Case Series

Forensic Analysis of Document Examination Cases at RFSL Dharamshala: Trends, Caseloads, and Criminal Context

التحليل الجنائي لقضايا فحص الوثائق في مركز RFSL دارامشالا: الاتجاهات، وأعباء القضايا، والسياق الجنائي

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Abstract

This paper presents a retrospective analysis of reported cases and examinations conducted by the Document Division of a prominent forensic science laboratory covering six districts in Himachal Pradesh, India, over the five years (2018–2022), additionally, we provide updated data for 2023–2024 limited to case intake and disposal at RFSL Dharamshala to reflect recent forensic case handling trends. The data collection process involved reviewing case files and examination reports to identify commonalities and deviations in cases related to document alterations. The dataset includes information on the types of document alterations, techniques used, and legal provisions applicable to each case. The analysis aims to provide insights into evolving trends in white-collar crimes involving document alterations within the jurisdiction. The dataset's reuse potential lies in its ability to inform future forensic investigations, policy development, and educational initiatives aimed at combating document-related fraudulent activities. This study contributes to the forensic science community's understanding of regional trends in document-related white-collar crimes and underscores the importance of continuous monitoring and

المستخلص

تقدم هذه الورقة تحليلاً استعادياً (بأثر رجعي) للحالات المبلغ عنها والفحوصات التي أجرتها شعبة الوثائق في مختبر بارز لعلوم الأدلة الجنائية يغطي ست مقاطعات في هيماشال براديش، الهند، على مدى الخمس سنوات (2018-2022). بالإضافة إلى ذلك، نقدم بيانات محدثة للفترة من 2024-2023 تقتصر على استقبال القضايا والتصرف فيها في مركز RFSL دارامشالا لتعكس الاتجاهات الحديثة في معالجة القضايا الجنائية.

تضمنت عملية جمع البيانات مراجعة ملفات القضايا وتقارير الفحص لتحديد أوجه التشابه والاختلاف في القضايا المتعلقة بتزوير الوثائق. تشتمل مجموعة البيانات على معلومات حول أنواع تزوير الوثائق، والتقنيات المستخدمة، والأحكام القانونية المطبقة على كل حالة. يهدف التحليل إلى تقديم رؤى حول الاتجاهات المتطورة في جرائم ذوي الياقات البيضاء التي تنطوي على تزوير الوثائق ضمن نطاق الولاية القضائية.

تكمن إمكانية إعادة استخدام مجموعة البيانات في قدرتها على توجيه التحقيقات الجنائية المستقبلية، وتطوير السياسات، والمبادرات التعليمية التي تهدف إلى مكافحة الأنشطة الاحتيالية المتعلقة بالوثائق. تساهم هذه الدراسة في فهم مجتمع علوم الأدلة الجنائية للاتجاهات الإقليمية في جرائم

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adaptation to emerging threats. By elucidating patterns and methods employed by perpetrators, the dataset facilitates the development of proactive strategies for prevention, investigation, and prosecution. The establishment of robust forensic databases is advocated to effectively combat the persistent threat of document-related fraudulent activities. The insights gained from this study are anticipated to guide future forensic investigations and support efforts to address the dynamic nature of document alterations in a rapidly evolving technological landscape.

ذوي الياقات البيضاء المتعلقة بالوثائق وتؤكد على أهمية المراقبة المستمرة والتكيف مع التهديدات الناشئة. من خلال توضيح الأنماط والأساليب التي يستخدمها الجناة، تسهل مجموعة البيانات تطوير استراتيجيات استباقية للوقاية والتحقيق والملاحقة القضائية.

تُنادى الدراسة بإنشاء قواعد بيانات جنائية قوية لمكافحة التهديد المستمر للأنشطة الاحتيالية المتعلقة بالوثائق بفعالية. ومن المتوقع أن توجه الرؤى المكتسبة من هذه الدراسة التحقيقات الجنائية المستقبلية وتدعم الجهود لمعالجة الطبيعة الديناميكية لتزوير الوثائق في مشهد تكنولوجي سريع التطور.

