ‘educational institution’ includes schools and colleges, but also other educational institutions, the schools and colleges were excluded from the ‘educational institutions’ category, i.e., they were not separately counted as educational institutions.

To validate the Google Earth data, we physically verified the facilities in three randomly selected wards with field observations. The field investigation revealed that Google Earth correctly listed more than 95 percent of the facilities that were observed during the fieldwork. Point data of attributes generated from Google Earth Pro were converted as latitude and longitude using ArcGIS V10.3. In addition to the facilities, data on the size of each ward in terms of surface area and in terms of resident populations based on census 2011 counts, were obtained from the Greater Chennai Corporation database and included with other ward attributes. These features function as more general measures of opportunity, reflecting that even with equal numbers of facilities, larger and more populous wards may offer more criminal opportunities.

The frequencies of all the facilities in Chennai, aggregated over all 201 wards, are shown in Fig. [2](https://link.springer.com/article/10.1007/s10940-021-09514-9#Fig2). Textile stores and other retail stores are by far most frequent, followed by stores for personal care products and services, restaurants and ‘hospitals’ (which also include many small centers for outpatient medical and dental care).

**Control Variables**

Two variables, ward area and ward population, were included as control variables because they are likely to affect target availability generally without being directly linked to any theoretical framework. First, as there is variability in the surface areas of the 201 wards, large wards are likely to provide more opportunities for snatching than small wards, even if both are equal in terms of distance, prior offences and numbers of crime generators and crime attractors, and population. Second, wards also vary in the size of the residential population. All else being equal, wards with larger populations may provide more snatching targets in public space than wards with smaller populations.