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Finding Needle in the Haystack: "Kasur's Bogeyman" Brought to Justice by Geographic Profiling and Mass DNA Screening

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Abstract. This article describes the application of the concept of geographic profiling in hunting a serial child rapist in Kasur, Pakistan. It also discusses, how DNA became the prime witness against the serial rapist in the court of law. In January 2018, the blind rape and murder case of Zainab Amin hit the headlines. Following autopsy and the subsequent forensic examination, the only piece of evidence, the agencies had, was the DNA profile of the perpetrator and the information that the source of DNA profile is a serial child rapist, involved in at least seven more cases. The analysis of all crime sites and the distance between them strongly suggested that the offender most likely was a local resident. Mass DNA screening in the target region was conducted by CSI teams of Punjab forensic science agency. The DNA matched with suspect number 814 who later confessed all his crimes. In Polygraph examination, the offender revealed his modus operandi which was in line with the hypotheses made during the geographic profiling of the crime scenes. Thus, geographic profiling proved to be a very useful investigative tool in predicting the probable location of the criminal involved in a series of crimes.

Keywords: Mass DNA screening; Geographic profiling; Serial killer; Child rapist; DNA profiling.

1. Introduction

Pakistan, a nation of more than 220 million, has witnessed alarming increase in child rape cases in the last decade[1]. Although prevalent in all parts of the

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country, Kasur, a city to south of Lahore, has been in media focus since the infamous child abuse scandal surfaced in Hussain khanwala, a town in Kasur, in 2015[2,3]. The accused in those cases were identifiable because they used to film the barbarous acts.

Kasur once again became media headline when six year old Zainab got abducted on her way to a Quran recital on January 04, 2018. Angry riots and shutdown strike were sparked by this incident as it was reportedly 12th case of child abduction in a short span in the jurisdiction of three nearby police stations.

Until January 09, 2018, when her lifeless, battered body was retrieved from a heap of garbage, the police could not locate the abductee. The autopsy report confirmed that the child was subjected to rape before being choked to death.

Since the electronic and social media went ablaze and “Justice for Zainab” immediately became the nation’s slogan, it put enormous pressure on law enforcement agencies and the government. Resultantly a Joint Investigation Team was constituted to probe these cases[4]. The Pakistani criminal justice system is governed by the Pakistan Penal Code (PPC) 1860[5] and the Code of Criminal Procedure (CrPC) 1898[6]. According to these laws which were initially drafted in the 19th century, investigation in Pakistan primarily relies upon the ocular account provided by the victim and the reported eyewitnesses. Investigation Officer is a police official who is the custodian of the crime scene however the investigation officers mainly depend upon the statements and interviews of the contending parties and witnesses rather than the physical evidence. Pakistan has an adversarial judicial/legal system for the trial of criminal cases and a judge is the trier of the facts presented by the prosecution and the defence. Prosecution’s case is based upon the investigation work carried out by the police. Hence, when the physical evidence and forensic analysis of the same are ignored by the investigation officer, the same practice is repeated by the courts as well[7].

In this case and several other similar cases, the victims were either deceased or even if they had survived, they were too immature to identify their assailant. The only of value evidence, investigation agencies had was the DNA profile of the offender. The DNA database of Punjab Forensic Science Agency had indicated that the same offender had committed at least eight similar

crimes. After analysing all the crime locations, the investigation agencies decided to use the concept of criminal profiling and geographic profiling to narrow down the most probative geographical zone. As modern geographical profiling was purely a new concept for Punjab Police, they lacked the specialized software and had to rely on manual mapping. This paper discusses how the criminal investigation agencies of Pakistan developed offender's profile and the geographic profile in this case. These hypotheses will subsequently be compared with the confessional account that the offender himself provided during the polygraph examination.

1.1 Conceptualising geographic profiling

Geographic profiling is a crime investigation tool that analyses the locations of a connected series of crimes to predict the most likely area of the criminal's residence[10-12]. According to Felson and Cohen, geographic profiling relies mainly on environmental criminology, more specifically on routine activity theory and crime pattern theory[8]. According to Felson and Clarke, routine activity theory consists of three elements: motivated offenders, appropriate targets, and an environment devoid of capable guardians against a crime. The crime pattern theory predicts that a pattern could always be found in crimes committed especially by a serial offender[8]. Furthermore, locations of crimes may indicate the offender's activity space, where they live, work or play, and the routes between these. This is in line with routine activity theory, which explains that direct-contact predatory crimes occur during the routine activities of the victim and offender, and that it is only possible at the intersection of them both in time and space. One can infer then that offenders tend to commit crimes in those places where they spend most of their time and on the journeys in-between these places. This can also be understood in terms of the offender's "awareness space" – the area in which they spend their maximum time and with which they are most familiar[9,10].