1. Introduction

Documents include various materials such as letters, orders, records, tickets, examination papers, wills, historical documents, posters, books, burned documents, checks, or any security documents. Most documents have been written on paper using a writing instrument such as a pencil, pen, ink, typewriter, computer, etc. [1]. According to the National Crime Records Bureau (NCRB) reports on crimes in India, offenses related to documents and properties have a significant number of 6,97,499 out of a total of 28,753,347 crime cases from 2018–2022 [2]. A vital role in resolving civil and criminal cases of fraud, forgery, and instances of counterfeit security papers is played by the forensic science subfield of documents, which is still expanding because of technological advancements. By gathering scientific data during the forensic analysis of contested documents related to criminal fraud and forgery, forensic document examiners uncover the truth. A document specialist still finds it challenging to resolve complex criminal cases [3, 4]. With no precedent for such detailed data, this pioneering effort leads the way in detailed data collection over the five-year period (2018–2022) from multiple districts of Himachal Pradesh, including Una, Chamba, Kangra, Hamirpur, Kullu, and Lahul and Spiti, pertaining to document-related crimes in Himachal Pradesh as well as data collected through Right to Information (RTI) request to different Central

Forensic Science Laboratories across the country. The examination covers multiple dimensions, including the total number of cases received and disposed of, district-wise variations, types of cases reported, and the application of various Indian penal code sections. The subsequent tables illustrate these findings, providing a detailed insight into the dynamics of document-related criminal activities in the region.

This study, through its meticulous analysis, not only bridges a vital research void but also enriches the existing knowledge in the field. By deciphering prevalent crime types, districts with varying reporting rates, and the predominant sections applied, this research enables law enforcement agencies and policymakers to make informed decisions based on empirical evidence.

Objectives of this study are to analyse and evaluate the trends and patterns in document-related criminal cases reported to the RFSL Dharamshala over the five-year period from January 2018 to December 2022. This analysis aims to:

- Determine the types of document-related crimes that are most frequently reported.
- Identify the districts within Himachal Pradesh where these crimes are most prevalent.
- Examine the specific sections of the Indian Penal Code (IPC) and other relevant laws that are most applied to these cases.
- Assess any significant changes or shifts

in the frequency and nature of document-related crimes over the study period.

2. Experimental design, materials and methods

Experimental Design: The research framework centres on a comprehensive analysis of data garnered from document-related cases within the ambit of the Regional Forensic Science Laboratory (RFSL), Dharamshala. The core focus of this study revolves around discerning the intricate web of reported cases, specifically unravelling their types, quantities, and the corresponding districts of origin. Additionally, the study delves into the legal sections that were predominantly applied to these documented cases. The experimental design encompasses a thorough exploration of frequencies, classification, and a multifaceted evaluation of crime types, ultimately culminating in an insightful portrayal of crime trends within the document-centric spectrum.

Materials and Methods: The foundation of this research rests upon a comprehensive dataset culled from the document cases submitted to the RFSL, Dharamshala. This dataset spans a substantial time frame, spanning from January 2018 to December 2022, encapsulating a dynamic landscape of criminal activities. The methodology involves meticulous scrutiny of reported cases, categorizing them based on their nature and origin in districts such as Una, Chamba, Kangra, Hamirpur, Kullu, and Lahul and Spiti. Concurrently, the legal sections applied to these cases are systematically documented, encompassing a holistic view of the legal framework. While detailed breakdowns by district, case type, and IPC sections are analyzed for the years 2018–2022, additional data for 2023 and 2024 include only the total number of document cases received and disposed of at RFSL Dharamshala. Furthermore, an encompassing perspective is gained by incorporating an overarching dataset comprising the cumulative number of reported and disposed cases from some of the major Central Forensic Science Laboratories, collection of this data involved the submission of Right to Information (RTI) requests to various Central Forensic Science Laboratories (CFSLs). While not all CFSLs had this data in a proper material form, hence did not provided the required data, few did agreed to contribute their data to the study, enriching the comprehensive dataset.This data extends the scope beyond the RFSL, affording a broader context for the research.

