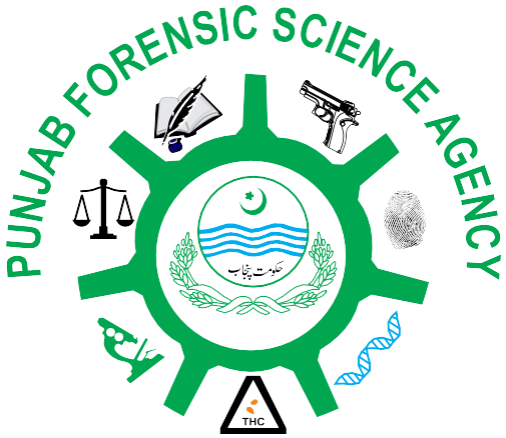


HOME DEPARTMENT
GOVERNMENT OF THE PUNJAB

PUNJAB FORENSIC SCIENCE AGENCY

ANNUAL PERFORMANCE REPORT 2023

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SUMMARY

By offering a thorough summary of its performance in terms of cases received, reports created, and cases backlogged throughout its laboratories, the Punjab Forensic Science Agency (PFSA) is abiding by Section 15 of the Punjab Forensic Science Agency Act of 2007. In order to successfully reduce the backlog, strategies and measures are being aggressively put into practice.

Brief introduction of following forensic disciplines is provided;

- Audio Visual Analysis Department
- Computer Forensics Department
- Crime Scene Investigation / Death Scene Investigation Department
- DNA & Serology Department
- Firearms & Tool Marks Department
- Forensic Photography Department
- Latent Fingerprints Department
- Narcotics Department
- Polygraph Examination Department
- Questioned Documents Department
- Forensic Toxicology Department
- Forensic Pathology & Histology Department
- Trace Chemistry Department

PREFACE

Applied to both criminal and civil laws, forensic science uses scientific methods to analyze various types of evidence obtained at crime scenes and make links between the evidence and the crime. Numerous specialized topics fall under the broad category of forensic science. When needed, Punjab Forensic Science Agency, the second-largest state-of-the-art laboratory in the world, provides expert testimony in court as well as forensic evidence analysis services in 14 disciplines. With the goal of assisting the general public in the administration of justice, Punjab Forensic Science Agency (PFSA) strives to provide exact, accurate, and timely analysis and results. The ISO/IEC 17025:2017 International Standard is followed by the PFSA laboratories for testing activities in order to accomplish this goal. Globally, forensic laboratories have embraced the ISO/IEC 17025:2017 standard, which defines the qualifications needed to perform testing, calibration, and sampling. Maintaining the integrity of laboratory results requires that minimum standards of care and attention be followed at every stage of the process, including obtaining the evidence and selecting the best method, timing, storing, transporting, and handling it, testing the samples of evidence, and creating reports.

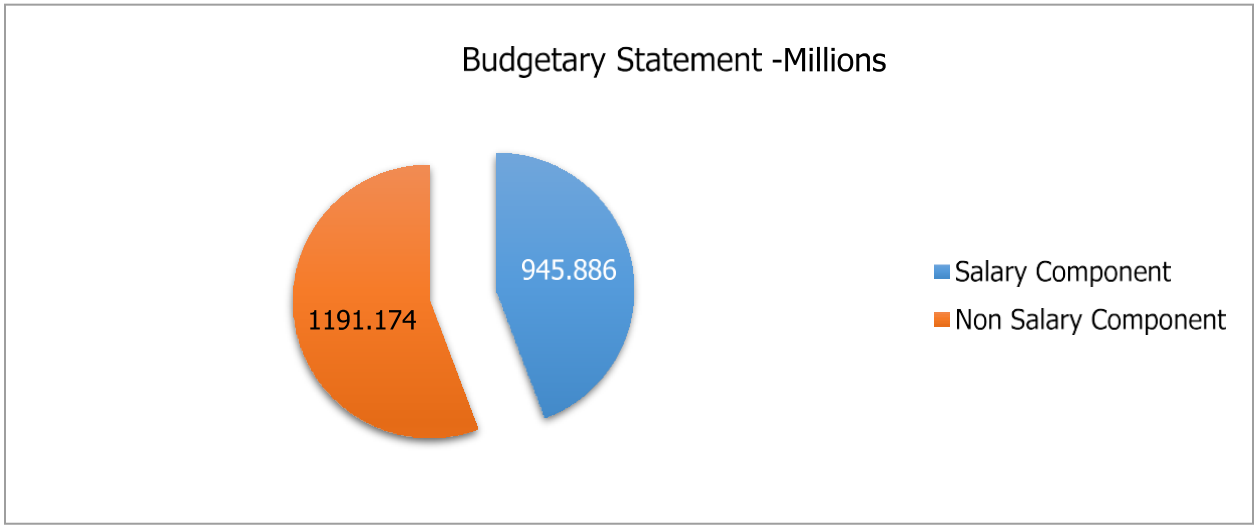
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MISSION STATEMENT

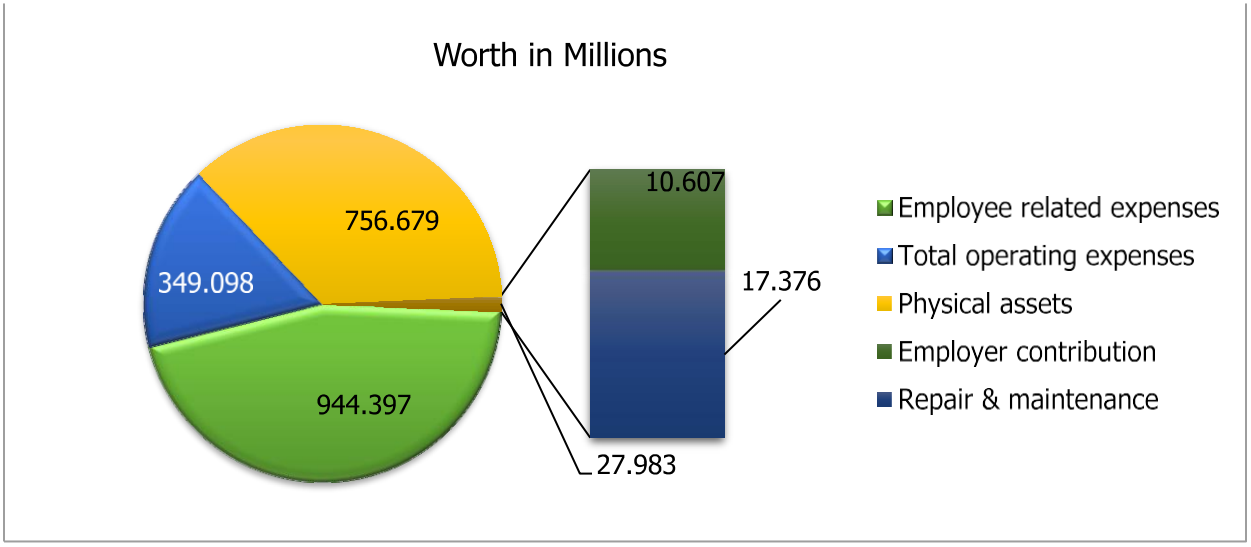
To receive physical evidence from Law Enforcement Agencies (LEA) in criminal as well as civil matters, analyse these and provide accurate results of forensic analysis well in time (on first come first served basis) and testify in COURTS OF LAW on analytical findings for the people of Punjab when required.

****

FINANCIAL REVIEW



Major expenses are as under:



The profitability of the Punjab Forensic Science Agency (PFSA) hinges on the cost of its services, much like any business. While forensic analysis is provided free of cost to law enforcement agencies and other departments of Punjab, the Punjab government allocates essential funds to cover expenses such as chemicals, equipment, and instruments. The evidence in each case is subjected to rigorous forensic analysis, culminating in a

laboratory examination report. To ascertain costs, PFSA calculates the total number of items processed by all disciplines. The table below represents the expenditure if these analyses were outsourced to vendor laboratories. Such vendors typically charge varying fees, with expedited services costing up to three times the standard rate. In 2023, PFSA generated laboratory reports valued at about Rs. 41.95 billion, if these services were outsourced to foreign vendor laboratories.

Section	Total cases	Total no of items	International cost per item (in USD)	Analysis cost if evidence items were out-sourced to foreign vendor laboratory (in USD)	Analysis cost if evidence items were out-sourced to foreign vendor laboratory (in PKR) (1 USD = PKR 280)
AV	1872	3658	1693	$6,192,378	PKR 1,733,865,727
CF	756	2970	1693	$5,028,346	PKR 1,407,936,836
/Drugs	29846	57378	227	$13,024,806	PKR 3,646,945,680
/Alcohol	27804	47727	126	$6,013,602	PKR 1,683,808,560
PGR	108	251	300	$75,316	PKR 21,088,421
QD	577	2573	1551	$3,990,999	PKR 1,117,479,804
PATH	3718	14666	2012	$29,507,581	PKR 8,262,122,749
Trace evidence	316	1111	674	$748,595	PKR 209,606,502
Explosives	339	1192	4618	$5,502,415	PKR 1,540,676,288
GSR	539	1078	1744	$1,880,032	PKR 526,408,960
drug/poison	3611	5488	413	$2,266,516	PKR 634,624,567
Blood alcohol	327	654	221	$144,534	PKR 40,469,520
DNA	8071	37010	496	$18,356,739	PKR 5,139,886,847
FTM	29456	49683	798	$39,647,015	PKR 11,101,164,140
LFP	3924	18113	398	$7,208,971	PKR 2,018,511,763
CSI	15209	15209	674	$10,250,866	PKR 2,870,242,480
Total	**126,473**	**258,759**	**17,638**	**$149,838,710**	**PKR 41,954,838,844**

Another aspect of the advantages resulting from the efforts of the Punjab Forensic Science Agency (PFSA) is the procurement of international donations facilitated by the Director-General of PFSA where possible.

HUMAN RESOURCE DEVELOPMENT

➢ ***Continuing Education***

In 2023, more than 200 scientists participated in one or more of the following international conferences, symposiums, and trainings:

i. Geographical Mapping – Australian Federal Police at PFSA, Lahore.
ii. 75th American Academy of Forensic Sciences annual conference, U.S.A.
iii. Critical Crisis Management, Emergency Planning College, U.K.
iv. Illicit drug analysis and use of laboratory equipment, conducted by UNODC in Italy.
v. Identification of drugs and precursors in the field conducted by UNODC at PFSA, Lahore.
vi. 9th International CSI Conference 2023 organized by Korean Police.
vii. The Sixth International Conference of the Arab Society for Forensic Sciences and Forensic Medicines, Riyadh, Kingdom of Saudi Arabia.
viii. Audio Authentication Analysis by Acustek, Ireland.
ix. Speaker recognition analysis by Oxford wave research, U.K.
x. Image and video authentication by Foclar, Netherlands.

These events offer scientists valuable opportunities to enhance their knowledge, skills and professional growth in the field of forensic science.

Total Staff

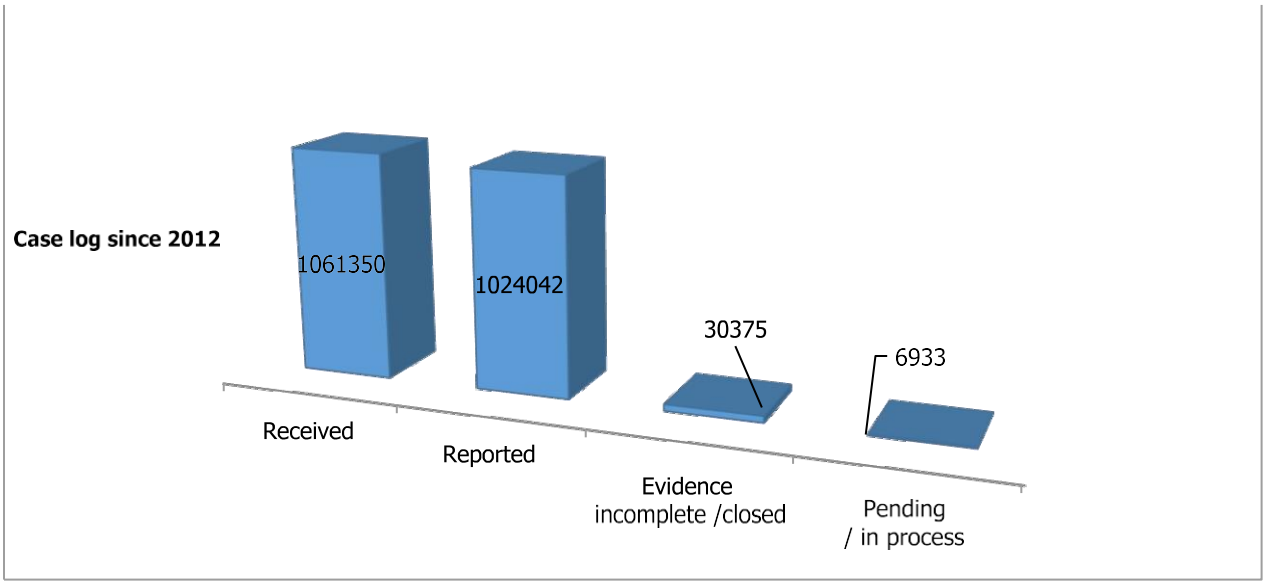
Positions	Sanctioned	Filled	Vacant
Forensic Scientists	177	141	36
Junior Forensic Scientists	285	248	37
Administrative/Technical/Support Staff	587	478	109
Total	1049	867	182
PFSA is currently working with **82.6%** human resource strength.			

PFSA CASE LOG

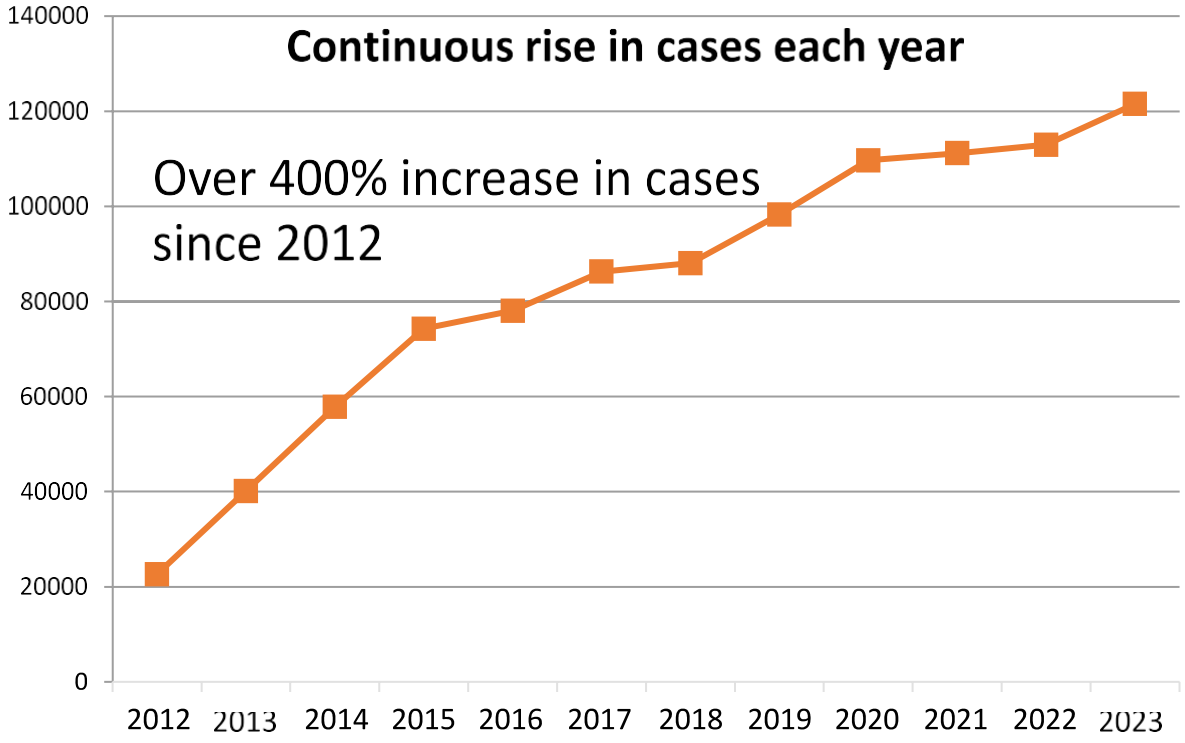
(SINCE INAUGURATION TO 31/12/2023)

Since its establishment in 2011, PFSA has received a total of 1061350 cases, with 1024042 cases reported and 30,375 cases classified as incomplete or closed. The backlog or pendency rate currently stands at 0.65%, significantly lower than that observed in other international laboratories. PFSA is actively addressing this minimal backlog, aiming to resolve it by the end of 2024.

According to the May 2023 report of "project FORESIGHT," which evaluates forensic science laboratories worldwide with data from 200 laboratories (174 from the USA and 26 from other countries), the median backlog of cases as a percentage of total cases across various forensic disciplines ranges from 1.4% to 25%. This report highlights higher levels of pending cases compared to PFSA's overall backlog rate.