2. Methods

2.1 Brief history of the case

The first case, in which the DNA of perpetrator was identified, had occurred in June 2015. The victim was a seven-year-old girl who was allegedly abducted

from outside her home and later discovered unconscious in an under-construction house. PFSA's serological analysis confirmed sexual assault as semen was found on her clothing and the DNA profile from the spermatozoa was generated. The police were unable to apprehend any suspect, so the case remained unsolved. However, the DNA profile was maintained in the PFSA DNA database[11].

In April 2016, a second case was reported where the victim was a 5 years old girl. She was kidnapped from a local market near her house and later found unconscious near a heap of garbage. Sexual assault was confirmed by the Medico legal review and subsequent forensic analysis of the evidence. The DNA profile was generated from the spermatozoa and was hit with the unknown DNA profile acquired in the previous case in 2015 after subsequent searching in the database. The PFSA confirmed the presence of this repeat offender to the police department in both cases. Numerous arrests were made, but after DNA comparison, all of them were cleared of the charge. Later on five more minors' rape and murder cases belonging to the same suspect were reported in the year 2017 before Zainab's murder in January 2018.

Figure 1. Timeline of Kasur rape cases.

2.2 Investigation methodology

The investigation agencies gathered data from all eight cases linked with this serial rapist. The CSI officials of PFSA again visited crime scenes and the houses of the victims, interviewed the victims who fortunately survived in order to get some clue about the probable age/ appearance of the suspect. After

gathering all data the investigation agencies started to develop the offender's profile.

3. Results

3.1 Analysis of the targets

It has been reported in different studies that predatory rapists do not select a target randomly or without a thought process involved. They usually attack whom they perceive as vulnerable[16].

The victims of this serial rapist belonged to poorest of the poor families or lower middle social class, where both parents had to work as labours for long hours. All victims were between 5-9 years of age and the locations of their houses were within the distance of 1km from corresponding crime scene. Children of this age group, who belong to the poor class, typically play in the streets and walk around nearby shops without the presence of any guardian, they are therefore easily accessible. So, it was speculated that perhaps because of the ease of access to children of underprivileged families, the perpetrator targeted children from underprivileged areas.

3.2 Analysis of crime sites

The crime sites are usually not selected randomly. It has been observed that serial rapists do not travel a great distance from their base to commit crime. This phenomenon is called "distance decay phenomenon". In a study conducted on 108 serial rape cases, it was observed that 83 offenders travelled on an average 3.14 miles to commit their crimes[17-20]. Investigators thoroughly reviewed all case records and mapped all crime scenes considering Zainab's house as the center point. Locations of the crime scenes and victims' residences were marked on the map. It was observed that all location points were present within an area of ~2.5 km^2. As Zainab's house was arbitrarily taken as the center point for search, it was noted that all marked locations lied within 2km radius with Zainab's house at the center. The search zone was thus divided into two sub-zones.

(1) The red zone- area inside the perimeter of all locations marked on the map i.e. the residences of all victims and their corresponding crime scenes (marked by red polygon in the figure).

(2) The yellow zone- an area inside 2 km radius with Zainab's house at the center (marked with yellow boundary).

It was also observed that all crimes were committed within 1 km distance from the respective victim's residence. Most of the bodies were recovered from under construction sites. Furthermore, two bodies (victim 2 and 7) were recovered from same location. From these observations, it was inferred that the suspect must be well aware of the locality and is most probably a resident of the red zone.