Data visualization techniques are adeptly employed to scrutinize the dataset, unveiling trends and insights that characterize the prevalent types of cases reported. By dissecting the legal sections applied to these cases, the study aims to discern patterns and correlations that could elucidate the major crimes associated with document cases. In alignment with the ethical standards and methodological rigor, the study ensures the veracity and reliability of the analysis and findings. The outcomes of this research endeavour contribute to an enhanced understanding of the criminal dynamics inherent to document-related cases within the purview of the RFSL.

3. Results & Discussion

This section presents a comprehensive analysis of the data gathered over the five-year period (2018-2022) pertaining to document-related crimes in Himachal Pradesh as well as data collected through RTI filing to different CFSLs across the country. The additional data for 2023 and 2024, though limited to case intake and disposal, indicate sustained reliance on forensic document examination. This supports the argument for strengthening capacity in regional labs like RFSL Dharamshala. The examination covers multiple dimensions, including the total
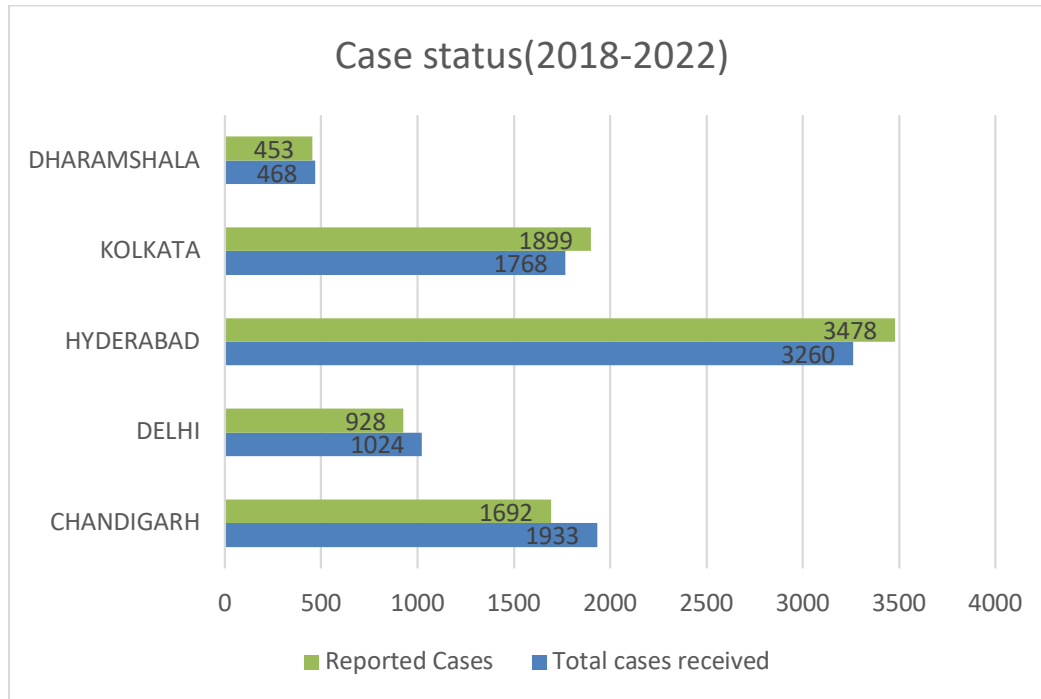
Fig.1- *Five-year data of document cases received, and disposed (CFSLs and RFSL Dharamshala)*
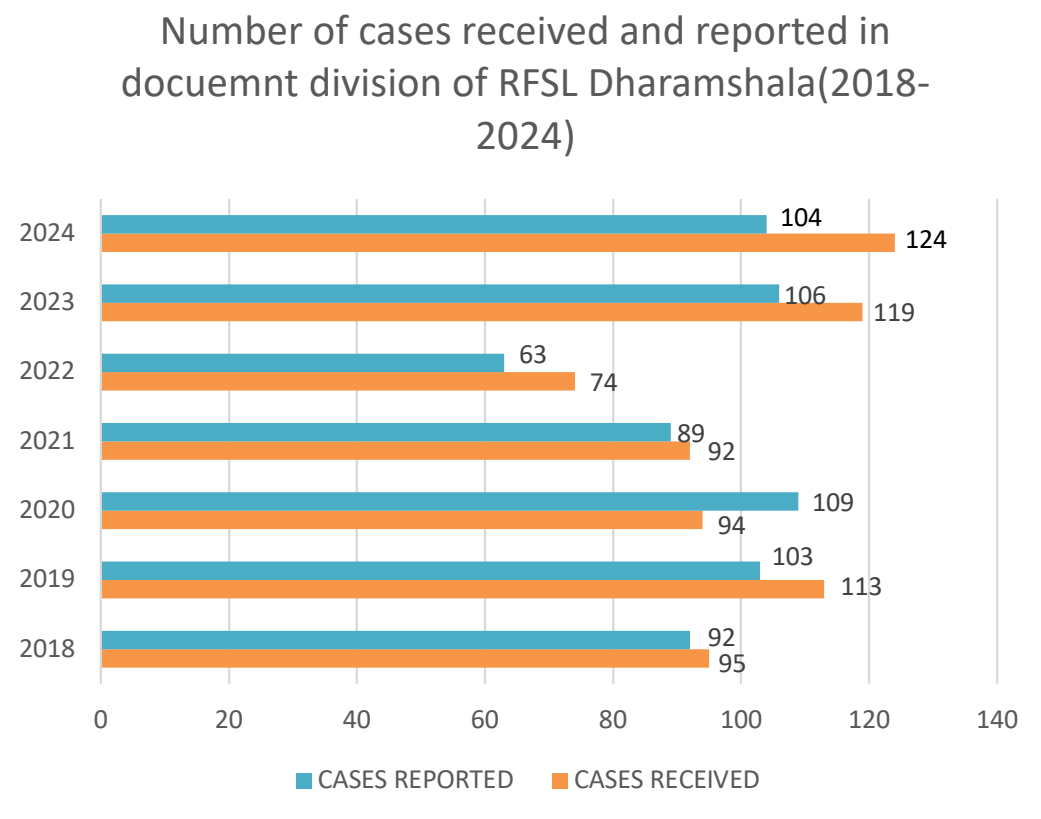
Fig.2- *Seven -year data of document cases received, and disposed (RFSL Dharamshala).*