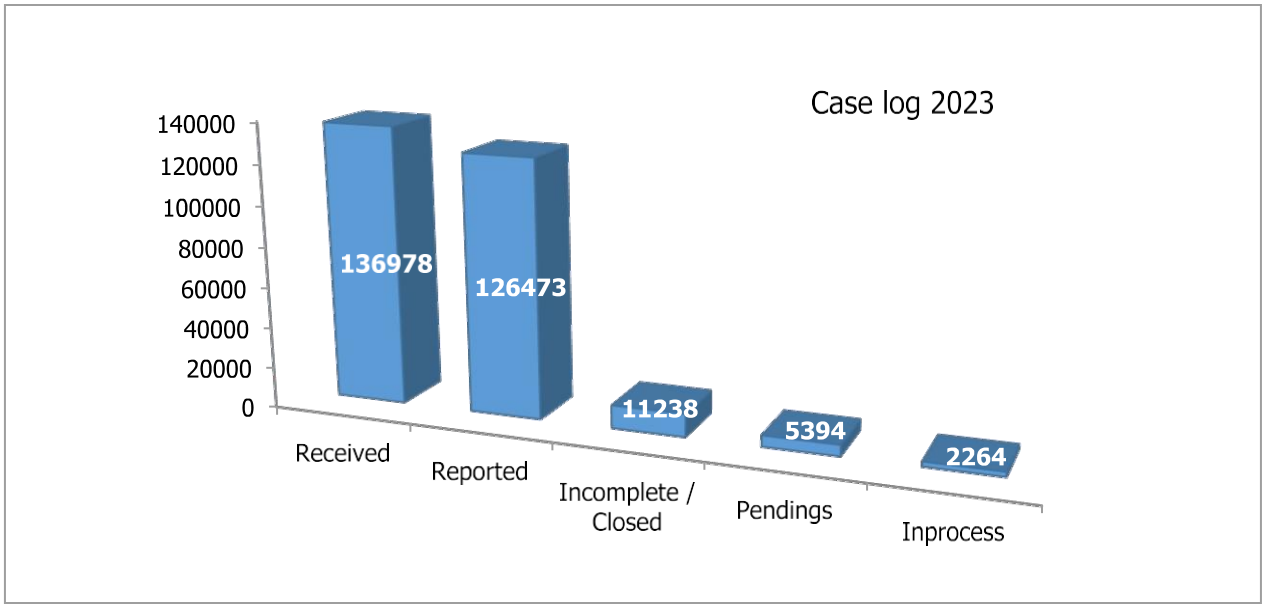


The existence of a case backlog is linked to the ongoing increase in annual case submissions, suggesting that while the backlog may persist, it is expected to remain at a relatively low percentage.



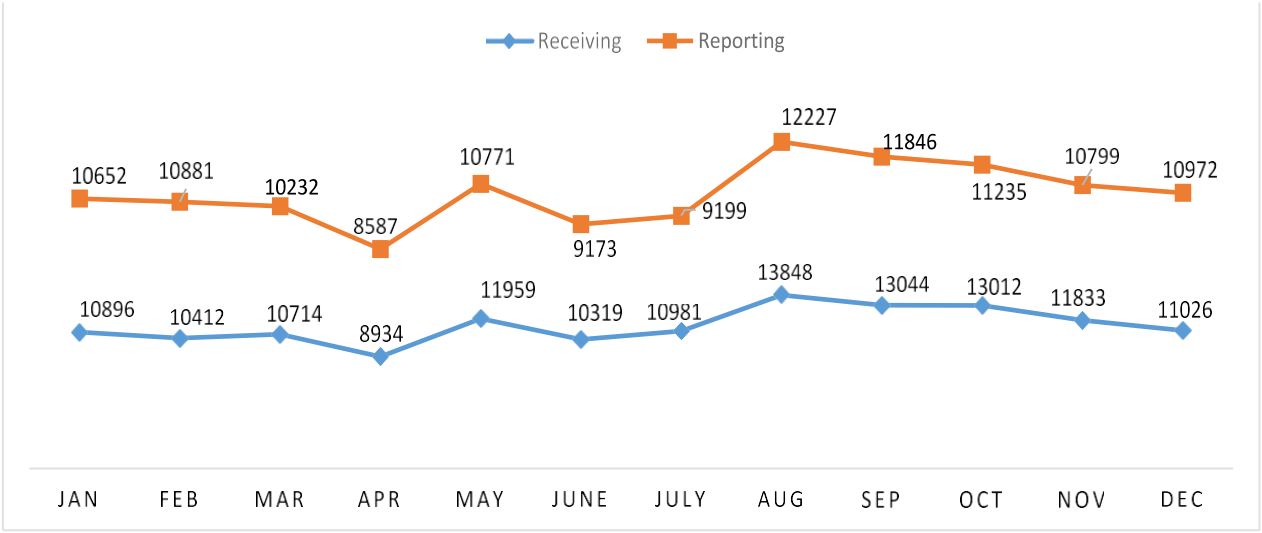
PFSA PROGRESS REVIEW (2023)

In 2023, PFSA received a total of 136,978 cases. The backlog or pendency rate for the same year is approximately 3.9%. The graph below depicts the total number of cases received, incomplete, pending, and reported in 2023:

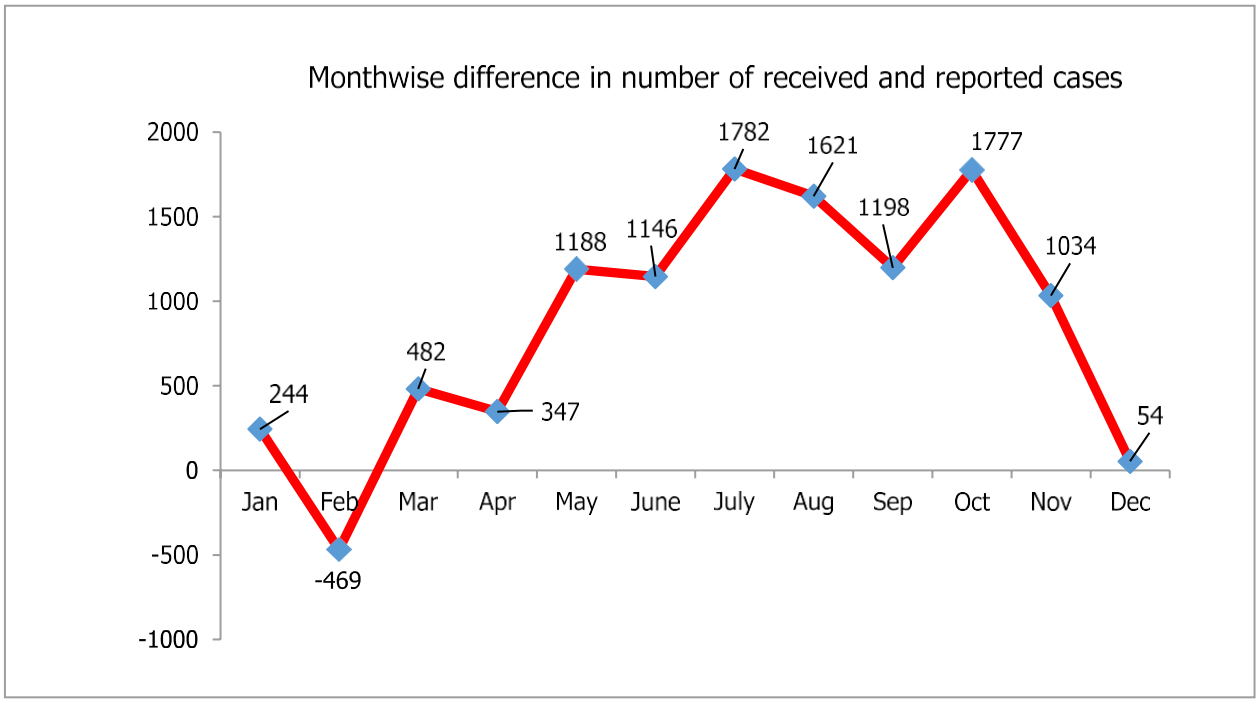


Note: 8391 cases were reported from previous years.

Month wise (January 2023 to December 2023) graph of cases received and reported in PFSA:



The line graph depicts a parallel trend between the number of cases received and the reports generated, with noticeable spikes observed in May and August.



The above graph indicates the dynamic nature of received & reported cases number throughout the year.

A comparison of influx of cases during year 2022 and year 2023 is given as follows;

Month	Cases Received in Year 2022	Cases Received in Year 2023	% age Increase in Incoming Cases
January	9816	10896	11%
February	9718	10412	7%
March	11287	10714	-5.1% (decreased)
April	9710	8934	-8 % (decreased)
May	10432	11959	14.6%
June	11062	10319	-6.7% (decreased)

July	9695	10981	13.2%
August	10733	13848	29 %
September	11639	13044	12 %
October	12238	13012	6.3 %
November	10845	11833	9 %
December	11426	11026	-3.5% (decreased)
Total	128601	136978	6.51%
OVERALL % age Increase/Decrease in Incoming case			**6.51%**

➢ *Reasons for Backlog/Pending cases:*

The issue of forensic case backlog is not limited to Pakistan; even Western countries such as the USA encounter this challenge despite their abundant resources. However, PFSA has effectively kept its overall backlog to just 0.8% (including pending cases from previous years), a rate that compares favourably with the best forensic facilities globally. Several factors have contributed to this backlog, including:

(i) Continuous increase in case submissions (6.51% rise in 2023) due to public confidence and awareness for forensic evidence analysis.

(ii) Insufficient cooperation and coordination among the prosecution, police, judiciary and the forensic agency.

(iii) Inadequate education about forensic techniques among the police, prosecution and judiciary.

(iv) Shortage of human resources (as PFSA is currently operating at 82.6% staff capacity).

(v) Submission of non-probative / unnecessary evidence items.

To address this backlog, following general steps have been taken;

(i) Implementation of a case-return-policy in case of discrepancies.

(ii) Completion of the recruitment process to fill remaining 17.4% of vacant positions; thereby increasing efficiency.

(iii) Implementation of an evidence rejection policy.

(iv) Performance evaluation measures.

(v) Streamlining processes to simplify them.

(vi) Utilizing support staff in technical departments to optimize staff utilization.

(vii) Hiring of additional technical expertise in pathology.

(viii) Providing technical training to staff.

(ix) Conducting training programs for the judiciary, prosecution and law enforcement agencies.

PFSA CASE RECEIVING (DIVISION WISE)

(Jan 2023 to Dec 2023)

Division	Cases Received	Cases Reported	%age Cases Reported
Lahore	24160	21856	90.4%
Gujranwala	23183	22034	95.0%
Faisalabad	15981	14555	91.0%
Sahiwal	9726	9247	95.0%
Multan	15331	14148	92.2%
Rawalpindi	14431	13369	92.6%
Bahawalpur	11668	10797	92.5%
Sargodha	10617	9751	91.8%
DG Khan	9506	8527	89.7%

About 10 % cases remained in process.

➢ *Lahore Division:*

District	Cases Received	Cases Reported
Lahore	15577	14404
Sheikhupura	3363	2888
Kasur	2944	2544
Nankana Sahib	2276	2020
Total	24160	21856

➢ *Gujranwala Division:*

District	Cases Received	Cases Reported
Gujranwala	7379	6842
Sialkot	6166	5975
Gujrat	3300	3189
Hafizabad	2145	2021
Narowal	1911	1906
Mandi Bahauddin	2282	2101
Total	23183	22034

➢ *Faisalabad Division:*

District	Cases Received	Cases Reported
Faisalabad	9786	8911
Jhang	2103	1876
Toba Tek Singh	2359	2181
Chiniot	1733	1587
Total	15981	14555

➢ *Sahiwal Division:*

District	Cases Received	Cases Reported
Okara	3263	2985
Sahiwal	2842	2704
Pakpattan	3621	3558
Total	9726	9247

➢ *Multan Division:*

District	Cases Received	Cases Reported
Vehari	3553	3391
Multan	6163	5585
Lodhran	2596	2502
Khanewal	3019	2670
Total	15331	14148

➢ *Rawalpindi Division:*

District	Cases Received	Cases Reported
Rawalpindi	8536	7923
Attock	2493	2256
Jhelum	1884	1810
Chakwal	1518	1380
Total	14431	13369

➢ *Bahawalpur Division:*

District	Cases Received	Cases Reported
Rahim Yar Khan	3908	3574
Bahawalnagar	3086	2823
Bahawalpur	4674	4400
Total	11668	10797

➢ *Sargodha Division:*

District	Cases Received	Cases Reported
Sargodha	6290	5754
Mianwali	1628	1551
Khushab	1578	1430
Bhakkar	1121	1016
Total	10617	9751

➢ *D.G Khan Division:*

District	Cases Received	Cases Reported
Rajanpur	1760	1589
Muzaffargarh	4356	3995
DG Khan	1974	1684
Layyah	1461	1322
Total	9506	8527

AUDIO VISUAL ANALYSIS (AV)

The Audio Visual Analysis Department specializes in the scientific examination, comparison, and evaluation of audio and video evidence for legal purposes. It is equipped with cutting-edge forensic tools designed for audio and video analysis, widely recognized and endorsed by LEVA International Inc. (Law Enforcement/Emergency Services Video Association), and utilized by the global forensic community. The AV department provides the following services:

i) **Digital Video/Image Enhancement:** To improve and clarify the visual appearance of persons/ objects seen in videos and images.

ii) **Forensic Image Comparison:** To compare the visual appearance of persons or objects seen in digital images and videos with suspected persons or objects seen in videos.

iii) **Digital Video Authentication:** To determine if a video is edited/tempered with or not (to determine the originality, authenticity and genuineness of the video).

iv) **Digital Audio Enhancement:** To enhance, improve and clarify the intelligibility of audio signals recorded into digital media or video recordings. To remove unwanted noise from audio recordings.

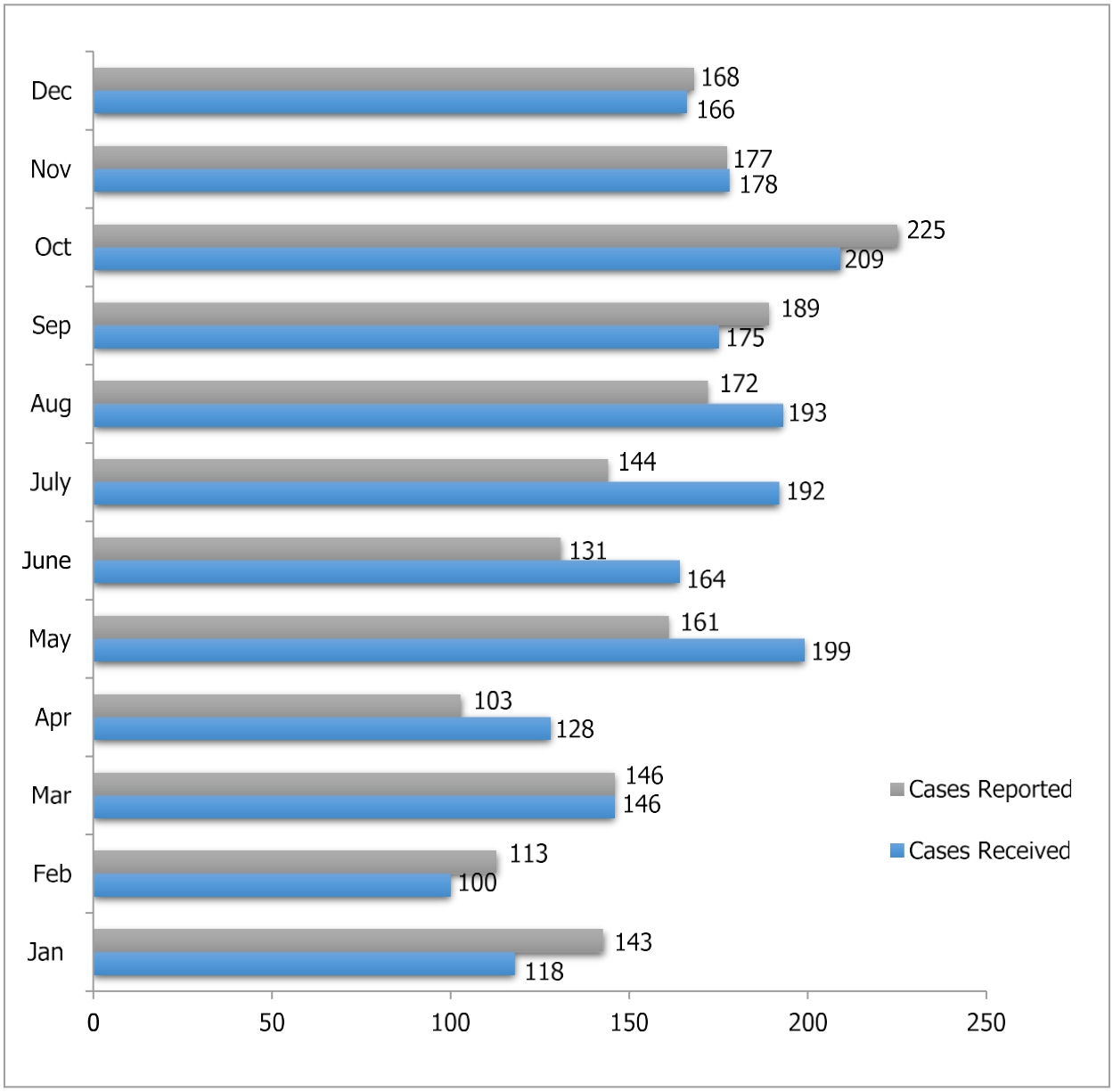
v) **Digital Audio Authentication:** To determine if an audio file is edited/ tempered with or not i.e. to determine the originality, authenticity and genuineness of an audio file.

vi) **Forensic Voice Comparison:** To compare the voice of a person in a digital audio recording with the voice of a suspected person.