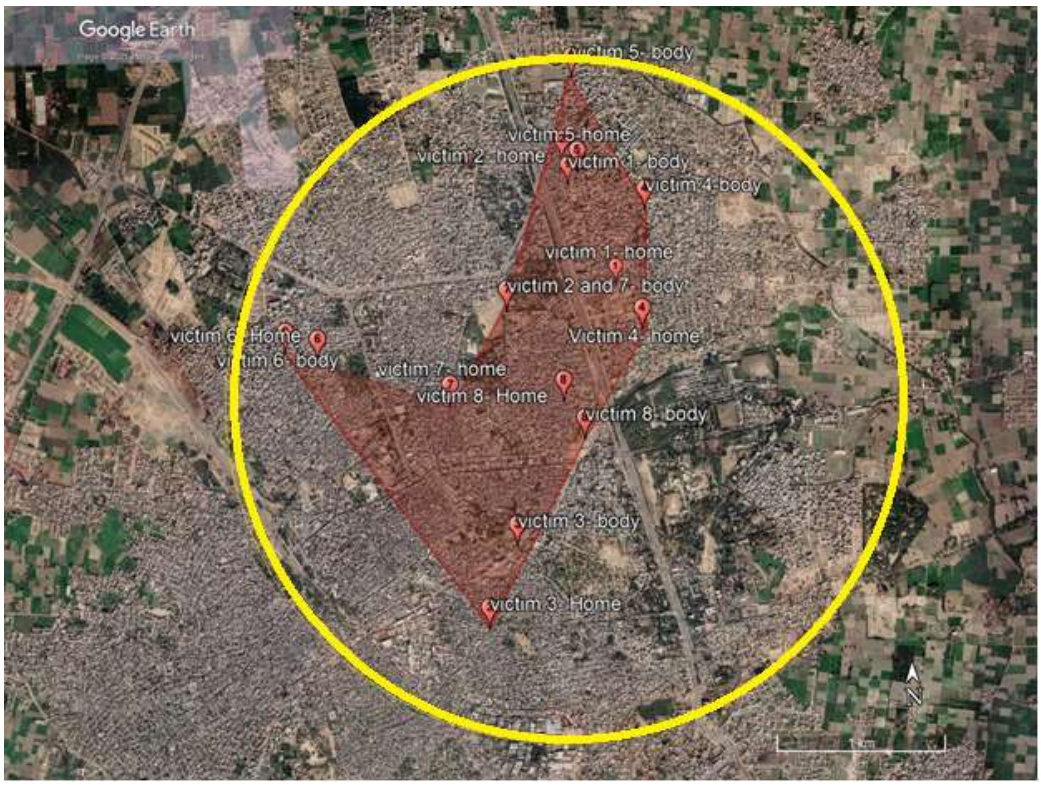

Figure 2. Map showing area covering all crime scenes.

The time of kidnapping in all cases ranged from 4:00 p.m. to 7:30 p.m. and, in most cases, the perpetrator selected under-construction houses for this felonious offence as shown in Table 1. Analysis of the crime sites made investigators think that the perpetrator is likely to be a mason or a laborer by profession. The offender cleverly selected this timeframe as construction usually stops around 5:00 pm in Pakistan. In small construction industry, the construction is usually done in daylight. So, the offender knew that under-construction houses become deserted after sunset. Moreover, the offender

never went far away from the site of abduction. In several cases, crime site was less than 500 meters away from the victim's home. This led to the speculation that the culprit always committed the crime after conscious selection of victim and crime site.

Furthermore, it was inferred that the suspect did not use any vehicle and instead used to walk his victims to the crime scene. This inference was confirmed through CCTV footages of the suspect with 8th victim in which he was seen walking with the victim. In the first footage the victim was playful but in the last footage victim appeared to be tired. The theory of rational choice also supported this inference as walking along a kid in the area of kid's residence is less suspicious than any other mode of travel especially given the fact that the kids belonged to underprivileged social class.

Case No	Age of Victim	Date	Police Station	Time of Abduction	Distance between the site of abduction and site of recovery	Site of recovery of the abductee
1	7 Years	June 23, 2015	Sadar Kasur	4 pm	200 meters	Under construction house
2	5 Years	April 05, 2016	Sadar Kasur	6:30 pm	500 meters	Heap of Garbage
3	5.5 Years	January 07, 2017	B-Division	7:30 pm	1 kilometer	Under construction house
4	4.5 Years	February 24, 2017	Sadar Kasur	7:30 pm	500 meters	Under construction house
5	7 Years	April 11, 2017	Sadar Kasur	5:30 pm	800 meters	Under construction house
6	8 Years	July 08, 2017	A-Division	5:15 pm	500 meters	Under construction house
7	6 Years	November 12, 2017	A-Division	4:30 pm	500 meters	Under construction house
8	6 Years	January 04, 2018	A-Division	7 pm	500 meters	Heap of Garbage

Table 1. Details about the eight incidents.

3.3 Mass DNA screening

Mass DNA screening in the forensic world is not a commonly used technique. In the Collin pitchfork case, it was used for the first time when the law enforcement authorities ran out of their options[21,22]. There have been very few examples since then, where mass DNA screening has been selected as an option to arrest the culprit.