Number of Cases Received (2018-2022)
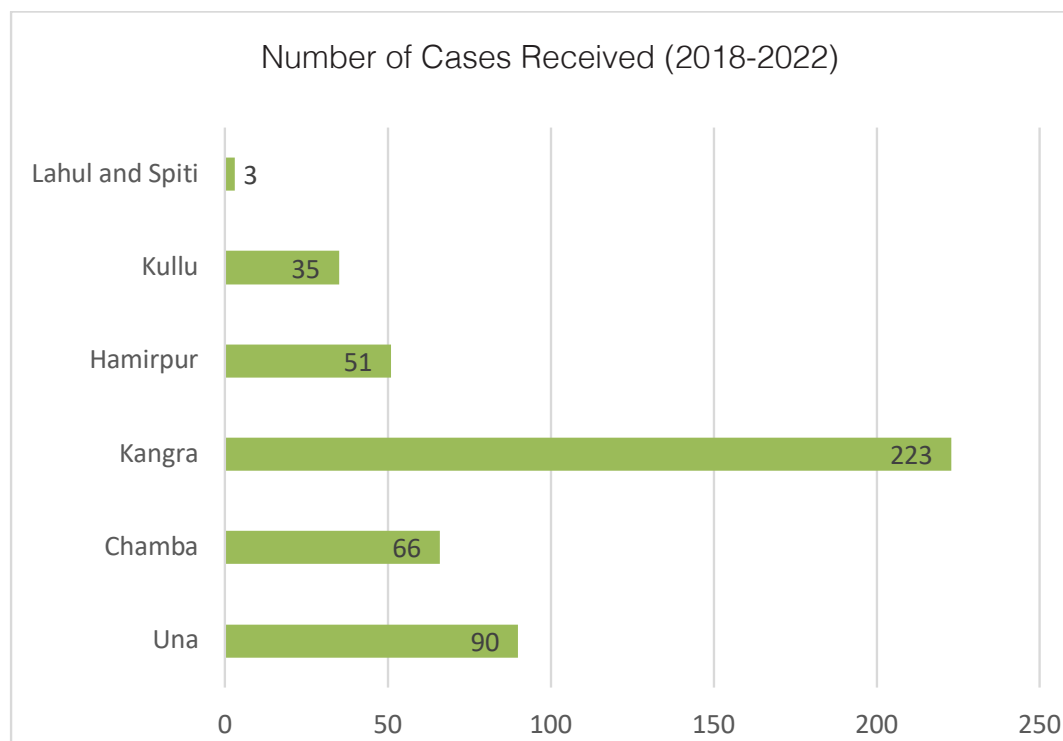
Fig.3- *Five-year data of document cases received from various districts of Himachal Pradesh at RFSL*