The case Log of the Audio Visual Analysis Department for the period January 2023 to December 2023 is as follows:

Total No. of Cases received at PFSA in 2023	1968
Reports Issued (January 2023 To December 2023)	1872
Incomplete / Closed (Due to non-submission of case analysis fee)	60
Pending	148
In process	33
NOTE: 145 extra cases were reported from the backlog of the previous period 2022.	

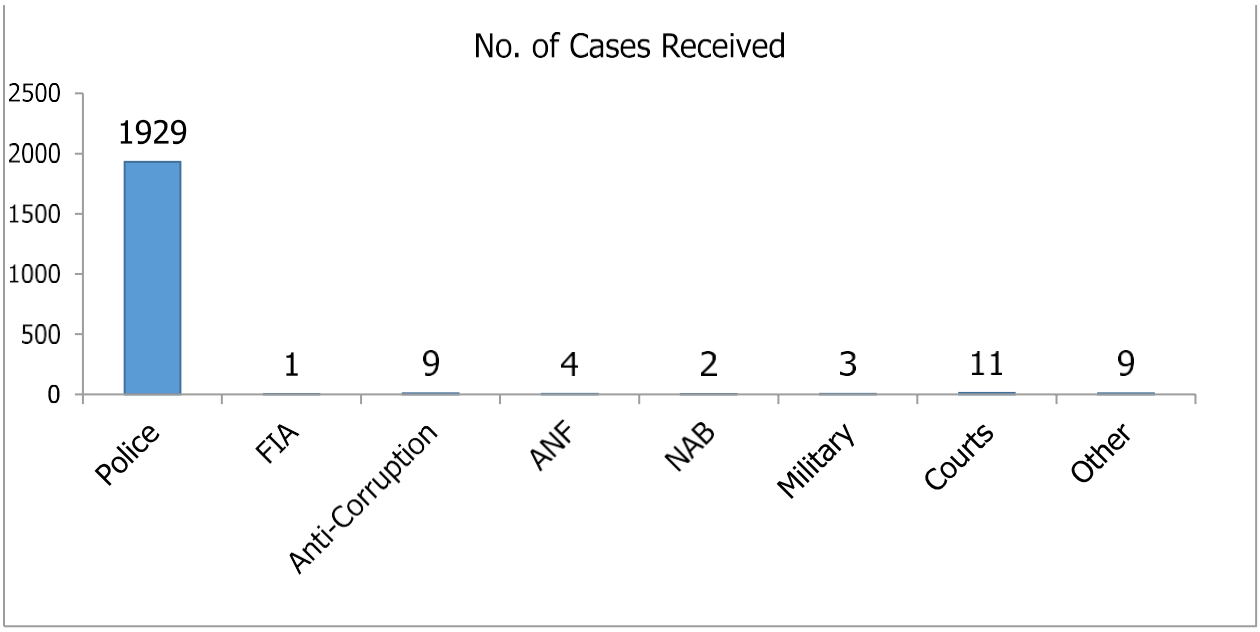
The following bar diagram shows the month-wise case receiving and report generated during 2023.



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Case classification can be seen according to the evidence submitted:

The Audio Visual Analysis Department received the cases from various agencies as shown below:



COMPUTER FORENSICS (CF)

Computer forensics involves employing investigative and analytical methods to collect and safeguard evidence from computing devices, ensuring it is suitable for court presentation. The escalating use of mobile phones and other digital devices necessitates thorough examination of the data they contain. These devices and their storage media can harbor valuable information such as call logs, pictures, SMS, chats, videos, audio recordings, documents, and more, which can play a crucial role in solving criminal cases.

Scope of the Computer Forensics Unit:

i) Scientific examination and analysis of Digital Storage Media. For example: hard disk drives, USBs, mobile phones, SIM cards, memory cards, CDs/DVDs, etc.

ii) Recovery of deleted digital data.

iii) Password deciphering /bypassing of submitted digital media.

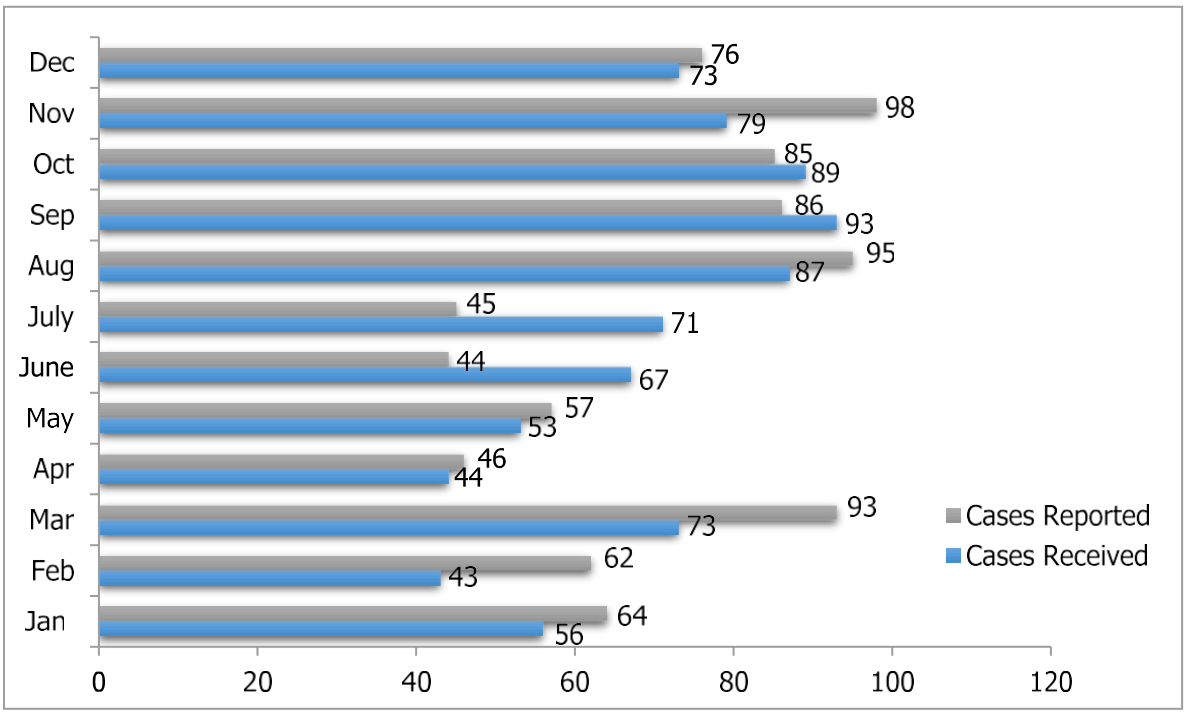
iv) Retrieving/acquiring evidence from digital media.

v) Expert testimony of case reports in the court of law.

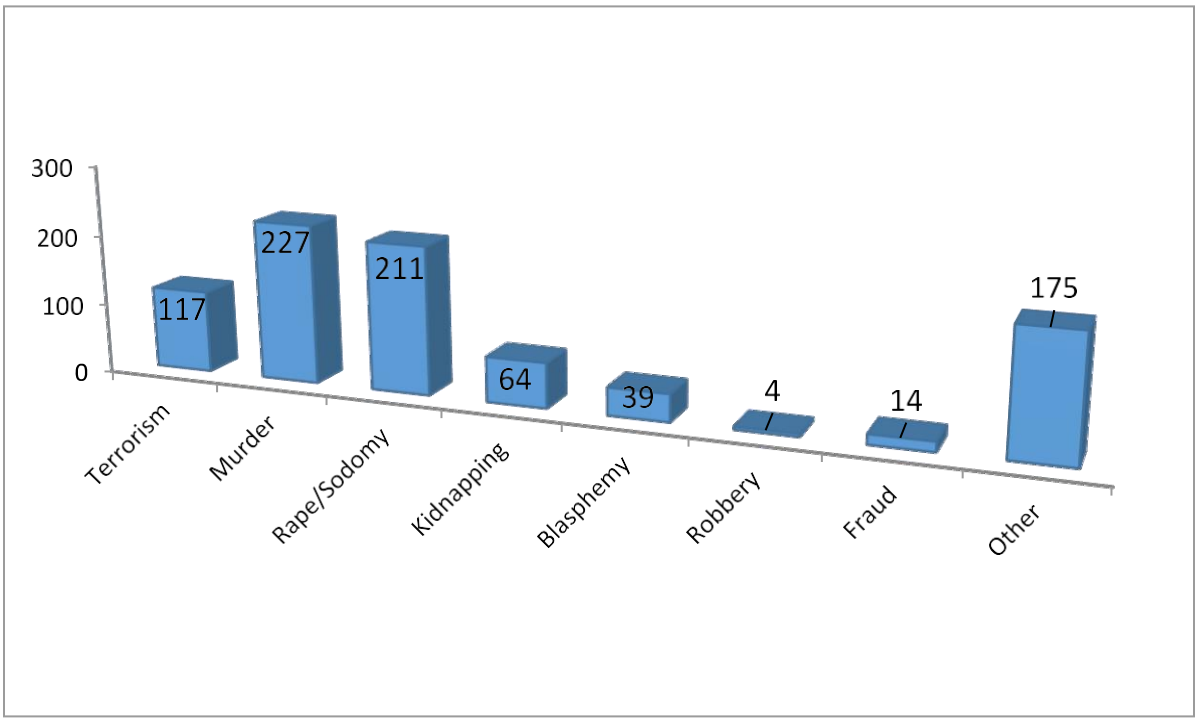
Case log of CF is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	828
Reports Issued	756
In Process	30
Incomplete / Closed (Due to non-submission of case analysis fee)	3
Pending	39

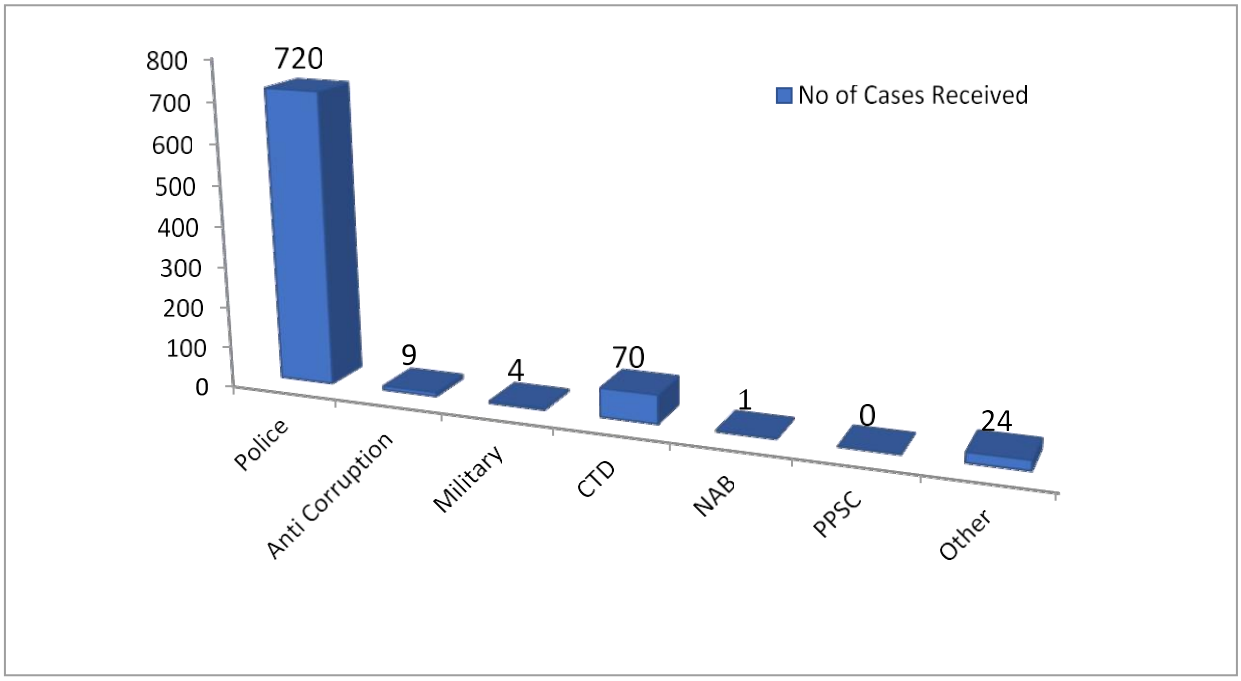
The month-wise cases received and reports generated during the year 2023 are shown in the following bar diagram.



Cases classification according to the crime type:



CF cases submitted agency wise:



CRIME SCENE INVESTIGATION (CSI)

A crime scene is any physical location where potential evidence can be found and investigated by skilled crime scene investigators. This encompasses various settings such as buildings, vehicles, outdoor areas, objects, and even a person's body.

The Crime Scene Investigation Unit (CSU) of PFSA offers forensic services around the clock to law enforcement agencies (LEAs) across Punjab, with satellite stations situated in all divisional headquarters. The CSU's responsibilities include the systematic identification, preservation, and collection of evidence at crime scenes, followed by establishing a chain of custody to maintain the evidence's integrity.

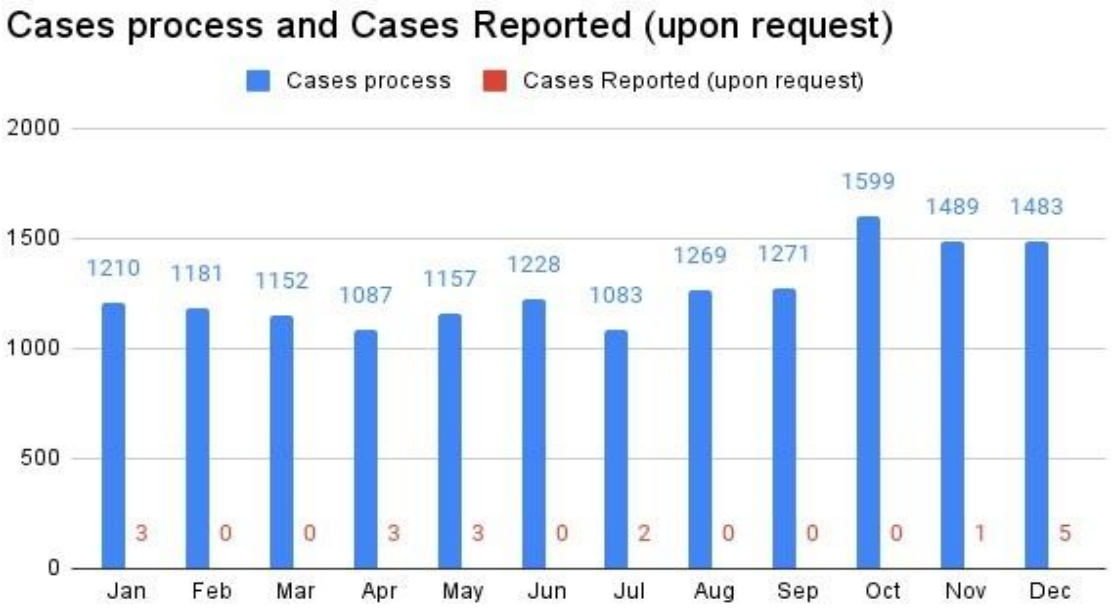
Crime scene investigators (CSIs) collaborate as a team when handling a crime scene. Their duties include delineating and securing areas potentially containing evidence, scrutinizing and documenting the scene, as well as collecting and preserving physical evidence. They package and transfer the evidence to the relevant LEAs directly at the crime scene. By utilizing crucial pieces of evidence, investigators can reconstruct the sequence of events in a crime.

CSIs undergo specialized training in areas such as bullet trajectory analysis, blood spatter pattern analysis, and they carry advanced kits for detecting explosive residues, identifying biological fluids, and processing shoe prints at crime scenes.