In Kasur rape cases, the investigation agencies had the DNA profile of the offender as the only lead. Since it did not match with any known person in database, so it was clear that the offender did not have a registered criminal record. There was no eyewitness in these cases that is why the only way to solve this case was through DNA match. With a total population of about 3.45 million and a male population of about 1.79 million, Kasur is a densely populated district[23]. DNA profiling of the entire male population of the area is impractical, so it was important to identify the probable area of the residence of the offender.

Besides offenders profile and the geographic profile, the police department had few CCTV footages of the suspect while he was luring away the last victim. Although the CCTV footage was vague in terms of facial recognition, it was strong enough to approximate the age/height/physical appearance of the suspect. It was estimated that the suspect probably belonged to the age group of 20-35 years and was bearded. By using elimination approach the male individuals below 20 years and above 40 were subtracted from the potential suspect list. As a result of the reduction strategy, law enforcement agencies reduced the suspicious population and it was estimated that approximately 10, 000 to 12, 000 men of the target age had to be sampled for DNA comparison in that region.

3.4 Use of census data

To get exact information about the individuals of the target age group in each house and to prevent any escape, law enforcement authorities decided to utilize census data. This was the first time when investigation agencies were given access to the census data so that they already had complete information regarding number of the target individuals in each house. The PFSA teams starting from Zainab's neighbourhood continued door-to-door operation to

collect buccal swabs. The operation continued for 11 consecutive days while working on 24/7 basis. A total of 1,187 samples were collected by CSI teams from target Population. Apart from buccal swab sampling, CSI teams also visited various abandoned places and under-construction houses in targeted area along with Police.

3.5 DNA match and arrest of the culprit

It was January 22, 2018 when the DNA profile of suspect number 814 got matched with the serial rapist's profile. The suspect lived near the house of Zainab. During door to door campaign for collection of buccal swabs for DNA profiling, the culprit deceived Police once by acting as a cardiac patient and escaped sample collection. Moreover, he also changed his appearance to avoid possible recognition by matching with CCTV footage. However, CSI team emphasized on collection of oral swabs of all persons as per Census data and ultimately suspect's sample was collected.

3.6 Revelations by the offender in polygraph test

In polygraph examination conducted at PFSA, the offender was asked in detail about his modus operandi. He was a daily wage laborer as speculated from the crime sites he chose. He revealed that he always chose the crime site before deciding the target. He used to participate in various religious congregations held in the mosques nearby the homes of the victims. It was during his visits to the mosques when he happened to observe children playing in nearby streets. He used to select his target and lure them to the already selected crime site. In the classification of Rossmo, he was a 'poacher' who sets out specifically to search for a victim, but starts from another activity[12,13]. The map of crime sites revealed perfectly his area of routine activities. He told that he was aware of the fact that after sunset, it is unlikely that someone will be present in those places as he himself used to work as labourer in under-construction houses. Additionally, darkness would help him get away if ever confronted. All this information confirms that the offender's activity space plays a significant role in shaping their crime locations. All his crime locations were at a short distance from the site of abduction and he did so with the rationale that his targets were small children who cannot walk longer distance comfortably. He revealed that to

create an alibi he used to participate in the religious sittings planned in the mosques after committing this heinous crime.

Figure 3. Distance of perpetrator's residence from the crime scenes and victim's residences.

Post-conviction analysis of geographic profiling data verified the following details.

3.6.1 Distances of place of residence and crime scenes from the perpetrator’s base

(1) The farthest crime scene from suspect’s residence was ~2km while the nearest one was less than 200 m from his residence. So, the area of the probable residence inferred from the crime site locations was accurate enough to narrow down the area for suspect’s hunt.

(2) The suspect preferred to move towards densely populated old city area or densely populated outskirts of the city of Kasur rather than urbanized area of the city.

3.6.2 Ease of access to victims and crime scenes

(1) The suspect was a mason by profession.
(2) He knew about the under construction sites in the vicinity, timings of work and security status of these construction sites.
(3) He garnered trust and social respect by participating in religious ceremonies and events and also used them as second base or alibi at the time of crime.