Types of Cases Received (2018-2022)
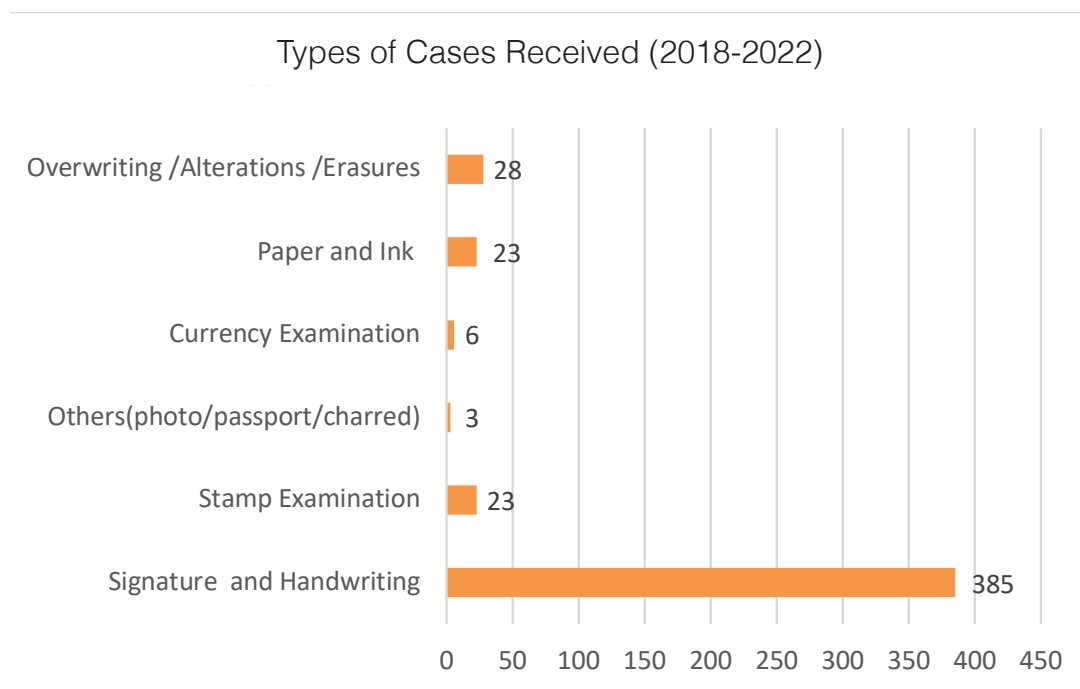
Fig.4- *Five year data of different types of Document Cases reported by the laboratory*

Table 1- *Five- Year data of different IPC (Indian Penal Code) sections applied to the Document Cases reported by the laboratory [5]*