Table-1: Crime Scene Coverage during 2023

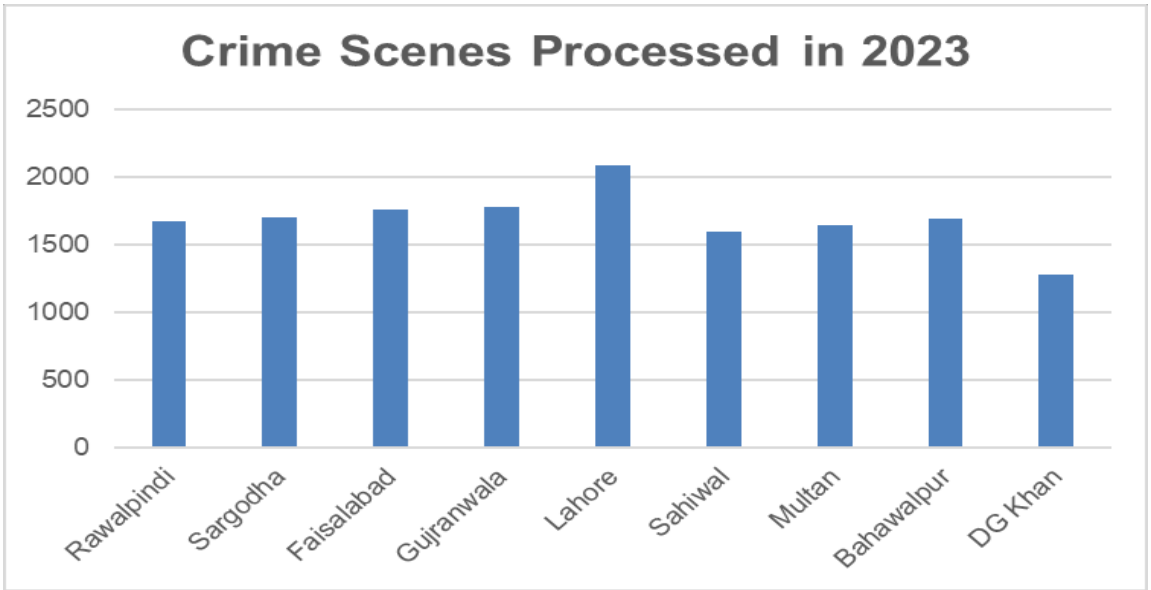
Total No. of Cases received at PFSA in 2023	15209
Total number of cases processed	15209
In Process	0
Pending	0

Month wise data of cases received and processed during 2023 is shown as follows;

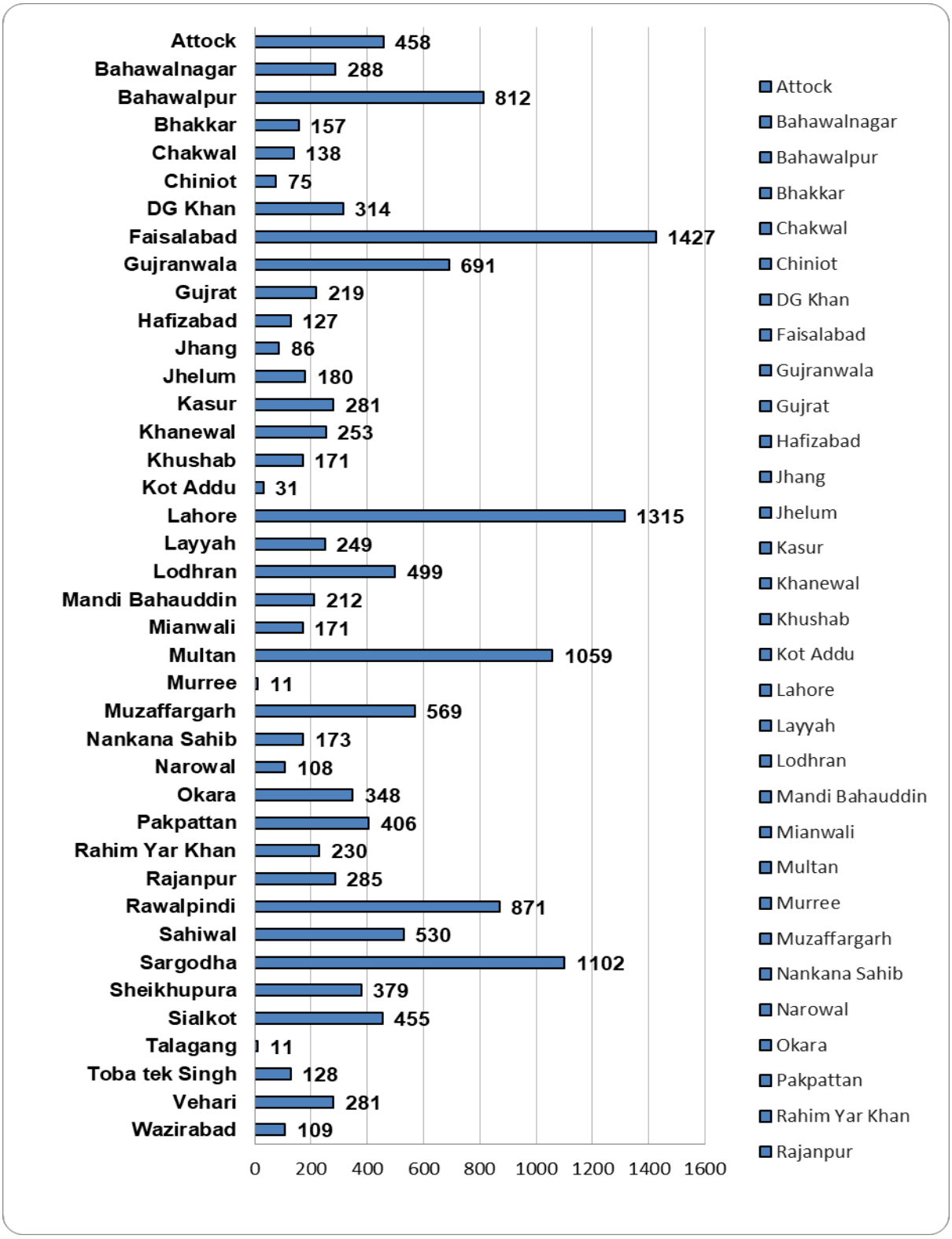


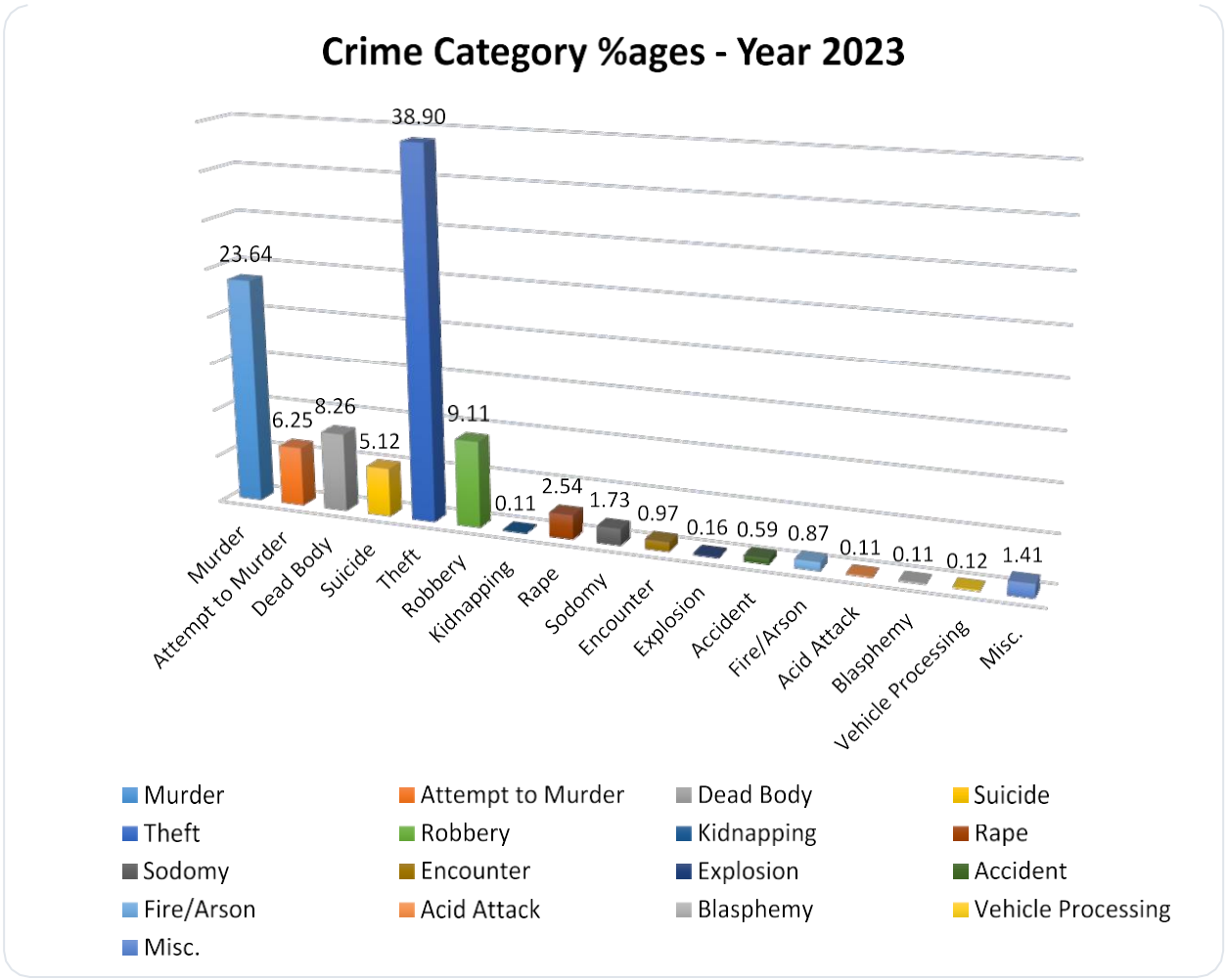
Satellite Stations of Crime Scene Investigation Unit

Since 2016, Satellite Stations of Crime Scene Investigation Unit are operational in all divisional headquarters of Punjab. Distribution of crime scene coverage during 2023 with respect to satellite stations is as follows;



District wise crime scene coverage during 2023;




Crime Category %ages - Year 2023
23.64
6.25
8.26
5.12
38.90
9.11
0.11
2.54
1.73
0.97
0.16
0.59
0.87
0.11
0.11
0.12
1.41
Murder
Attempt to Murder
Dead Body
Suicide
Theft
Robbery
Kidnapping
Rape
Sodomy
Encounter
Explosion
Accident
Fire/Arson
Acid Attack
Blasphemy
Vehicle Processing
Misc.

DNA & SEROLOGY (DNA)

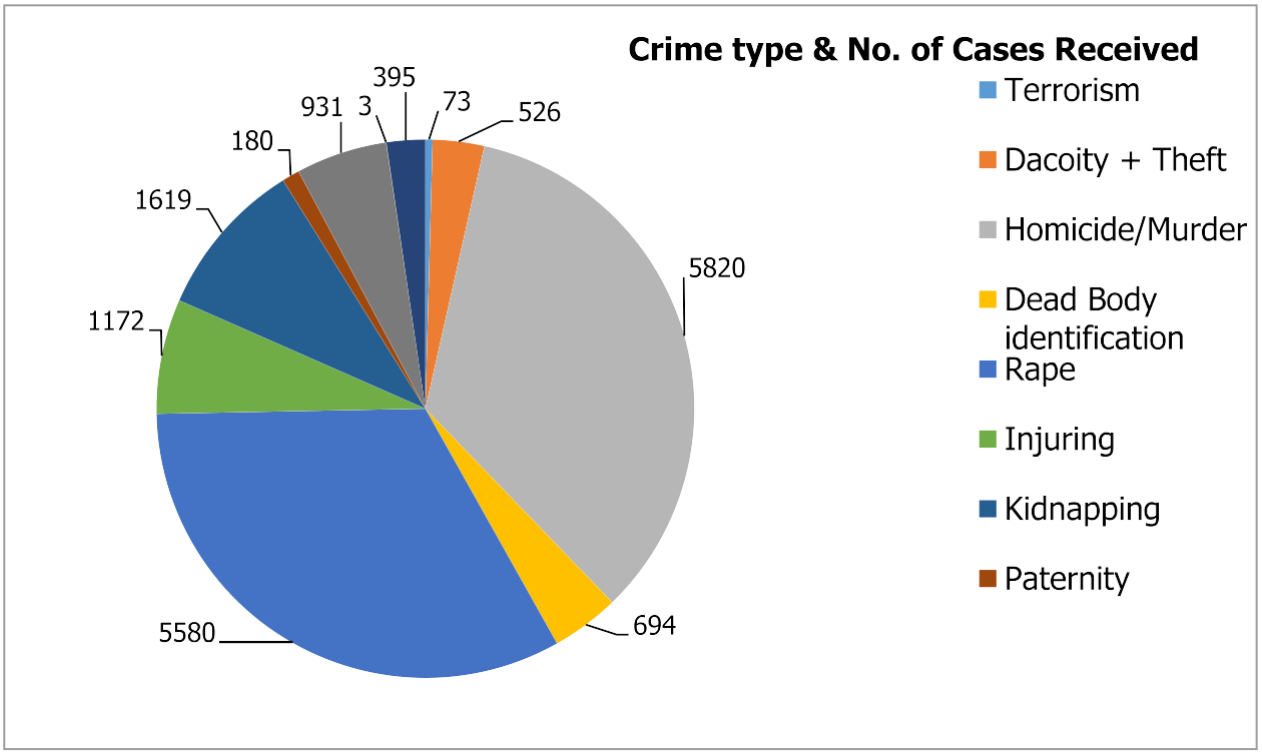
The DNA and serology analysis involves the identification of body fluids on submitted evidence and the creation of DNA profiles from pertinent fluid stains. These profiles are compared against standard reference samples to determine potential contributors. The findings are detailed in a laboratory examination report and presented to law enforcement and courts to support the judicial process.

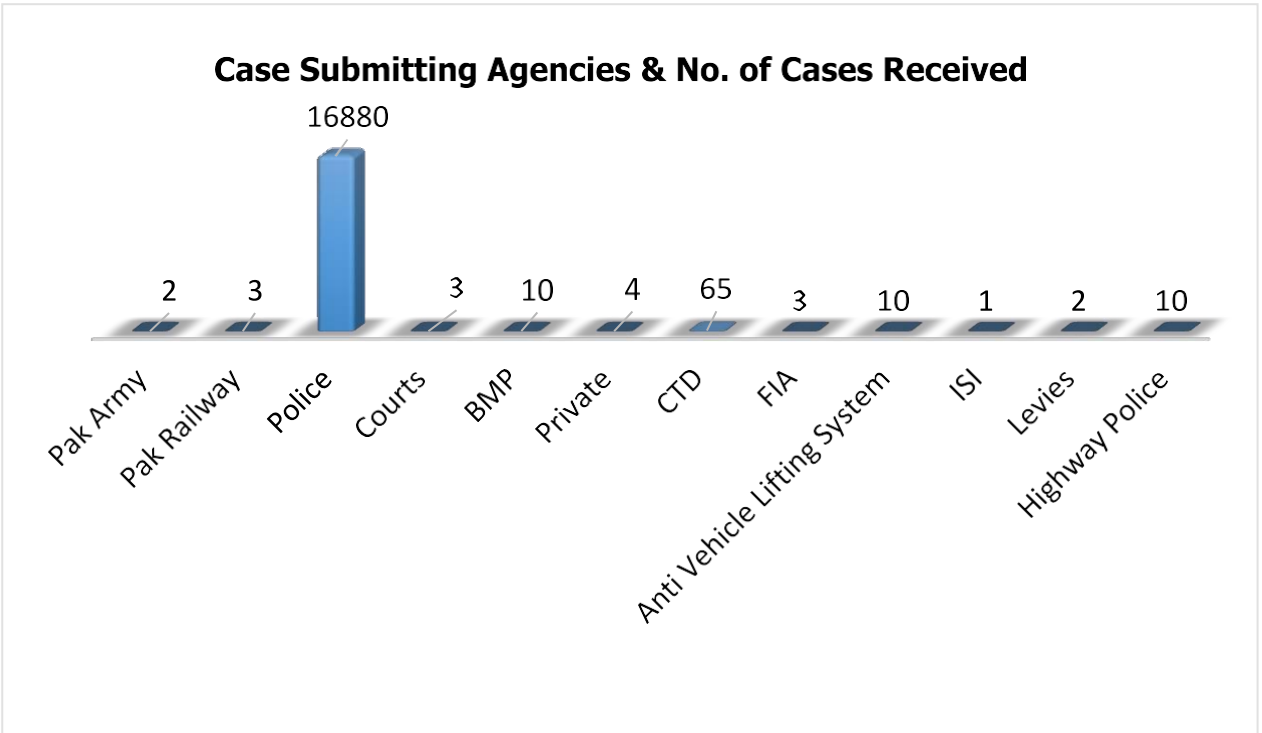
The department operates nationwide, handling cases from across Pakistan, not limited to Punjab, resulting in a substantial caseload. These cases predominantly involve serious offenses such as terrorism, murder, and sexual assault. In 2023, the DNA section managed a significant workload, processing 16,993 cases. Over the past decade, the efforts of the DNA section have significantly enhanced the significance of DNA evidence in court proceedings throughout Pakistan. Courts now regard DNA results as critical and substantial evidence in serious criminal cases, aiding in their decision-making process and the dispensation of justice. This achievement has garnered acclaim from the country's highest judicial bodies. Furthermore, the DNA section has successfully resolved several high-profile cases that captured national attention.

PFSA maintains an unwavering commitment to upholding the highest standards of quality assurance. The DNA and serology section implements ISO/IEC 17025:2017 standard. The DNA section remains steadfast in delivering top-tier services to support the judicial system and contribute to the advancement of Pakistani society, handling over a thousand cases monthly in 2023.

Case Log of DNA & Serology (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	16993
Reports Issued	8071
In Process	826
Pending Owing to Incomplete Submission (Either reference samples not submitted by police or analysis request by competent authorities is awaited)	8096


Crime type & No. of Cases Received
395
931
3
73
526
180
1619
5820
1172
5580
694
Terrorism
Dacoity + Theft
Homicide/Murder
Dead Body identification
Rape
Injuring
Kidnapping
Paternity


Case Submitting Agencies & No. of Cases Received
16880
2
3
3
10
4
65
3
10
1
2
10
Pak Army
Pak Railway
Police
Courts
BMP
Private
CTD
FIA
Anti Vehicle Lifting System
ISI
Levies
Highway Police

FIREARMS & TOOLMARKS UNIT (FTM)

Firearms and tool marks analysis is crucial component of forensic science. The firearms and tool marks unit at PFSA plays a pivotal role in firearm identification, focusing on analyzing firearms and ammunition to establish connections with specific firearms or crime scenes.

Within this discipline, firearms examiners utilize specialized tools like comparison microscopes to scrutinize components such as fired bullets, cartridge cases, and shotgun shells. These examinations involve comparing unique characteristics, often referred to as mechanical fingerprints, such as rifling patterns on bullets or impressions left by firing pins on cartridge cases.