3.7 Trial and conviction

The suspect was produced before the Anti-Terrorism Court after his detention. The trial began in Lahore's Kot Lakhpat Jail on February 10, 2018. The gruesome incident was unseen. Along with the direct evidence i.e. the confession of the of the accused in the presence of a judge, the circumstantial evidence pieced together by the prosecution, to tie the accused with the rape and murder of the deceased comprised of: (i) the medical evidence including the post-mortem report and the statement of medicolegal examiner, who conducted the autopsy of the deceased: and (ii) the DNA test report regarding the vaginal/anal swabs of the deceased as well as the stains from the clothing of the deceased, which reported matching of the DNA found in those swabs and stain sections with that of the accused. On conclusion of the trial he was convicted by the court under sections 302, 376, 377 and 7ATA of Pakistan Penal Code in the rape and murder of Zainab Amin. Four death sentences, one life sentence and seven years imprisonment was handed down to the convict. He was also directed to pay PKR 3.2 million fine to the legal heirs of the victim. The culprit was later trialled separately for the rape and murders of other seven children. On appeal to the High Court (Appellate Court) by the petitioner, the High Court maintained the convictions and sentences of the petitioner. The culprit appealed to Supreme Court of Pakistan against the judgment and later a petition for mercy was sent to the President of Pakistan, but the verdict

remained unchanged. He was executed at Kot Lakhpat Prison, Lahore, Pakistan, on the morning of 17 October 2018.

4. Discussion

In this case example the investigation was laid principally on the two general assumptions of Geographic profiling: (i) distance decay and (ii) domocentricity[17,18]. Distance decay theory believes that the offender do not travel far away from his base point to commit the crime while domocentricity argues that the offenders resides in the area encircling his criminal activity. This case was perhaps the first case of its nature where the police used concepts of geographic profiling and offenders profiling to solve the crime. Geographic profiling alone does not allow investigators to capture the guilty, like in this case also it narrowed down the field of suspect hunt. In this case, the DNA evidence had already linked all eight cases of rape to a serial rapist. The next move was to identify the possible location of the rapist as DNA profiling of the entire city is impractical.

Geographic profiling in this case helped in shortlisting of suspects and narrowing down of the region for mass DNA screening, reducing the suspicious population to approximately 10 000. When the irrefutable DNA match was found, the guilty had no choice but to confess to all his crimes.

DNA evidence has never been given its due significance in Pakistan's criminal justice system, and its evidentiary value is still at the discretion of judges and case situations. DNA evidence is currently being reviewed in context of Articles 59 and 164 of the Qanun-i-Shahadat Order (QSA) 1984. Article 164 provides that the courts can permit the production of any evidence which may have been made available on the basis of modern equipment and techniques. Provisio 2 of Article 164, introduced in 2017, specifies that a prosecution on the basis of modern devices and techniques may be lawful. Article 164 read with Article 59, inter alia, allows modern forensic science to enter courts through the credible and valued scientific opinions of experts as evidence, in order to arrive at the truth[24-26]. The DNA evidence helps to give the courts a high degree of confidence in the identity of the suspect and the courts are in a better position to draw a fair verdict by using DNA technology by convicting the real perpetrators as well as exonerating the wrongfully involved accused. The DNA

test points to the perpetrator with scientific certainty and accuracy and is therefore considered to be one of the most corroborative evidence to date, especially in cases of rape.

5. Conclusion

Pakistan needs to improve the current crime investigation approach where reliance is made only on the ocular evidence. This case is a classic example of importance of modern crime investigation techniques. Since there was no ocular evidence in this case, it was impossible for the police department to apprehend the offender or to link all these cases to a single offender in the absence of DNA technology. Similarly, because DNA of the entire population was impracticable, geographic profiling, despite being reliant on human judgment, contributed greatly in narrowing down the area for manhunt. The theory behind geographic profiling explains quite well the patterns found. This rapist was perfectly living a double life without anyone suspecting that he was a serial rapist in his spare time. However, he revealed his activity space through his crimes.

It is noteworthy that an integrated geographic profiling system is still not in use by Pakistani law enforcement agencies. The use of geographic profiling principles in order to predict the assailant's location, has exhibited a great potential for future use. If an integrated geographic profiling system of different crimes was in effect, it would have been easier to predict the next crime and narrowing of the search zone without the loss of lives of these innocent children.