Sections	Description	Year					Total
		2018	2019	2020	2021	2022	
420 IPC	Cheating and dishonestly inducing delivery of property	53	67	65	60	41	286
471 IPC	Using as genuine a forged document	34	40	36	41	25	176
468 IPC	Forgery for purpose of cheating	35	41	34	38	23	171
467 IPC	Forgery of valuable security, will, etc.	28	38	32	33	18	149
120B IPC	Punishment of criminal conspiracy	26	36	27	29	17	135
465 IPC	Punishment for forgery	10	6	7	6	41	70
34 IPC	Acts done by several persons in furtherance of common intention	9	16	14	4	8	51
419 IPC	Punishment for cheating by personation	9	8	14	10	4	45
409 IPC	Criminal breach of trust by public servant, or by banker, merchant or agent	3	3	4	9	11	30
306 IPC	Abetment of suicide	4	7	12	3	4	30
406 IPC	Punishment for criminal breach of trust	4	9	2	9	5	29
506 IPC	Punishment for criminal intimidation	2	3	5	3	4	17
201 IPC	Causing disappearance of evidence of offence, or giving false information to screen offender	3	4	0	3	3	13
408 IPC	Criminal breach of trust by clerk or servant	2	1	0	2	2	7
498A IPC	Husband or relative of husband of a woman subjecting her to cruelty	3	1	1	1	0	6
380 IPC	Theft in dwelling house, etc.	2	2	1	0	0	5
354D IPC	Stalking	1	1	1	1	1	5
218 IPC	Public servant framing incorrect records or writing with intent to save person from punishment or property from forfeiture	0	3	0	0	2	5
466 IPC	Forgery of record of court or public register, etc.	1	0	2	1	0	4
170 IPC	Personating a public servant	1	0	1	1	1	4
403 IPC	Dishonest misappropriation of property	1	0	2	1	0	4
457 IPC	Lurking house -trespass or housebreaking by night in order to commit offence punishable with imprisonment	2	1	0	0	0	3
411 IPC	Dishonestly reeving stolen property	2	1	0	0	0	3
504 IPC	Intentional insult with intent to provoke breach of the people	1	1	1	0	0	3

Sections	Description	Year					Total
		2018	2019	2020	2021	2022	
182 IPC	False information, with intent to cause public servant to use his lawful power to the injury of another person	1	0	0	1	1	3
153A IPC	Promoting enmity between different groups on the ground of religion, race place of birth, residence, language etc. and doing prejudicial to maintenance of harmony	2	0	0	0	0	2
499 IPC	Defamation	1	0	0	0	0	1
422 IPC	Dishonestly or fraudulently preventing debt being available for creditors	1	0	0	0	0	1
500 IPC	Punishment for defamation	1	0	0	0	0	1
501 IPC	Printing or engraving matter known to be defamatory	1	0	0	0	0	1
505 IPC	Statements conducing public mischief	1	0	0	0	0	1
Other than IPC	State and special laws applied	3	10	4	11	8	36

number of cases received and disposed of, district-wise variations, types of cases reported, and the application of various IPC sections. The subsequent figures and tables illustrate these findings, providing a detailed insight into the dynamics of document-related criminal activities in the region.

Our study indicates a consistent increase in the number of document examination cases, highlighting the growing reliance on forensic analysis in legal proceedings. This trend aligns with data from the National Crime Records Bureau, where the demand for forensic document examination has been on the rise due to increasing instances of document-related fraud and disputes [6]. The seven-year analysis of cases received and reported in the document division of RFSL Dharamshala (2018–2024) shows notable trends in workload and efficiency(as shown in figure.2). From 2018 to 2020, the lab maintained a strong balance, with the number of cases reported nearly matching or even exceeding those received, particularly in 2020 when 109 cases were reported against 94 received likely reflecting backlog

clearance or enhanced processing. A decline was observed in 2021 and became more prominent in 2022, which recorded the lowest figures (74 received and 63 reported), possibly due to external disruptions such as the pandemic. However, 2023 and 2024 witnessed a significant rise in caseloads, with 124 cases received and 104 reported in 2024 the highest in the period. This increase signals a growing reliance on forensic document examination, though the widening gap between received and reported cases in recent years suggests a need to strengthen resources and capacity to prevent future backlogs. Delving into forensic caseloads in the Central Forensic Science Laboratories (CFSLs) in Chandigarh, Delhi, Hyderabad, and Kolkata, presents an insightful overview of their caseload dynamics. As figure.1 and figure.2 shows in terms of cases received, CFSL Hyderabad emerges with the highest total, having received 3260 cases, followed by CFSL Chandigarh (1933), CFSL Delhi (1024), and CFSL Kolkata (1768). When examining the efficiency in case disposal or reporting, CFSL Hyderabad again

stands out by having reported 3478 cases. CFSL Kolkata follows with 1899, CFSL Chandigarh with 1692 cases disposed, CFSL Delhi with 928, and. Remarkably, RFSL Dharamshala, despite its lower caseload, has disposed of 453 cases, showcasing a noteworthy efficiency in the forensic process. This comparison indicates that while the CFSLs, especially Hyderabad, handle a substantially higher number of cases, RFSL Dharamshala demonstrates commendable efficacy in disposing of cases, suggesting a streamlined workflow and efficient forensic procedures at regional level.

