

## **CHAPTER -I**

### **INTRODUCTION**

Statistical analysis involves collecting and scrutinizing every data sample in a set of items from which samples can be drawn. A sample, in statistics, is a representative selection drawn from a total Collection or Population. Statistical analysis can be subdivided Descriptive Statistics and Inferential Statistics. In descriptive statistics, one summarizes and graphically represents data of a sample or a whole population. In inferential statistics, one not only collects numerical data as a sample from a population but also analyses it and, based on this analysis, draws conclusions with estimated uncertainties (i.e., by using probability theory) about any particular topic. Statistical analysis of material objects or physical evidences sent to forensic science laboratories deals with the importance and role of physical evidences in criminal justice system.

The physical evidences play a vital role to determine the occurrence or omission of crime and violation of rules and are legally punishable under law of the government, where the physical evidences are the proofs for crime. The statistical significance of forensic evidence in criminal trials is classified as; forensic evidence appreciated withheld by court of law; if withheld, the level of drop and reasons are reflected along with discussion. Correlation between evidence status and verdict of the court is highlighted in this chapter. This will provide idea about attrition level of forensic evidence during criminal trial and the reasons behind. The reasons for withholding of forensic evidence in court are explained in detail with case examples. Some of the errors excavated at various levels of investigation, analysis and prosecution are improper collection and packaging of evidences, improper sealing and overlooking important official bureaucracies, failure in sending evidences to FSL in time, improper techniques of evidence analysis, unprotected custody of evidences, not maintaining chain of custody etc., due to which evidences had lost its evidential value in court. This can be taken into consideration to make the forensic evidences more effective during criminal investigations and trials.

Types of Physical Evidence are Blood, semen, saliva, Documents, Drugs, Explosives, Fibres ,Fingerprints ,Firearms and ammunition ,Glass ,Hair ,Impressions ,Organs and physiological fluids and biological fluids, Paint, Paint chips ,Petroleum products ,Plastic bags ,Plastic,

rubber, and other polymers, Powder residues, Soil and minerals, Tool marks, Vehicle lights, Wood and other vegetative matter.

Purpose of Examining Physical Evidence is the examination of physical evidence by a forensic scientist is usually undertaken for identification or comparison purposes. Proves the commission or omission of crime. Links the suspect to the crime, crime scene (primary, secondary, tertiary) victim, modus operandi etc. Identification: the determination of the physical or chemical identity of a substance with as near absolute certainty as existing analytical techniques will permit. A comparison analysis subjects a suspect specimen and a standard/reference specimen to the same tests and examinations for the ultimate purpose of determining whether or not they have a common origin. Without Forensic Science the criminal Justice System can't solely give accurate findings on any particular case which lead to the loss of property or person. To inform the investigator as to what the Crime Laboratory is equipped to do for him. To outline what is expected and required of him in the proper collection, preservation and submission of evidence for analysis to the laboratory. A critical element in the investigation of any crime is the collection of physical evidence. Eyewitness accounts are not always reliable and many times the victims, as well as the suspects, give biased accounts of what occurred. Frequently, there is only one survivor and one story available. It is the physical evidence which is used to resolve any conflicts. Physical Evidences can give the jury proof beyond a reasonable doubt. Physical evidence can convict a criminal, or it can free an innocent man. It can bring closure to families and to the law enforcement that work the cases.

Impact of Forensic Science on Criminal Justice System is the primary aim of forensic science is to assist law enforcement agencies and the legal system in fulfilling their primary functions such as the prevention, detection, and investigation of crime, and the delivery of justice. The outcome of legal cases in Ghana is underreported, particularly cases from the lower courts. This challenge makes it difficult to ascertain the contribution of forensic science in legal inquiries. The main sources of information about criminal and other legal cases are through the media. A major area of police inquiry and prosecutions, where forensic science plays a routine role is illegal drug possession and use. Scientific laboratory techniques hold the potential of developing information from the physical clues left at the

crime scene that can assist in determining what transpired at the scene and who was (and was not) involved. Specifically, the types of information it can provide are: Identification and Classification. The review of physical evidence by competent crime laboratory examiners often begins with tests to identify and classify a substance. Common Origin This is a refined and powerful conclusion in which the examiner concludes that an item of evidence originated from a particular person or source. Reconstruction/Corroboration - Reconstruction aids the investigator and prosecutor in hypothesizing the order of events, the relative position of actors to one another, and how the crime in question unfolded. Different Origin/Negative Identification Negative identifications are conclusions that a substance is found not what the investigator hypothesized it to be. A conclusion of different origin is a laboratory result that states two or more items of evidence are not of common origin or source. Inconclusive - A comparison between an item of evidence and a standard (paint, glass, plastic, etc.) may simply be inconclusive.