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Referências

1. Mehnaz A. Child Abuse In Pakistan-Current Perspective. National Journal of Health Sciences. 2018;3:114-7. https://doi.org/10.21089/njhs.34.0114

2. Mustafa AU, Mehmood A. The Kasur Incident of Child Abuse: A Fact Funding Report; Analyzing State of Child Protection in Pakistan. SSRN. 2017:1-35 https://doi.org/10.2139/ssrn.2961326
3. Ali A. Kasur Child Sexual Abuse Case. Pakistan Journal of Applied Social Sciences. 2015;2(1):101-4. https://doi.org/10.46568/pjass.v2i1.288
4. Geo News. Zainab rape-murder: JIT to probe seven other similar cases. Geo News: 27/01/2018 [accessed in 20/04/2021]. Available at: https://www.Geo.Tv/Latest/178964-Zainab-Rape-Murder-Case-Jit-To-Also-Probe-Seven-Other-Similar-Cases
5. Pakistan. Penal Code. Act XLV of 1860.
6. Chitaley VV. The Code of Criminal Procedure (V of 1898). All India Reporter. Vol. 5, 1956.
7. Sahito IH. The criminal investigation in Pakistan: Trends and Reality. Journal of Pakistan Vision. 2009;10(2):175-96.
8. Felson M, Cohen LE. Human ecology and crime: A routine activity approach. Human Ecology. 1980;8(4):389-406. https://doi.org/10.1007/BF01561001
9. Brantingham PJ, Brantingham PL. Anticipating the displacement of crime using the principles of environmental criminology. Crime prevention studies. 2003;16:119-48.
10. Glass D, Friedo H. Mapping matters: geoprofiling application in South African serial rape investigation. Crime, Law and Social Change. 2021;75(4):349-71. https://doi.org/10.1007/s10611-020-09926-x
11. Anjum MS, Ahmad S, Siddique N, Ahmad QL, Amjad M, Tahir MA. PFSA DNA Database: A Tool to hunt the serial offenders. Forensic Science International. 2021; 329:111061. https://doi.org/10.1016/j.forsciint.2021.111061
12. Rossmo, DK. Geographic Profiling. 1st ed. New York: Routledge; 1999. 378 p. https://doi.org/10.4324/9780367802011
13. Rossmo DK, Rombouts S. Geographic Profiling. In: R. Wortley & L. Mazerolle (Eds.), Environmental Criminology and Crime Analysis. 1st ed. Cullompton: Willan Publishing. 2008; p. 136-49.
14. Campobasso CP, Colonna MF, Carabellese F et al. A Serial Killer of Elderly Women: Analysis of A Multi-Victim Homicide Investigation. Forensic Science International. 2009;185(1-3):e7-11. https://doi.org/10.1016/j.forsciint.2008.12.023
15. Santtila P, Pakkanen T, Zappalà A et al. Behavioral Crime Linking in Serial Homicide. Psychology, Crime & Law. 2008;14(3):245-65. https://doi.org/10.1080/10683160701739679
16. Stevens DJ. Predatory rapists and victim selection techniques. The Social Science Journal. 1994;31(4):421-33. https://doi.org/10.1016/0362-3319(94)90033-7

17. Canter D, Larkin P. The environmental range of serial rapists. Journal of Environmental Psychology. 1993;13(1):63-9. https://doi.org/10.1016/S0272-4944(05)80215-4
18. Canter D, Youngs D. 1st ed. Principles of geographical offender profiling. London: Routledge; 2016. 312 p. https://doi.org/10.4324/9781315246086
19. LeBeau JL. Journey to rape – Geographic distance and the rapist's method of approaching the victim. J. Police Sci. Admin. 1987;15(2):129-36.
20. Santtila P, et al. Testing the utility of a geographical profiling approach in three rape series of a single offender: a case study. Forensic Science International. 2003;131(1):42-52. https://doi.org/10.1016/S0379-0738(02)00385-7
21. Wise J. The New Scientific Eyewitness: The Role of DNA Profiling In Shaping Criminal Justice. VDM Verlag; 2009. 344 p.
22. Roewer L. DNA Fingerprinting in Forensics: Past, Present, Future. Investigative Genetics. 2013;4(1):1-10. https://doi.org/10.1186/2041-2223-4-22
23. Punjab Gov [accessed in 01/11/2021]. Available at: https://Kasur.Punjab.Gov.Pk/District%20_Profile
24. Cheema SA. DNA Fatawa in Pakistani Courts: An Appraisal. SSRN 2814443. 2016;1-15. https://doi.org/10.2139/ssrn.2814443
25. Rana AA. Admissibility of Evidence Produced via Modern Devices and Techniques: A Look in Pakistani Prospective. International Journal of Reasearch. 2020;8(5):67-77. https://doi.org/10.2139/ssrn.3652379
26. Ahmed N. The Legitimacy of Forensic Evidence in Criminal Justice System of Pakistan. J. Islamic St. Prac. Int'l L. 2016;12:73.