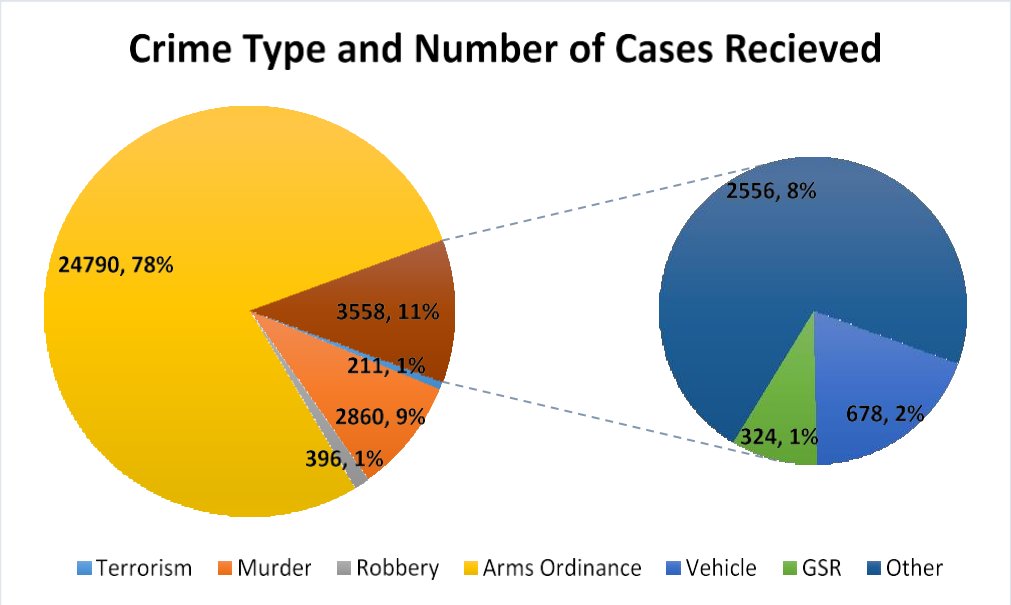
The importance of firearms identification reverberates throughout criminal investigations, providing law enforcement agencies with invaluable insights. It assists in linking firearms to suspects and crime scenes, aiding in perpetrator identification, reconstructing events, and determining the type of weapon used.

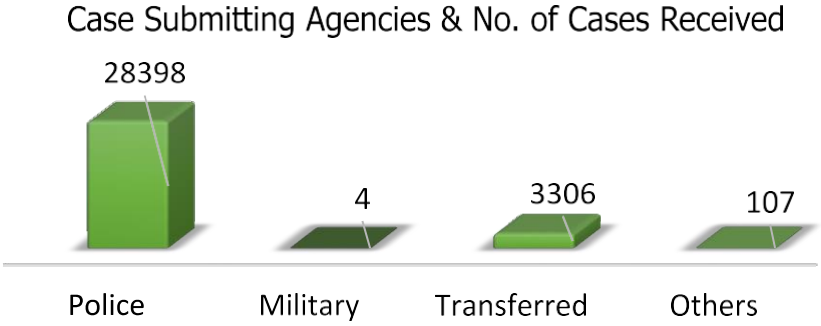
Services provided by the FTM Unit

- Examination of submitted firearms to determine model, caliber, serial number, and functionality.
- Examination of evidence bullets and cartridge cases to determine (with submitted firearms) if either or both were fired in or from the firearms and their entry in Automated Ballistic Identification System.
- Examination of evidence ammunition to determine bullet type.
- Examination of submitted tools in conjunction with evidence Toolmarks or silicone casts to determine if the tool was used to create the Toolmarks.
- Restoration of altered, modified, or obliterated serial numbers.
- Analysis of gunpowder patterns on a variety of evidence, using submitted firearms and ammunition to determine the approximate distance from the muzzle to the point of impact.
- Shooting scene reconstruction using trajectory analysis to determine the sequence of two or more events in a particular incident utilizing information derived from the physical evidence.
- Shotgun Shots Pattern Analysis to determine the approximate distance of the shooter from the target.

Case Log of FTM Unit (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	**31815**
Cases Reported	**29456**
In Process	**1064**
Pending Cases	**4552**
Evidence Incomplete	**3027**
Note: 6284 cases were reported from the backlog of previous year 2022	





LATENT FINGERPRINTS DEPARTMENT (LFP)

The Latent Fingerprint Department operates as an ISO17025:2017 compliant laboratory, providing standard fingerprint examination services to law enforcement agencies. Fingerprint identification involves using impressions created by the minute ridge formations or patterns found on fingertips. This method is highly effective for personal identification and is widely used as forensic evidence in modern times. Each individual has unique fingerprints, which remain unchanged throughout their lifetime, making them an excellent means of identification that assists law enforcement agencies in various fields to combat crime rates.

A new method utilizing Indandione has been introduced after verification for developing latent prints on thermal papers. PFSA has also installed an Automated Fingerprint Identification System (AFIS), which is connected via VPN to 31 prisons in Punjab and PFSA headquarters for real-time submission of criminal data, including fingerprints, palm prints, and mug shots. AFIS has successfully resolved 162 cold cases using fingerprint evidence to date. It has recorded fingerprints, palm prints, and mug shots of over three hundred thousand criminals from different Punjab prisons.

Services offered by the LFP laboratory include:

i) Scientific examination of friction ridge skin impressions including latent fingerprints, palm prints and foot prints.

ii) Comparison of thumb impressions in the property cases (e.g. Mutations, Affidavit and Agreements etc.).

iii) Examination of Forged and Fabricated thumb impressions.

iv) Development and processing of latent prints.

v) Authorising report about the findings and provide expert testimony related to these examinations in the legal proceedings.

vi) Establish the identity of unknown deceased persons.

vii) Recording of legible fingerprints in immigration cases for criminal history verification.

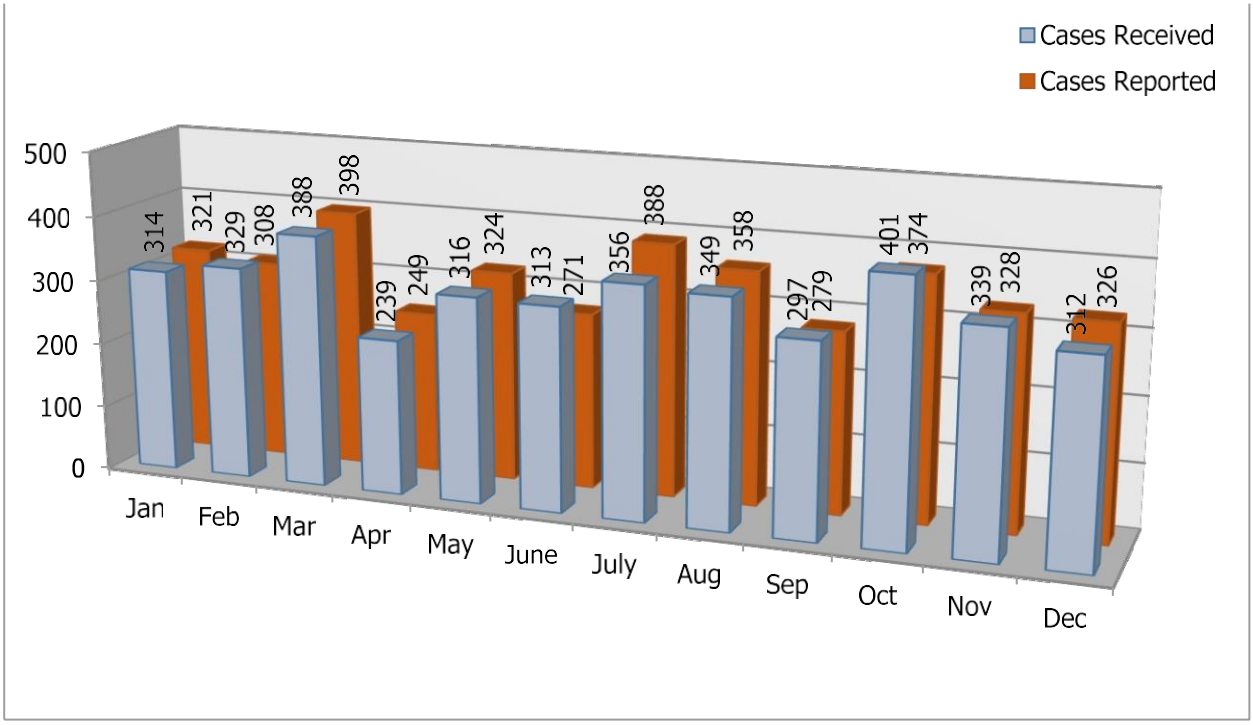
viii) Provide training to the law enforcement community.

ix) Latent Fingerprint search through Automated Fingerprint Identification System.

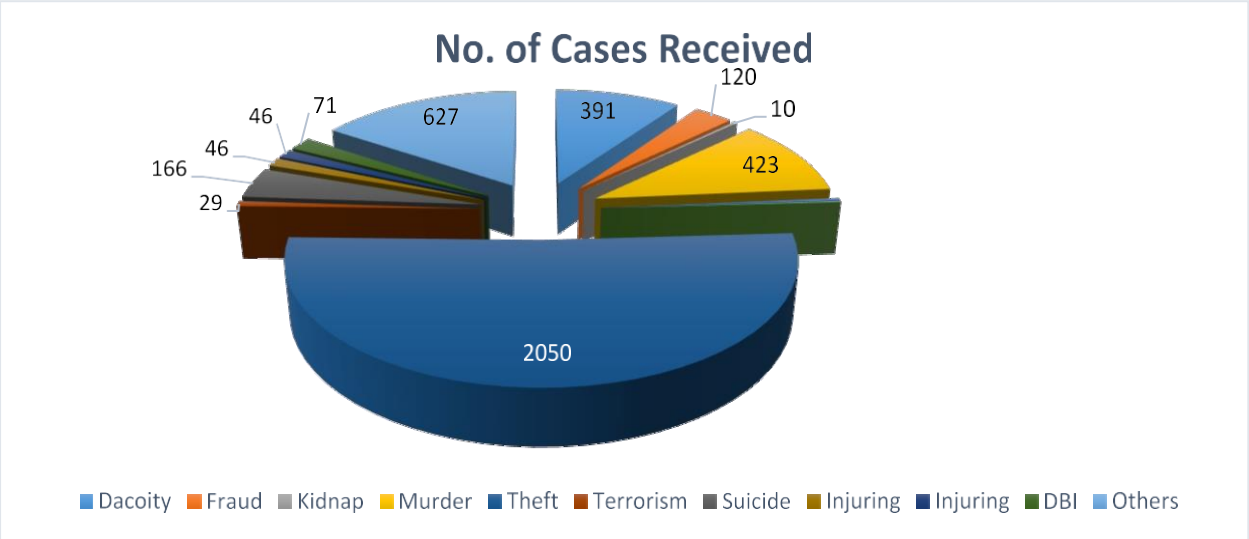
Case Log of LFP is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	3953
Reports Issued/closed	3924
In Process/pending	116
Incomplete Cases (Due to non-submission of case analysis fee)	17
Note: 104 cases from 2022 were also reported in 2023.	

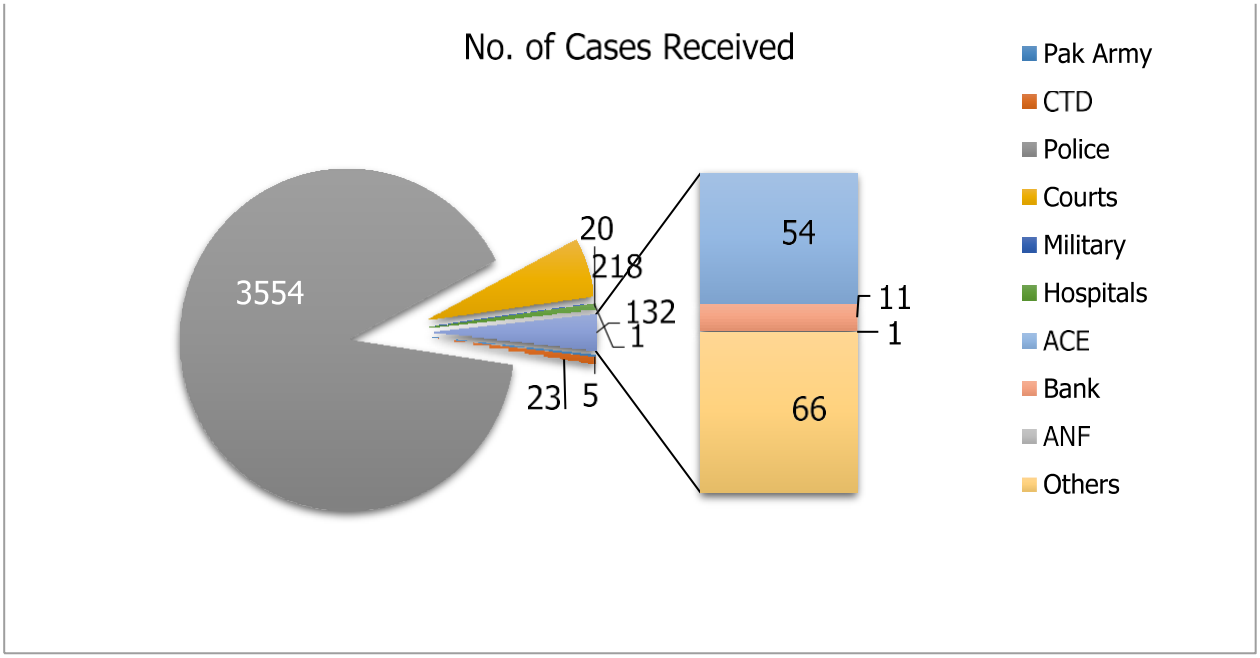
The month-wise cases received and reports generated during the year 2023 are shown in the following bar diagram. LFP has zero backlog.



Cases classification shown according to the evidence submitted:



Agencies submitting LFP cases are as following:



NARCOTICS DEPARTMENT (NAR)

The Narcotics unit of Punjab Forensic Science Agency is equipped with state-of-the-art and highly efficient equipment recognized as the gold standard worldwide for analyzing controlled substances. This unit conducts examinations of suspected narcotic & psychotropic substances in accordance with the requirements of the Control of Narcotic Substances (Amendment) Act, 2022, Pakistan.

The Narcotics unit is an ISO 17025:2017 accredited laboratory.

The Narcotics laboratory adheres strictly to international guidelines for the analysis of seized drugs. Its analysis procedures and protocols are fully compliant with internationally recommended standards

- SWGDRUG Recommendations
- UNODC procedures
- ISO/IEC 17025:2017 requirements

➢ **Scope of Analysis**

Narcotics unit has the capacity to qualitatively identify the controlled substances listed in Control of Narcotic Substances (Amendment) Act, 2022, Pakistan and internationally contraband substances as well.

➢ **Case Submitting Agencies**

Samples of seized materials are being submitted for analysis from different law enforcement agencies including;

- Punjab Police
- Anti-Narcotics Force
- Pakistan Rangers
- Pakistan Army
- Pakistan Railways
- Counter Terrorism Department
- Border Military Police
- Customs department

- Law enforcement agencies of other provinces, Islamabad Capital Territory and Kashmir.

➢ ***Type of Samples Received***

Narcotics Unit receives samples of various seized materials for analysis including;

- Cannabis (Bhang, Charas and Cannabis plant)
- Opium (Afyun, Poast, Bhukki, Poppy plant)
- Heroin
- Cocaine
- Ketamine
- Methamphetamine (ICE)
- MDMA (Ecstasy Tablet)
- Ephedrine and Pseudoephedrine
- Acetic Anhydride
- Controlled solvents
- Acids
- Suspected Narcotics Injection (Ativan, Clonazepam, Lorazepam etc.)
- Items soaked in Narcotic substances (i.e. clothes)
- New Psychoactive Substances used worldwide (Synthetic Cannabinoids)
- Alcohol

➢ ***Analytical Techniques***

Available technology for testing includes;

- Chemical Spot Tests (Color tests)
- Fourier Transform Infra-Red Spectrometer
- Gas Chromatograph-Mass Spectrometer
- Gas Chromatograph-Flame Ionization Detector
- LC/MSMS
- Raman Spectrophotometer
- Stereomicroscope

- Polarimeter
- UV/Visible Spectrophotometer

Submitted seized materials are identified by presumptive testing (e.g. color tests) and then confirmed using confirmatory techniques (e.g. GC-MS). Gas Chromatograph/Mass Spectrometer (GC-MS) operates on the basis of chemical fingerprinting of drug molecules. Detail of molecular structure of pure substances can be confirmed using Fourier Transform Infrared Spectrometer (FTIR).