#### THEORETICAL SIGNIFICANCE OF FORENSIC EVIDENCE

The level of interaction of the offender with the victim and/or crime scene environment is what produces the physical evidence in the first place. Scientific laboratory techniques hold the potential of developing information from the physical clues left at the crime scene that can assist in determining what transpired at the scene and who was (and was not) involved.

#### EXPLORING RELIABILITY OF FORENSIC EVIDENCE IN CASE PROCEEDINGS

Remarkable growth is observed in the development of forensic science technology. There are few studies exist associated with application of forensic evidences in legal proceedings. This article reviews such literature and isolates areas of reliability and discrepancy across such research fragments as well as explores the influence of forensic evidences at the investigation and court trial levels Studies of such kind are found widely held in USA and UK. Quite a few studies in the 1970s and 1980s explored the effect of physical evidence on the outcomes of police investigations and prosecutions as per National Institute of Justice (NIJ) Report, Peterson et al., The Role and Impact of Forensic Evidence in the Criminal Justice.

## CHAPTER II

### LITERATURE REVIEW

**Richard Lempert** (1986) described this revolutionary shift from trial rules of admissibility  
Crime Detection Laboratory WILLIAM J. COLLIER Director Edited by Raymond Gieszl  
1990. The criminal justice system is requiring an increased use of physical evidence and expert  
testimony regarding the information obtained from its examination. It is no longer sufficient  
for an officer to determine that a crime has been committed and to simply identify and arrest a  
suspect. The officer must be able to demonstrate the circumstances involved in the incident by  
utilizing physical evidence from the individuals involved and the crime scene to support the  
criminal charges.

**To the principles of logical proof as follows:**

“Evidence is being transformed from a field concerned with the articulation of rules to a field  
concerned with the process of proof and disciplines outside law, like mathematics, psychology  
and philosophy are being plumbed for the guidance they can give”. The New Evidence  
Scholarship (as this new movement was called) was born, and evidence in law became  
interdisciplinary. William Twining, Terence Anderson, David Schum, Richard Eggleston, John  
Jackson, Peter Tillers, Ronald Allen, Michael Pardo, and a host of other scholars have produced  
interesting theoretical, philosophical, socio-legal, and context-rich works on the theoretical  
foundations of inference and proof in law.

As David Schum and others have emphasized, we need to distinguish E (the occurrence or  
non-occurrence of an event) from E (someone’s testimony that an event did or did not occur).  
So suppose we designate Ian Williams’ testimony as: E. Williams’ testimony to event E is not  
the same as event E itself. For the mere fact, that Williams testifies to E does not provides  
conclusive evidence of the occurrence of event E. Perhaps Elliot’s fingerprints were not  
recovered at the crime scene at all and Williams in collusion with the police had simply planted  
the evidence. Or perhaps Williams is mistaken in his identification of the

fingerprints. Simply put, E (the occurrence or non-occurrence of an event) is distinct and distinguishable from E\* (someone else's claims that event E occurred).

Cain's and Lambert's studies of city forces in the early and late 1960s show a clear pattern of rank-and-file police prejudice, perceiving blacks as especially prone to violence or crime, and generally incomprehensible, suspicious and hard to handle. ... My own interviews in Bristol in 1973-4 found that hostile and suspicious views of blacks were frequently offered quite spontaneously in the context of interviews concerning police work in general. ... One uniform constable summed up the pattern: 'the police are trying to appear unbiased in regard to race relations. But if you asked them, you'd find 90 per cent of the forces are against coloured immigrants.

**Peterson and Hickman's (2005)** report and analysis of survey data in the Bureau of Justice Statistics'(BJS) 2002 Census of Forensic Crime Laboratories identified 351 public crime laboratories in the United States. This census documented an almost four-fold increase in crime laboratories in the U.S. since Joseph's 1968 study. The major area of growth has been the state supported regional crime laboratories that began to be constructed in the 1970s and were created to bring forensic science services closer to medium sized and rural communities and law enforcement agencies in the United States. To be counted in the 2002 census, laboratories needed to employ at least a single examiner with a minimum of a bachelor's degree in science. This excluded the thousands of 'identification' units in police agencies around the nation performing crime scene, photography, fingerprint and occasional pattern matching work. The survey documented for the first time the numbers of scientific and management personnel, operating budgets, testing capabilities, resource needs, caseloads, and backlogged requests for laboratory services. The survey found these crime labs received almost 2.7 million new cases for analysis in 2002, but ended the year with more than 500,000 backlogged requests for forensic services. The survey also found almost half of the crime laboratories were also outsourcing forensic casework to outside private laboratories, mostly in the area of DNA testing.