Moving to district-wise analysis, as shown in the figure 3, Kangra consistently has the highest number of cases submitted contributing 47% of the total cases which shows the alignment with the previous crime reports of the state [7], followed by Una (19%) and Chamba (14%), Hamirpur and Kullu together contribute 18% of the total cases with moderate variations. This suggests that these districts might have higher rates of certain document-related issues or crimes. Lahul and Spiti represent less than 1% of the total cases, with minimal variations, which could be due to lower population density or lower crime rates in that region. This trend aligns with media reports identifying Kangra as consistently leading in various crime categories within Himachal Pradesh [8], reinforcing its high contribution to forensic case submissions. Notably, a five-year retrospective study on poisoning cases submitted to RFSL Dharamshala (2011–2015) [9] also found high case submissions from Kangra district. Though focused on forensic chemistry, their findings support our interpretation that the lab consistently serves as a forensic hub for Kangra and nearby regions.

In our findings 83% of the examined cases involved handwriting or signature issues underscore the central role handwriting examination plays in forensic document analysis (as shown in figure.4).

This observation is consistent with the literature [10], where handwriting analysis is considered a fundamental aspect of questioned document examination. Stamp examination cases show a minor presence, contributing approximately 4% of the total cases, but its consistency implies a continuous need for scrutiny of stamps in legal matters. Other cases related to photo/passport/ charred documents are limited but existing cases contributing less than 1% indicate the relevance of these document-related issues in legal proceedings. Currency Examination cases also contributed less than 2% of the cases. Paper and ink related cases present variability, contributing 5% of the total cases. Overwriting/Alterations/Erasures cases presents a consistent, moderate caseload contributing 5% of the total cases, indicating persistent issues with document alteration. These findings are consistent with international observations documented in the Interpol Questioned Documents Review (2019–2022) [11], which reported a global increase in signature verification requests, forged document detection, and analysis of document alterations, highlighting the universal nature of these challenges in forensic document work. Discussing about the IPC sections applied to the reported cases, according to the Table.1 420 IPC (Cheating and dishonestly inducing delivery of property) most applied section, contributing 22.05% of the total cases. 471 IPC (using as genuine a forged document), consistently high, contributing 13.5 % of the total cases. 468 IPC (Forgery for purpose of cheating) maintains a consistent caseload, contributing 13.2 % of the total cases. 467 IPC (Forgery of valuable security, will, etc.) steady presence, contributing 11.5% of the total cases. 120B IPC (Criminal conspiracy), consistent application, contributing 10.4% of the total cases. 465 IPC (Punishment for forgery), indicates cases specifically focusing on the act of

forgery, contributing 5% of the total cases. Literature confirms that forgery of documents is legally recognized as a serious criminal offense [12] under the Indian Penal Code [5]. Sections such as 467, 468, and 471 explicitly criminalize acts of document forgery, use of forged documents, and cheating by impersonation, reflecting their relevance in forensic casework. All other applied sections individually hold very insignificant percentages. In the absence of previous localized studies for Himachal Pradesh, the present dataset lays a strong empirical foundation for future comparative research.

4. Conclusion

To sum up, this study highlights how important forensic labs are to improve our comprehension of crime trends in the context of the criminal justice system. The detailed examination of criminal cases handled by the Documents Division of the Regional Forensic Lab during the seven-year period from 2018 to 2024 sheds light on the complex dynamics of crime reporting. Through a thorough analysis of five-year data from various districts in Himachal Pradesh, such as Una, Chamba, Kangra, Hamirpur, Kullu, and Lahul and Spiti, reveals changes and oscillations in crime rates, making it easier to pinpoint specific regions that require special attention. By utilizing a substantial dataset, this study offers insightful information that can influence policy initiatives, legislative reforms, and law enforcement tactics. The results enhance the comprehension of crime reporting trends and provide a more knowledgeable and efficient strategy for dealing with criminal activity in various jurisdictions.

Conflict of interest

The authors declare no competing interest.

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