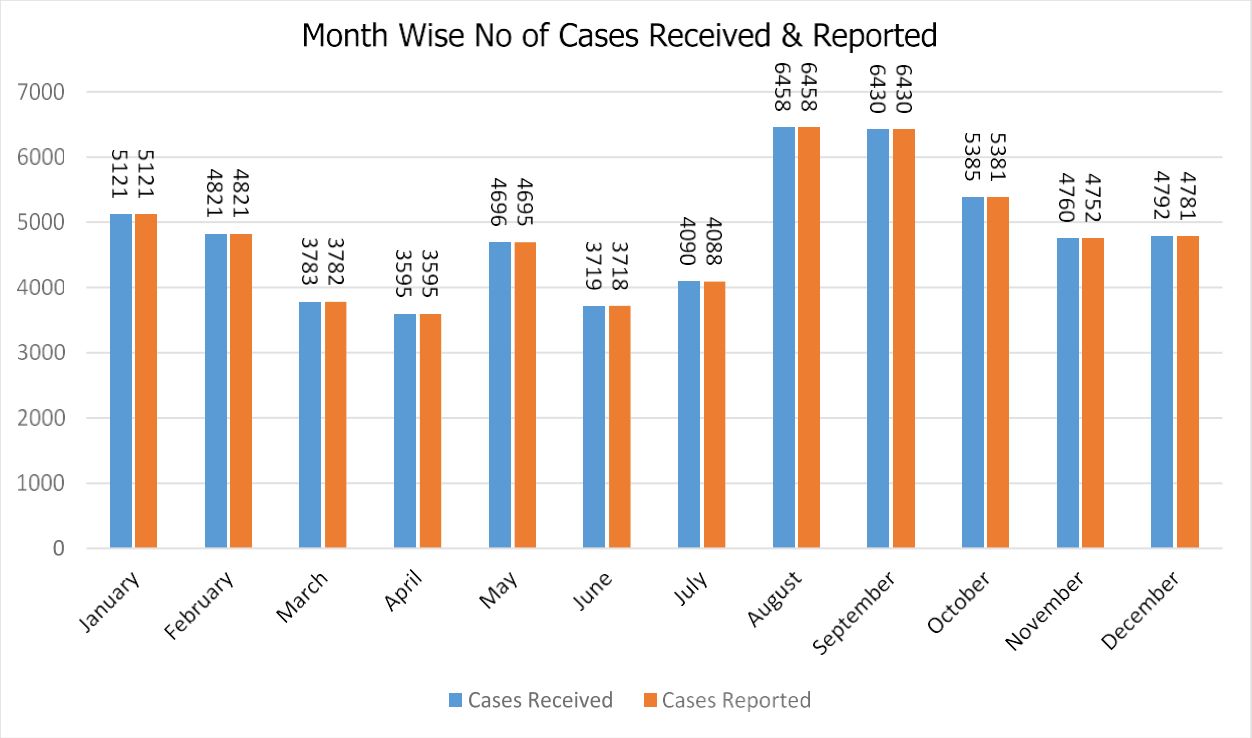
➢ Case Log

Case Log of Narcotics is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	57650
Reports Issued	57622
Incomplete / Closed (Due to non-clearance of discrepancy)	07
Pending	21

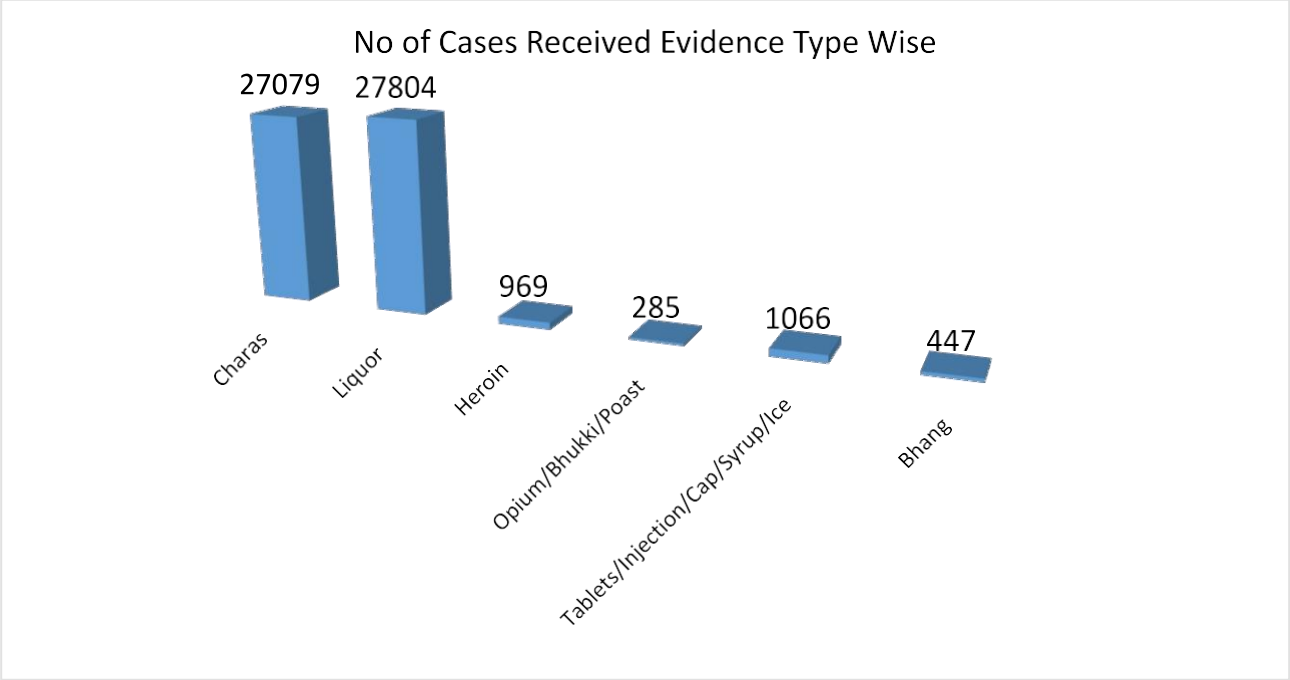
➢ Month Wise Data of Cases

Month-wise data regarding number of cases received and reported during 2023 is shown in the following bar chart.



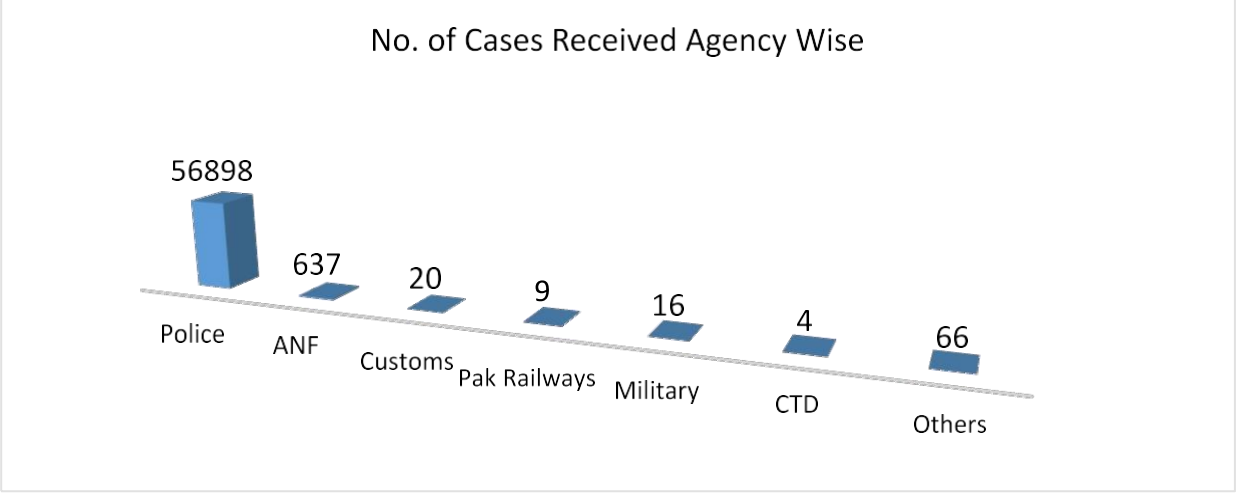
➢ Evidence Type Wise Data of Cases

Classification of cases according to the type of evidence submitted is as under:



➢ Submitting Agency Wise Data of Cases

Classification of cases according to the case submitting agency is as under:



FORENSIC PATHOLOGY & HISTOLOGY (PATH)

Forensic pathology is a fundamental discipline in medico-legal investigations. It entails applying forensic scientific and pathological techniques to determine the cause and manner of death, distinguish between suicide and homicide, assess the nature of injuries including burns, fractures, electric shock, and drowning, whether occurring before or after death. The Forensic Pathology department also determines the cause of death for unidentified bodies and individuals who die in police or law enforcement custody. It handles cases involving sexual assaults, abortions, fetal age determination, and violence against women with specialized expertise.

Forensic pathology primarily focuses on investigating sudden, violent, suspicious, and unexpected deaths.

Services Provided by Forensic Pathology Department

The department of forensic pathology provides the following services:

i) A full fledge autopsy hall is available in department of Forensic Pathology.

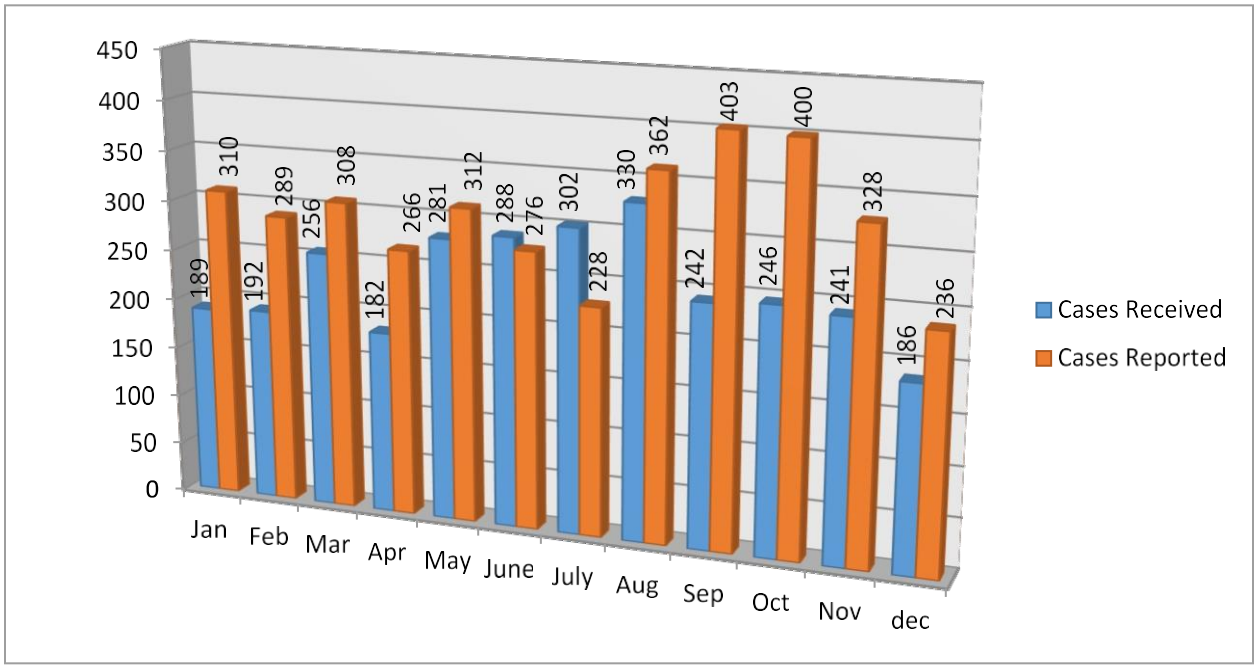
ii) Histopathology lab, equipped with all necessary and latest instruments, provides the histological/ microscopic findings of the tissue specimens taken from the autopsy or the tissue samples received from entire country.

iii) Forensic pathology has two walk-in refrigerators and two walk-in freezers for storage of biological evidence.

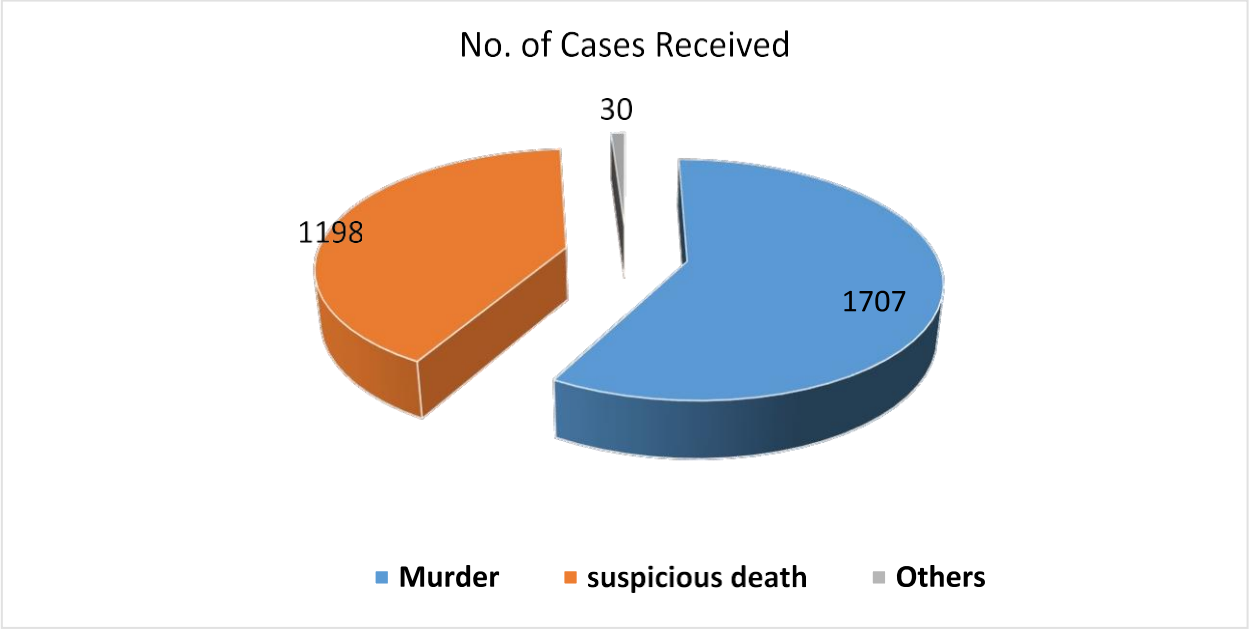
Case log of PATH is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	2935
Reports Issued	3718
In Process	115
Incomplete / Closed	0
Pending	623
NOTE: 1521 extra cases were reported from the backlog of 2022.	

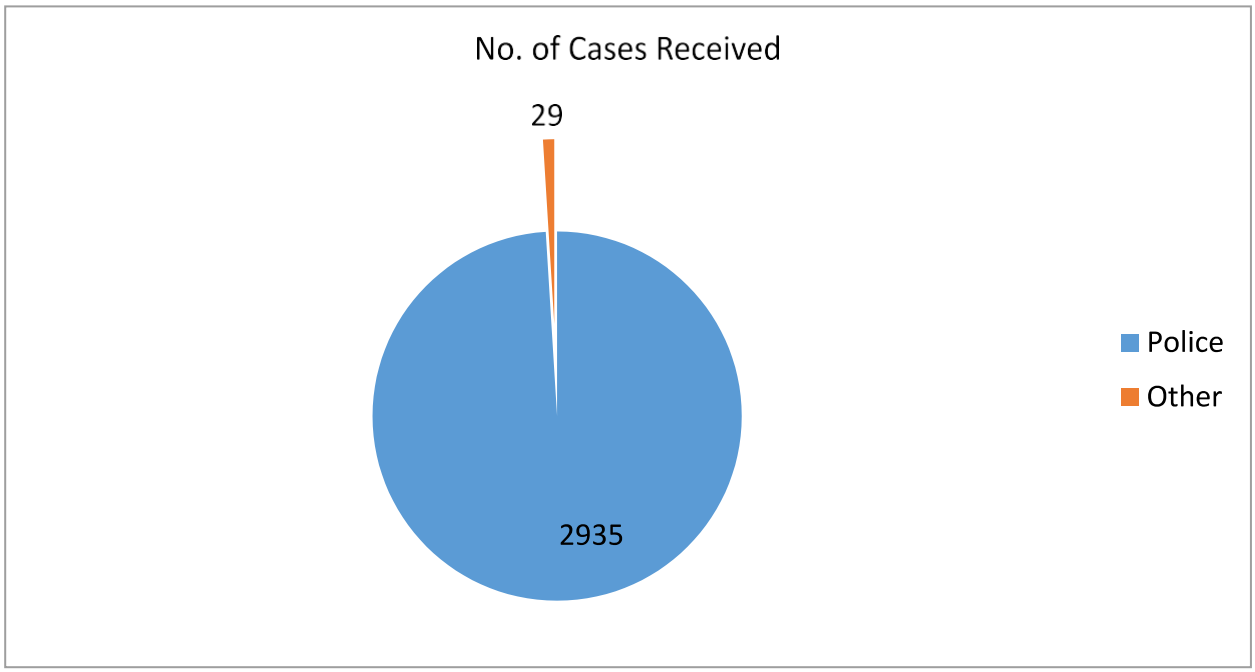
Month wise case receiving and reporting during 2023 is shown in the following bar chart. Reporting was increased by implementing improvement actions which helped clearing the previous backlog:



Classification of received cases can be seen as under:



PATH cases can also be seen with respect to submitting agency:


No. of Cases Received
29
2935
Police
Other

POLYGRAPH EXAMINATION (PGR)