**Prima Facie [Latin, On the first appearance.]** A fact presumed to be true unless it is disproved.

In common parlance the term prima facie is used to describe the apparent nature of something upon initial observation. In legal practice the term generally is used to describe two things: the presentation of sufficient evidence by a civil claimant to support the legal claim (a prima facie case), or a piece of evidence itself (prima facie evidence).

For most civil claims, a plaintiff must present a prima facie case to avoid dismissal of the case or an unfavourable directed verdict. The plaintiff must produce enough evidence on all elements of the claim to support the claim and shift the burden of evidence production to the respondent. If the plaintiff fails to make a prima facie case, the respondent may move for dismissal or a favourable directed verdict without presenting any evidence to rebut whatever evidence the plaintiff has presented. This is because the burden of persuading a judge or jury always rests with the plaintiff.

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#### III. EXPLORING RELIABILITY OF FORENSIC EVIDENCE IN CASE PROCEEDINGS

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Justice Process. Greenwood et al. to the investigating officers at the crime scene was most influential in guessing whether a crime would be solved. A very small role is played by Traditional investigation methods and physical evidence in solving crimes. This study also found that physical evidence are available in maximum cases and latent fingerprints in over half, but the fingerprint led to the identification of the perpetrator in only 1% of cases.

A study by Ramsay .M found that forensic laboratories provided “helpful information” to the police in about three-quarters of cases where suspects had been identified (suspects were absolved in about 7% of evidence submissions), but in less than 40% of cases without suspects. This line of research did not continue into the 1990s and beyond.

A study by Boland B et. al showed that on average only about half of police arrests resulted in formal charging by a prosecutor. Of the cases charged, about 70– 80% resulted in conviction; however, the vast majority (90%) was resolved through a plea and only 10% had actually gone to trial.

Forst B. et al. surveyed the case outcomes after arrest. As per this study, more than 70% of arrests did not lead to conviction. Three factors were recognized by them which lead the arrest.

**Eric Stauffer, Reta Newman, in Fire Debris Analysis, 2008**

The forensic science community, through ASTM International, has developed consensus guidelines for the analysis of fire debris, and for the classification of ignitable liquids and their residues. These standards are an important aspect of quality in forensic sciences and are discussed in greater detail in Chapter 16. One important aspect of the fire debris standards is the ignitable liquid classification scheme, which is contained in ASTM standard test methods E 1387 and E 1618<sup>3</sup>. This system for organizing ignitable liquids recovered from fire-related evidence is an important tool in understanding the similarities and differences in petroleum-based ignitable liquids. The current system for the classification of ignitable liquids is the result of the work of many dedicated analysts striving for improved quality in their field. As part of an ASTM standard test method, this classification scheme will continue to undergo regular reviews to ensure that it reflects the variety of ignitable liquids encountered.

**S.L. Zabell et .al, 2001** Much of forensic science is devoted to the identification of substances or individuals, and in both cases important statistical issues arise. Classical gunpowder residue, blood alcohol level, and drug tests, three examples of tests for the suspected presence of substances, must all take into account the statistical variability inherent in the testing process. In the case of human identification, additional issues arise. The determination of human identity has classically exhibited two extremes. In fingerprint analysis, it is usually accepted that an adequate fingerprint exhibiting enough characteristics suffices to uniquely identify its source. In classical serological testing, in contrast, determining the ABO type of a biological specimen (usually blood, saliva or semen) merely suffices to narrow down the class of possible donors to perhaps 25 percent to 1 percent of the population. Such evidence, although probative, obviously cannot by itself establish identity. It is only recently, with the advent of sophisticated methods of DNA testing, that the potential for human identification has dramatically increased.

*Canadian Society of Forensic Science Journal (la Société Canadienne des sciences judiciaires)* (1974–)

The Society – Canadian Society of Forensic Science

<http://www.csfs.ca/journal/journal.htm>

The *Canadian Society of Forensic Science Journal* is published quarterly and is devoted to the publication of original papers, comments and reviews in the various branches of forensic science. Matters of forensic interest in the social sciences or relating to law enforcement and jurisprudence may also be published.

***Forensic Science Reviews***

Central Police University Press, Taipei, Taiwan

Contains review articles on a variety of forensic disciplines. This journal has worked with the Society of Forensic Toxicology to publish monographs drugs and driving for various compounds. Published bi-annually.



***Forensic Science International*** (1972–)

Elsevier, Atlanta, GA

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/505512/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/505512/description#description)

Another widely read journal in Forensic Toxicology containing many international publications. Contains many methodological papers as well as more basic research. Published monthly.

***Journal of Analytical Toxicology*** (1977–)

Preston Publications, Niles, IL

<http://www.jatox.com>

Widely read journal for forensic toxicology. A primary source for many investigators in the field. Published an annual special edition with papers from the Society of Forensic Toxicologists' annual meeting. Published monthly.

***Journal of Forensic Sciences*** (1972–)

Blackwell Publishing Inc. Malden, MA

<http://www.aafs.org/>

The publication of the American Academy of Forensic Sciences. This journal is distributed to the membership of the Academy and contains articles in all of the forensic disciplines. Published six times per year.

**CHAPTER III**  
**AIM AND OBJECTIVES**

**Aim:**

To conduct a study of material objects or physical evidences or samples sent to forensic science laboratories for analysis and expert opinion during 2015-2019.

**Objectives:**

- 1.To determine the number of cases in which samples or material objects sent to FSL'S per year during 2015-2019.
- 2.To estimate the increase or decrease in the number of cases in which the samples or material objects sent to FSL's for analysis during 2015-2019.
- 3.To determine the amount of time consumed to get the report of the samples received by the FSL's

**CHAPTER IV**  
**MATERIALS AND METHODOLOGY**

**Materials**

1. Case study with Forensic science laboratory reports.
2. Data bases from the District and Sessions court and various additional class Magistrates in Rajamahendravaram urban.

**Methodology**

Data base collected from the 3<sup>rd</sup> Additional Judicial First-Class Magistrate Court. The necessary case details were collected in which the samples or material objects or physical evidences sent to forensic science laboratories for analysis and expert opinion during the period of 2015-2019. In each and every crime, the evidences are collected, packaged and sent to FSL's for analysis. Followed the same process with 1<sup>st</sup> Additional District and Sessions and Najarat Court, District and the sessions court, Juvenile Justice Court, 8<sup>th</sup> Additional District and Sessions Court cum Special Court for Trail of Offenses against women.

**CHAPTER V**  
**OBSERVATION**

**Table 5.1: Showing the number of cases in 2015 and their details.**

S. No	Type of crime	No. of cases	Samples sent to FSL	Report provided by FSL after analysis	Duration taken by FSL for analysis
1.	Suspected Paternity case	01	Blood Samples from 3 Persons (mother of the child, 18 months old female child, person suspected to be the biological Father)	Autosomal STR proves the person suspected to be the biological father of the child is not the Biological Father.	2 months
2.	N.D.P.S Cases	04	dry leafy substance with flowering stalks and characteristic smell of Ganja	Ganja (Cannabis Sativa) are confirmed.	22 Days
3.	Murder case	01	Pieces of liver, intestines, lung, turbid liquid, petticoat, voni, langa, blue coloured liquid	Kerosene oil Flammable Hydrocarbons are found	58 days

**Table 5.2: Showing the Number of cases in 2016 and their details.**

S. No	Type of crime	No. of cases	Samples sent to FSL	Report provided by FSL after analysis	Duration taken by FSL for analysis
1.	Murder	01	1. Soil, clothes 2. Stomach, intestines, liver, kidney	1. blood detected on clothes is of human origin 2. Ethyl alcohol found in the above sent samples	3 months
2.	Attempt to Murder	01	blood stained tar road pieces, control of tar road, blood stained foot wear, blood stained clothes, blood stained piece of iron from automobile, blood stained seat cover, blood stained Iron rod	Blood is detected and is concluded to be of human blood, blood group couldn't be determined	5 months
3.	Attempt to Murder	01	Blood stained cement pieces, control cement pieces, Rug and Bed sheet, blood stained wooden plank, clothes (saree, jacket, inner petticoat, shirt and lungi)	Blood is detected on the above sent M.O and is concluded to be of human blood, blood group couldn't be determined	5 months
4.	N.D.P.S Case	03	dry leafy substance with flowering stalks and characteristic smell of Ganja	Ganja (Cannabis Sativa) are confirmed.	3days to 5 days
5.	Suspect Paternity case	01	Blood samples collected from Md. Shakeer (person suspected to be the biological father of the	Autosomal STR Analysis concluded Md. Shakeer is not	5 months

			male child), Sheik.Jhabina, male child	the Biological father of the male child of Sheik Jhabina	
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**Table 5.3: Showing the number of cases in 2017 and their Details**