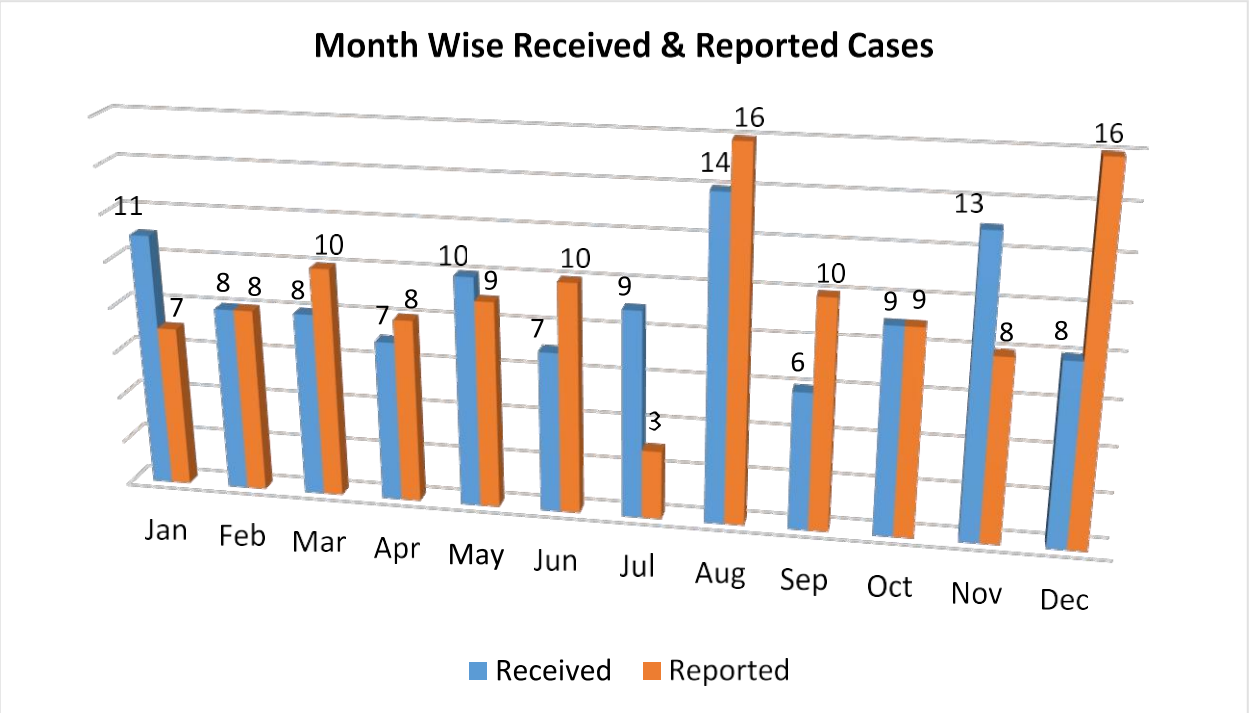
- The polygraph examination is a scientific procedure utilized to evaluate the truthfulness of an individual's statements. Conducting a polygraph examination involves several distinct stages, which include an interview, pre-test discussion, data collection, and analysis. During the examination, physical data from the examinee is gathered using a polygraph instrument and analyzed objectively to determine the outcome. Sensors on the feet and other parts of the body monitor physiological responses to ensure the accuracy of the responses. Examinees respond to a series of questions by indicating either "yes" or "no."
- ***Polygraph testing can be successfully employed in:***
  - i) Criminal Investigations
  - ii) Civil cases
  - iii) Intelligence and Counter-Intelligence activities
  - iv) Pre-employment Testing

Available research suggests that polygraph is 90% reliable technique. *Level of skill and experience of the examiner play an important part in the accuracy of the examination*. Comparative studies have shown that polygraph tests yield an accuracy that equals or exceeds that of many other forms of evidence.

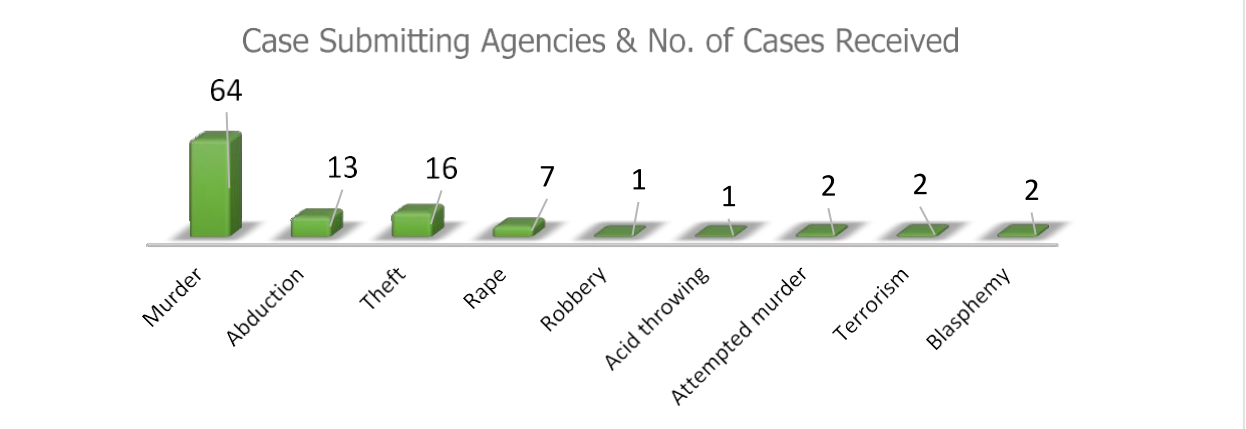
Case log of PGR is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	110
Reports Issued	108
In Process	2
Incomplete / Closed	0
Pending	0

Month wise data of cases received and reported during 2023 is shown by the following bar diagram;



Case classification is shown below according to the evidence submitted:



All cases were submitted by police.

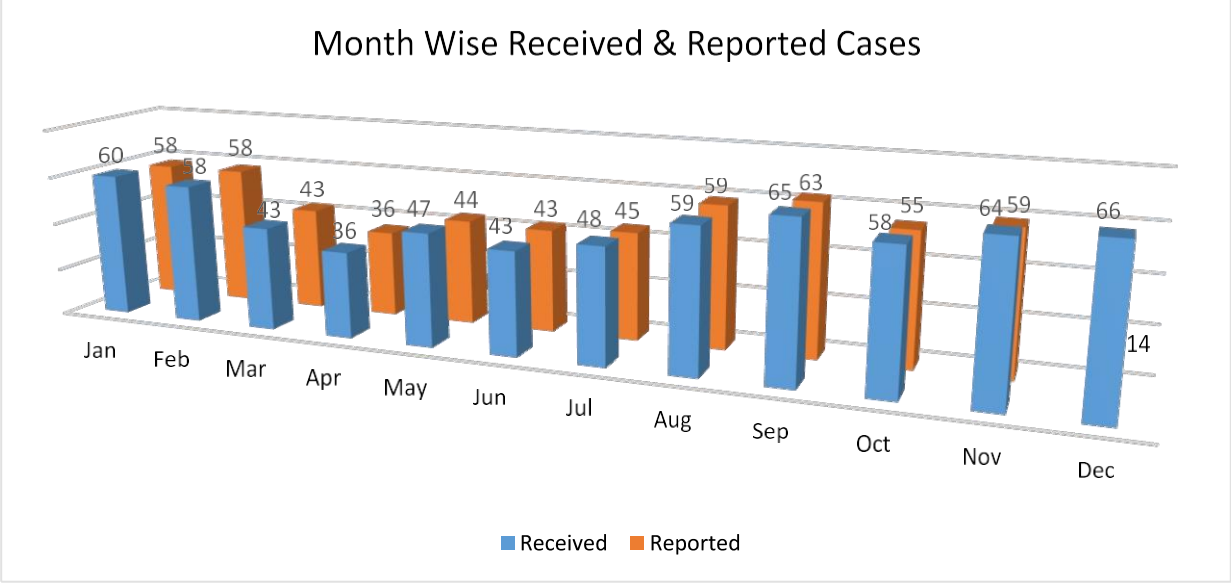
QUESTIONED DOCUMENTS (QD)

Questioned Documents Examination involves the scrutiny of documents that are potentially disputed. The Questioned Documents Section of Punjab Forensic Science Agency in Lahore is tasked with examining documents whose authenticity has been questioned. These examinations include analysis of handwriting and signatures to ascertain their authorship, examination of typewritten text, inspection of altered documents, assessment of indentations on paper, and non-destructive analysis of inks, examination of stamped impressions, examination of counterfeit documents etc.

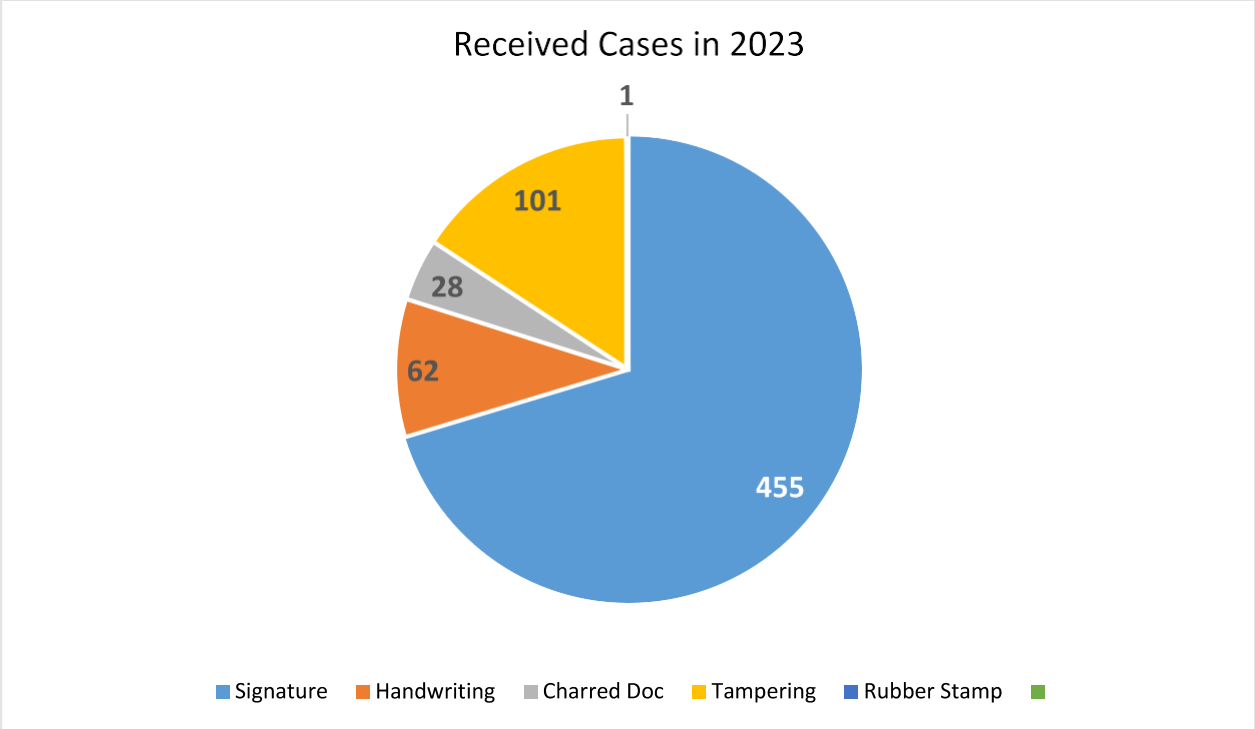
Case detail of Questioned Documents Section for the year 2023 (January 2023 to December 2023) is as follows:

Total No. of Cases received at PFSA in 2023	647
Reports Issued	577
In Process	42
Incomplete Cases (Due to non-submission of case analysis fee and required documents)	28
Pending	0

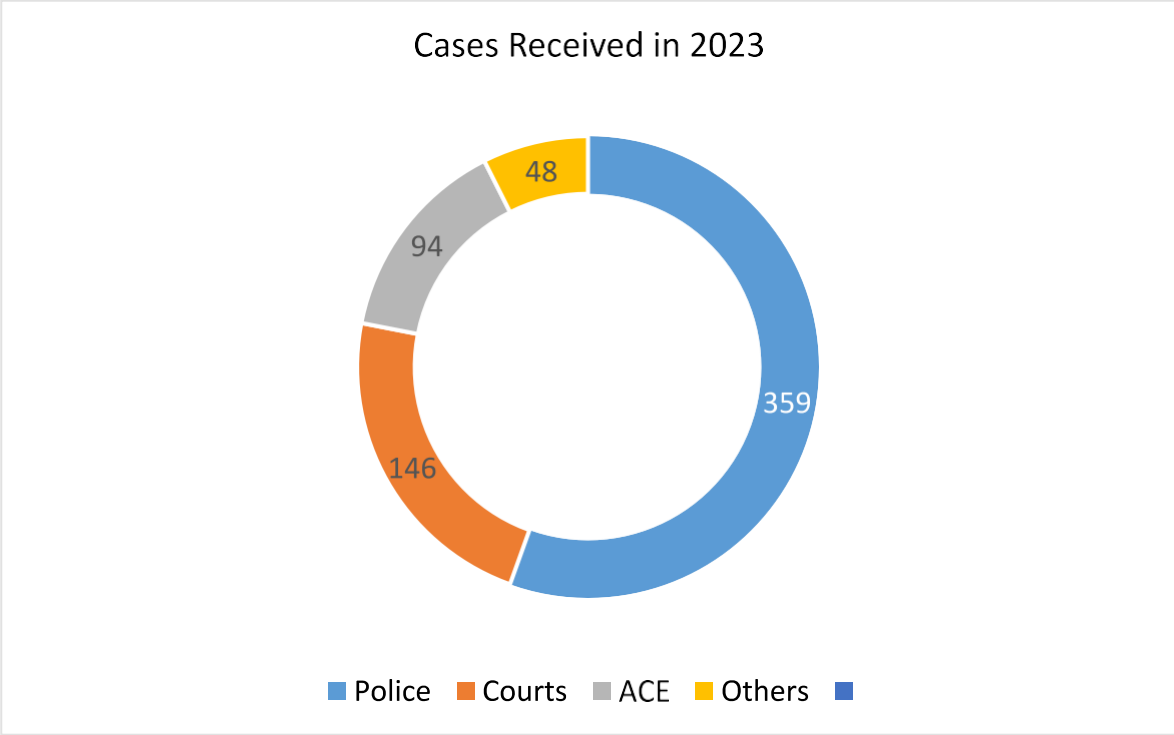
Month wise case receiving and reporting during the year 2023 is shown by the following bar diagram.



Number of cases received based on case type can be seen as under:



Detail of cases received based on submitting agency is as under:



FORENSIC TOXICOLOGY (TOX)

Forensic toxicology is a branch of forensic science dedicated to analyzing drugs, poisons, and other chemicals in biological and non-biological samples to determine their presence, concentration, and potential effects on individuals. This field integrates principles from analytical chemistry, pharmacology, and toxicology to offer evidence and expert opinions in cases involving drug overdoses, driving under the influence, workplace accidents, suicides, and homicides. Forensic toxicologists employ specialized techniques and instruments to identify substances in body fluids, tissues, hair, and other samples obtained from both living and deceased persons. They interpret their findings and present them in legal proceedings or courtrooms.

Adhering rigorously to guidelines set by globally recognized bodies such as The International Association of Forensic Toxicologists (TIAFT), American Board of Forensic Toxicologists (ABFT), Society of Forensic Toxicologists (SOFT), and Toxicology Subcommittee of the Organization of Scientific Area Committees (OSAC), the Forensic Toxicology Department at PFSA maintains the highest standards of proficiency. This commitment ensures that the forensic evidence provided by PFSA is of utmost reliability, thereby playing a crucial role in the criminal justice system. The Forensic Toxicology Department of PFSA has received ISO-17025:2017 accreditation and upholds global standards of excellence in Forensic Toxicology.

Techniques available at Toxicology Department

The analysts working at toxicology laboratory of PFSA, are trained in toxicological analysis, interpretation, court testimony and use of latest instrumentations such as:-

i) Gas Chromatography-Mass Spectrometry (GC-MS)

ii) Gas Chromatography- Triple Quadrupole Mass Spectrometry (GC-MSMS)

iii) Headspace Gas Chromatography-Flame Ionization Detector (HS-GCFID)

iv) Gas Chromatography-Nitrogen Phosphorous Detector (GC-NPD)

v) High Pressure Liquid Chromatography (HPLC)

vi) Enzyme-linked Immunosorbent Assay (ELISA)

vii) Liquid chromatography-Quadrupole Time of Flight Mass Spectrometry (LC-QTOF)

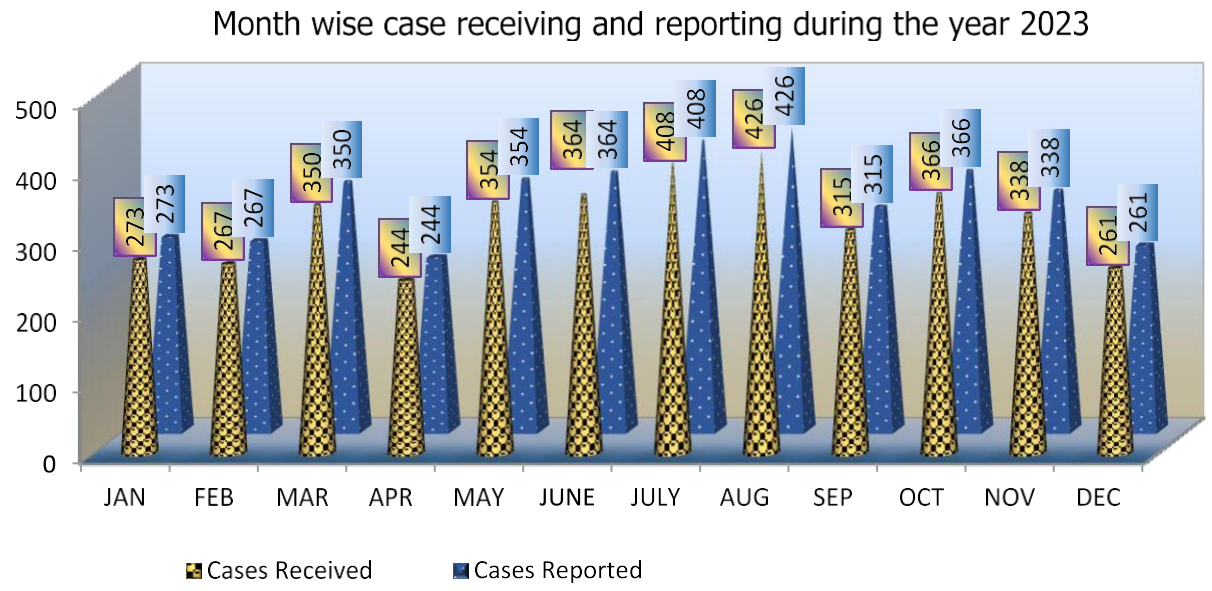
viii) Atomic Absorption Spectroscopy.

ix) Conway Diffusion Technique for carbon monoxide determination.