S. No	Type of crime	No. of cases	Samples sent to FSL	Report provided by FSL after analysis	Durati on taken by FSL for analysi s
1	Rape (P.O.C.S.O)	08 Cases	clothes for semen Examination, vaginal samples, nail clippings	Blood and semen and spermatozoa and foreign materials are not detected.	3 Month s to 6 Month s
2	Attempt to murder	01 Cases	1.Visceral samples (stomach, liver, kidney, small intestine, turbid liquid) 2.Soil with dark brown stains, soil, clothes (shirt, pant) axe with wooden handle with dark brown stains	All the sent samples sent are analysed but no Poisonous substances are not found.	3 Month s
3.	NDPS cases	8 Cases	dry leafy substance with flowering stalks and characteristic smell of Ganja	Ganja is confirmed	1Mont h to 1 Day

**Table 5.4 showing the number of cases in 2018 and their Details**

S. No	Type of crime	No. of cases	Samples sent to FSL	Report provided by FSL after analysis	Duration taken by FSL for analysis
1	Attempt to Murder	01	Clothes with dark brown stains (worn by the victims LW1 & LW2 and the suspects A1), small cock fight knife, concrete road pieces with dark brown stains	Human blood detected on the Material objects sent. Blood group of stains on the clothes is of "B "group, and blood group of a few couldn't be determined	1month
2.	Rapes	07	Swabs And Smears From Cervix, Introitus, Post Fornix, Nail Clippings, Hair Clippings, Pubic Hair	*Blood detected on inner petticoat	3 Months
3.	Rape	01	CDR from 14/08/2018 to 15/08/2016	CDR proves the conversation between the victim and defendant with Idea sim (CD retrieved from 14/08/2018 to 15/08/2016)	6Days

4. S. C	N.D.P.S Cases	03	dry leafy substance with flowering stalks and characteristic smell of Ganja	Ganja (Cannabis Sativa) are confirmed.	1Week to 4Days
5.	Suspecte d Paternity case	01	Blood sample from mother,8 months old female child, father of suspected paternity.	Autosomal STR analysis proves that the suspected person is the biological father of the female child	2 Months



**Table 5.5 Showing the number of cases in 2019 and their Details**

S. No	Type of crime	No. of cases	Samples sent to FSL	Report provided by FSL after analysis	Duration taken by FSL for analysis
1.	Murder	02	<p>1.Visceral samples, stomach, small intestines with contents, liver, kidney, sternum</p> <p>2.Pieces of stomach&amp; small intestines, &amp;brownish turbid liquid, pieces if liver brownish turbid liquid, pieces of kidney brownish turbid liquid,</p> <p>d.turbid liquid.</p>	Ethyl alcohol detected in sample no other poisonous substances are found.	3-5 Months
2.	Rape (P.O.C.S.O)	01	Clothes for analysis of Blood and Semen	Blood and semen and spermatozoa and foreign materials are not detected	4 Months

**CHAPTER-6**  
**RESULT AND CONCLUSION**

**RESULT:**

**Table 6.1:** Showing the number of cases in which Samples/Material objects/Physical Evidences sent to FSL'S for analysis and expert opinion

S. No	TYPE OF CRIME	No. of Cases	DURATION OF REPORT
1	NDPS	18	1 Day to 2 Months
2	SUSPECTED PATERNITY	2	6 Months
3	RAPE	17	2-5 Months
4	MURDER	4	3 Months
5	ATTEMPTED MURDER	4	3-5 Months

**CONCLUSION:**

Majority of the cases collected were POCSO, Murder cases, Rape cases and NDPS cases and there were a very few civil cases like Forgery of signatures. The negative reports are delivered because of the lack of immediate action of police force and clues team. There is no complete protection to the physical evidences and sometimes there are no physical evidences left and thus resulted in the negative FSL's reports as the victim and their families give more importance to name fame and prestige. They didn't used to report at the prime time, so there can be contaminated physical evidences as in case of rape victims informing about the incident lately due to fear and various other issues results in the degradation of evidences (seminal stains).

Immediate Response to a crime and proper handling of physical evidences, proper lifting of evidences and immediate delivery to FSL's will help in rendering Justice to the Victims on time.

## REFERENCES

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