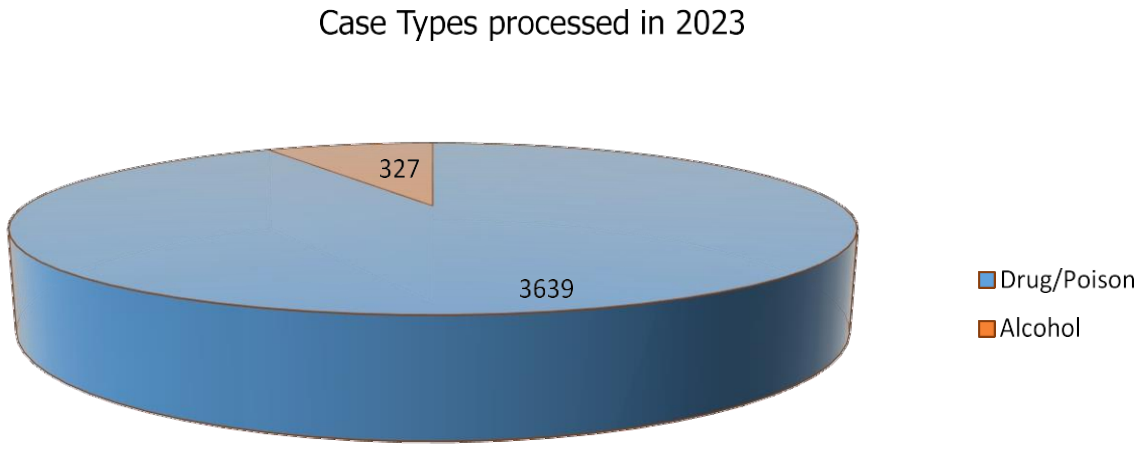
- **Scope of Testing:**
  - Quantitative Analysis of drugs in peripheral blood (i.e. femoral blood)
  - Alcohol Analysis in blood and urine in ante-mortem cases
  - Alcohol Analysis in vitreous humour, blood and urine in post-mortem cases
  - Volatiles analysis (acetone, isopropanol, methanol, toluene, chloroform) in biological samples.
  - Analysis of drugs of abuse in biological samples (blood, urine, gastric lavage/ gastric contents, or liver etc.)
  - Analysis of drugs used in drug facilitated crimes (alprazolam, lorazepam etc.) in blood and urine
  - Analysis of pesticides, blackstone, wheat pills, rat kill pills and cyanide in biological samples
  - Analysis of carbon monoxide in blood.

Case Log of Toxicology is as follows (January 2023 to December 2023)

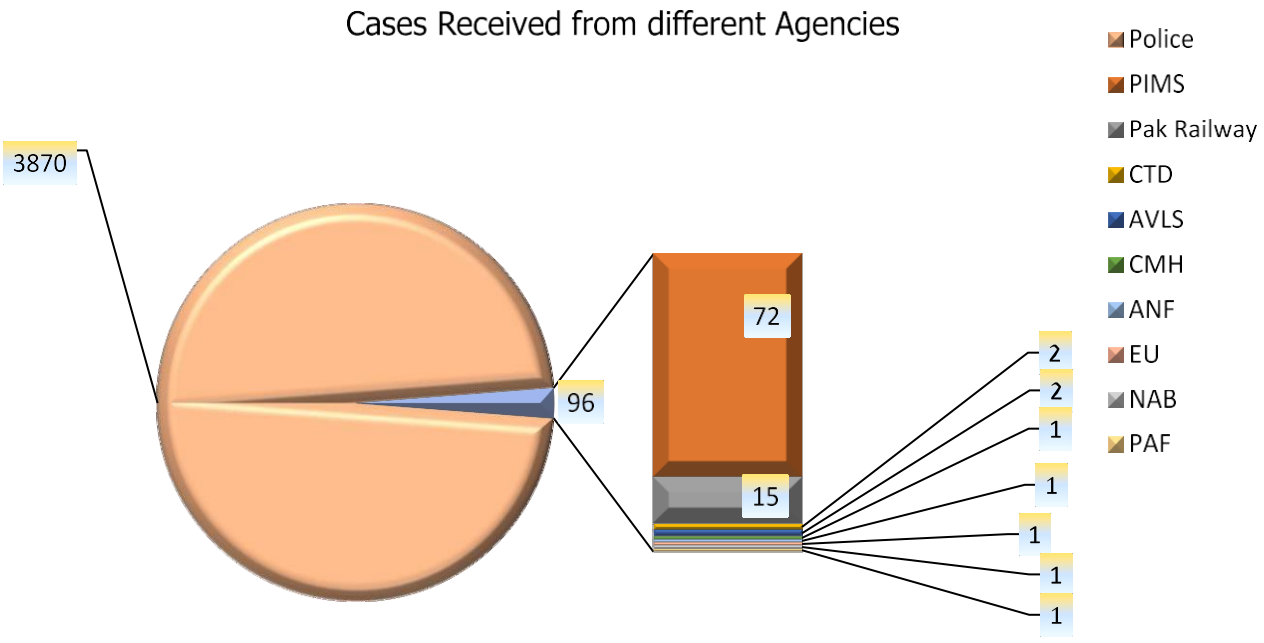
Total No. of Cases received at PFSA in 2023	3966
Reports Issued	3966
In Process	0
Pending	0



Cases classification can be seen as under according to the case types



Details of cases received from different submitting agencies



PIMS: Pakistan Institute of Medical Science
CTD: Counter Terrorism Department
ANF: Anti-Narcotics Force
NAB: National Accountability Bureau

CMH: Combined Military Hospitals
AVLS: Anti-Vehicle Lifting System
EU: European Union
PAF: Pakistan Air Force

TRACE CHEMISTRY (TC)

The Trace Chemistry Department specializes in unraveling the intricate details of crime scenes, employing a meticulous approach to analyze minute fragments such as hairs, fibers, accelerant residues, and remnants of explosives. Our dedicated team of scientists at Trace Chemistry (TC) provides critical insights that assist forensic investigations. Tailoring specialized tests to each material, we uncover their origins and connections to perpetrators, forming the foundation of the investigative process.

At the core of our operations is explosives examination, pivotal in combating terrorism and crime. This examination underscores our commitment to national security by deciphering the chemical composition of explosive materials, offering vital intelligence to law enforcement agencies.

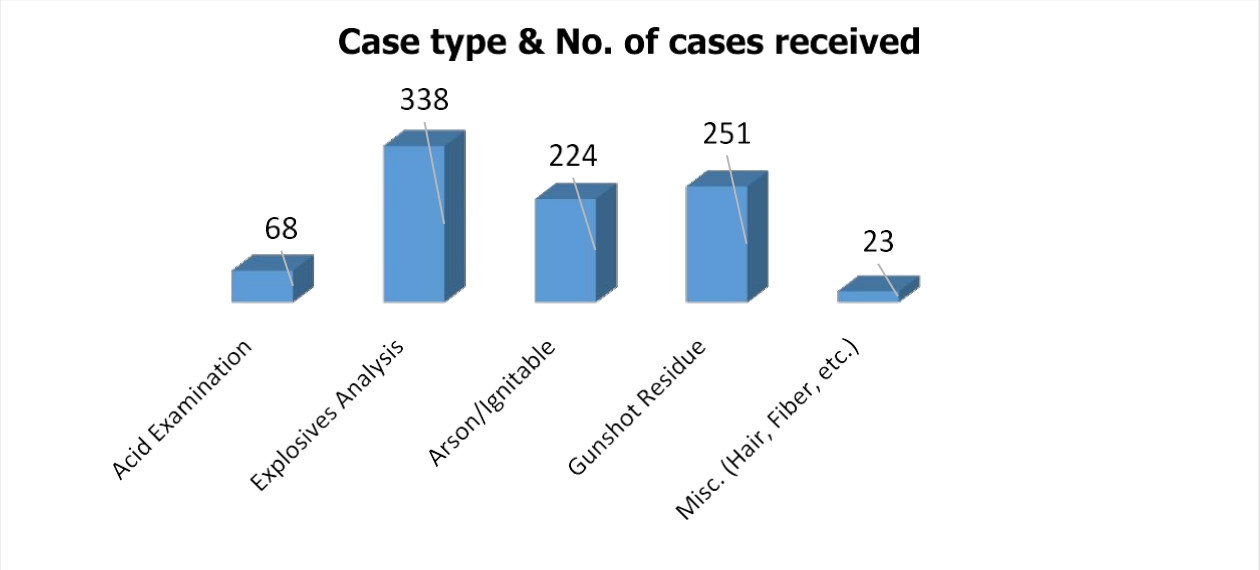
Beyond explosives examination, TC department encompasses a diverse range of forensic analyses including Primer Gunshot Residue Analysis, Fire Debris Examination for traces of Ignitable of Liquids, Acid/Base Examination, Fiber and Cordage Examination, Impression Evidence Examination, Paint Examination, and more. Each analysis is conducted with precision and rigor to ensure no detail escapes scrutiny.

The Trace Chemistry Department stands at the forefront of forensic science, where every trace tells a story, and every analysis brings us closer to uncovering the truth.

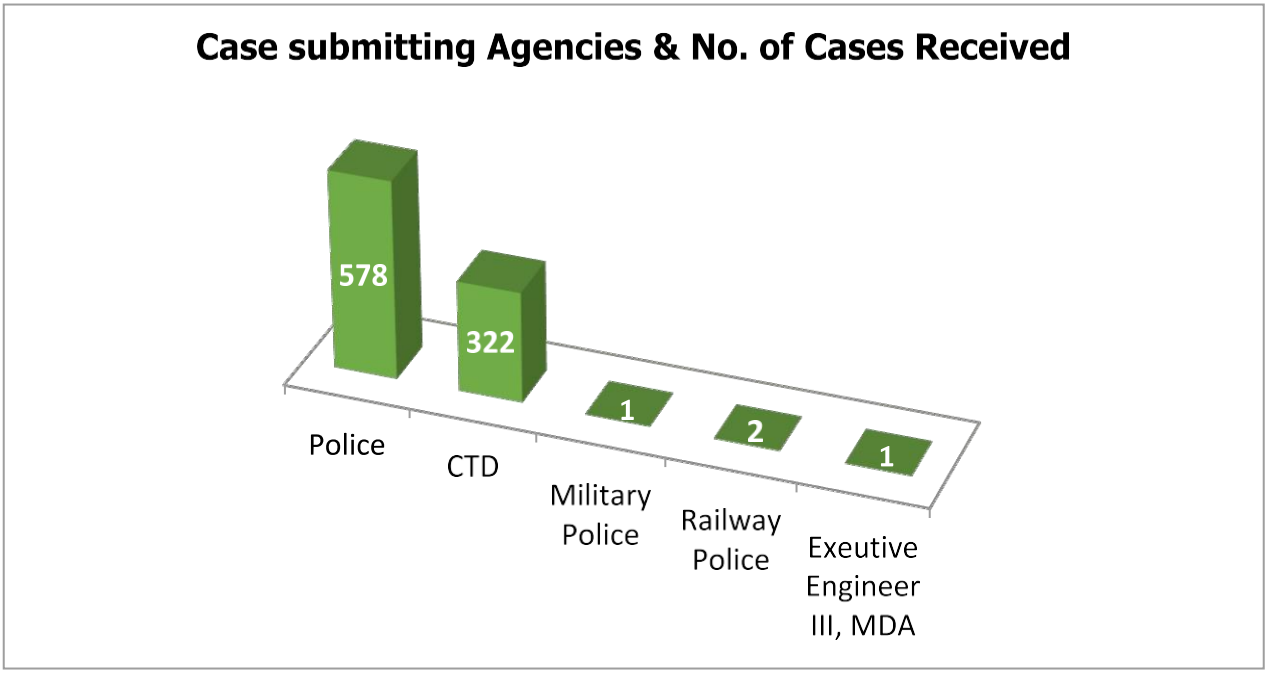
Case log of Trace Chemistry is as follows (January 2023 to December 2023):

Total No. of Cases received at PFSA in 2023	904
Reports Issued	1194
In Process	36
Incomplete / Closed	0
Pending	11
NOTE: 337 cases were reported from the backlog of previous period.	

Cases classification based on test types shown below according to the evidence submitted:



Trace Chemistry cases submitted agency wise in Year 2023:



QUALITY ASSURANCE (QA) MEASURES AT PFSA

ISO/IEC 17025:2017 Implemented

➢ Measures to Ensure Validity of Test Results

PFSA successfully meets all applicable clauses of the standard ISO/IEC 17025:2017 to ensure competence of testing laboratory.

Following are some examples, in addition to many other, of quality control measures taken in different sections of PFSA:

i. Use of the certified reference materials or quality control materials.
ii. Functionality (performance) check(s) of measuring and testing equipment
iii. Use of control charts (e.g. blood drug and blood alcohol quantitation control charts)
iv. Intermediate checks on measuring equipment (e.g. weighing balance)
v. Replicate tests if required using the same or different method (e.g. testing on same sample with two different methods/techniques)
vi. Correlation of the results for different characteristics of an item if necessary (e.g. detection of drug and its metabolite in same blood sample)
vii. Technical and administrative review of cases
viii. Proficiency testing/ inter-laboratory comparison
ix. Implementation of daily quality controls
x. Bi-annual random case file review
xi. Court testimony monitoring
xii. Internal audits

➢ Achievements

Punjab Forensic Science Agency has achieved many objectives during 2023, following

are some examples of such achievements:

1- Published 2 articles (toxicology department) in international journals.

2- PFSA databases are growing and helping in identification of cold cases and unknown criminals. During 2023;

a. Automated fingerprints identification system (AFIS) helped in solving 69 cases with the help of latent fingerprints recovered from crime scenes, this database has biometric record of 348,000 criminals.

b. Automated Ballistic Identification System helped in solving 263 cases involving use of firearms size of database reached to 113,600 entries.

c. DNA Database (54700 profiles) helped to solve 5 blind cases.

3- To facilitate police and other evidence submitting agencies, evidence receiving units established at Sargodha and Rawalpindi satellite stations, more than 13,000 cases received at these stations during 2023.

4- Audio visual analysis scope extended to include digital voice comparison and audio authentication.

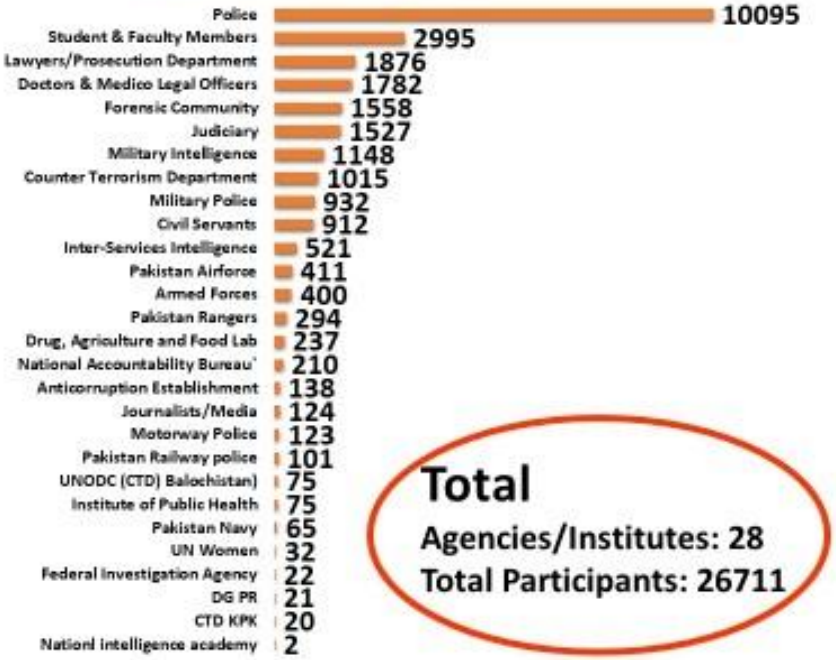
5- PFSA scientists has testified more than 200 times in different courts in 2023. The court officials graded our testimony services as outstanding (44 %), very good (51%) and good (5%). None of the scientists was graded "average" or "poor".

6- PFSA successfully completed Proficiency testing program of Collaborative Testing Service Inc. USA and Inter-Laboratory Comparison program (International Collaborative Exercise) of UNODC.

TRAINING AND AWARENESS-2023



TRAINING AND AWARENESS-2012 through December 31, 2023




PUNJAB AGRICULTURE,FOOD & DRUG AUTHORITY
AREA : 44 KANALS & 9 MARLAS
PROJECT COST : 6.322 MILLION
PROJECT COMPLETION : JUNE, 2020
CENTRE OF FORENSIC SCIENCES
AREA: 70 KANALS & 16 MARLAS
PROJECT COST: 1220 MILLION
PROJECT COMPLETION : NOV, 2019
PUNJAB FORENSIC SCIENCE AGENCY
AREA: 50 KANALS
PROJECT COST: 2.566 MILLION
PROJECT COMPLETION : OCT, 2011
MAIN GATE
CENTRE OF FORENSICS SCIENCE